The Effects of Recent Events and Uncertainty Estimates on Decision Quality

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Introduction

- Although climate change is measured in averages over many decades, people's belief in climate change may be unduly influenced by recent weather events.
- If recent weather is colder people are less likely to believe in global warming than when the weather is warmer (1), this may be because of availability (events that are easier to remember are judged to be more likely; 2).
- The recency of weather events might influence people's climate related decisions making them more ore less cautious than it is warranted (3).
- Uncertainty information might attenuate the effects of recency on cautiousness (4).

Research Questions

The following questions were asked in a lab-based crop-planting decision task, using seasonal climate forecasts.

1. Are people unduly influenced by recent weather events in climate based decisions?
2. Does uncertainty information attenuate effects of recent weather in climate based decisions?

Experiment 1: Method

- ***Task:*** Undergraduate students (N = 208) used a seasonal drought forecast to tell farmers which crop to plant. Then, they rated trust in the forecast and learned the outcome. They made 46 such decisions. Participants received bonus points (virtual $) for successful choices.

	Risky crop Cost:$100	Riskless crop Cost: $200
Yield if No Drought (Net Gain)	**$300** **($200)**	**$300** **($100)**
Yield if Drought (Net Gain)	**$0** **(-$100)**	**$300** **($100)**

Economically Optimal Strategy:
Choose:
- Risky crop when probability of drought ≤ .33
- Riskless crop when probability of drought > .33

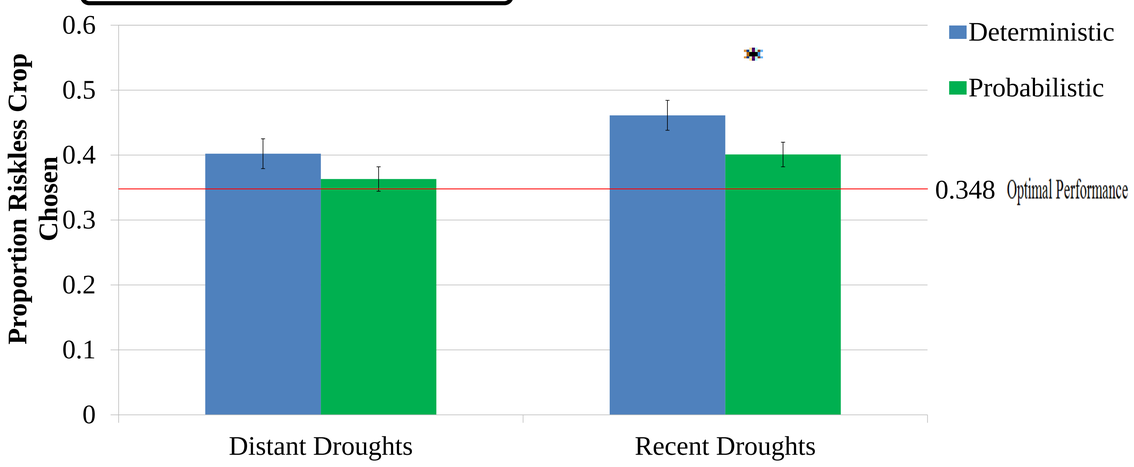
Expected value (EV) of each crop on each trial: (cost) + (yield no drought *probability no drought)

- Goal: Maximize budget by minimizing losses
  - Starting Budget: $1,000
  - Droughts occurred on 14 out of 46 trials

- **Dependent Variable**
  - Crop choices on trials 24-46 (target trials)

- **Independent Variables** (between subjects)
  - Recency:
    - Recent: 7 successive droughts (trials 16-22)
    - Distant: 7 successive droughts (trials 2-8)
  - Forecast:
    - Probability: "X% chance of drought" (varied by trial between 10% & 60%-perfectly calibrated)
    - Deterministic: "Drought projected" (probability of drought > 33) or "Drought no projected" (probability of drought ≤ 33%)

Results 1



- **Recency:** Greater cautiousness in recent than distant condition, F (1, 204) = 4.378, p = .038 (Cohen's D = .293)
- **Forecast**: Reduced cautiousness in probab. than deter. condition, F (1, 204) = 4.606, p = .033 (Cohen's D = .300)
- *Probabilistic forecasts marginally reduced cautiousness in recent droughts condition, p = .066

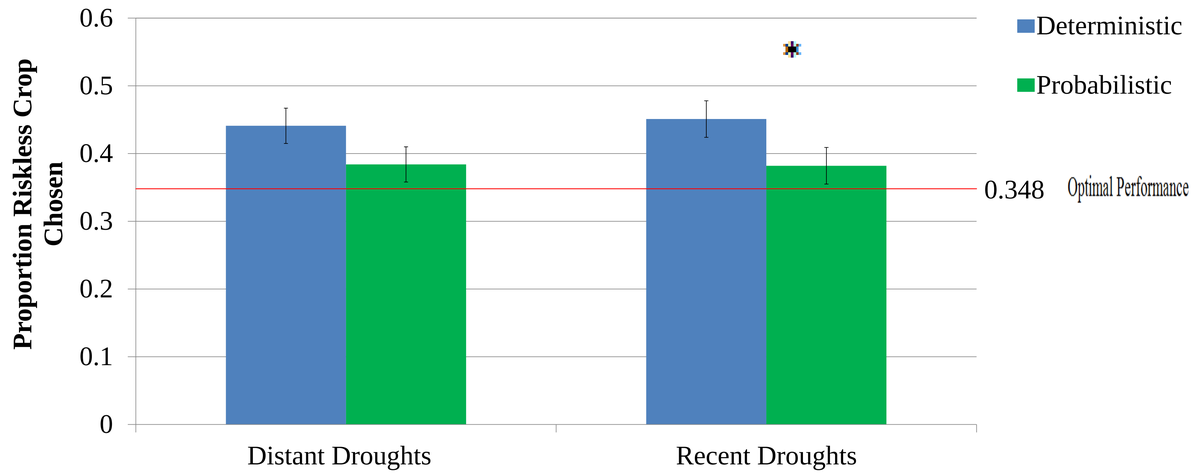
Experiment 2

- Was the greater cautiousness among participants in the recent drought condition in experiment 1 due to availability – recent droughts more accessible to memory – or because they believed that the time and region they were operating in was particularly prone to droughts?

Experiment 2: Method

- Procedure: Identical to Experiment 1 except
  - After trial 23 participants were asked to imagine that for the following trials 5 years had elapsed and that they were operating in a different region.

Results 2



- **Recency:** Greater cautiousness in recent than distant condition, F (1, 636) = 5.579, p = .018 (Cohen's D = .191)
- **Forecast:** Reduced cautiousness in probab. than deter. condition, F (1, 636) = 21.517, p < .001 (Cohen's D = .37)
- * Probabilistic forecasts significantly reduced cautiousness in recent droughts condition, p = .001

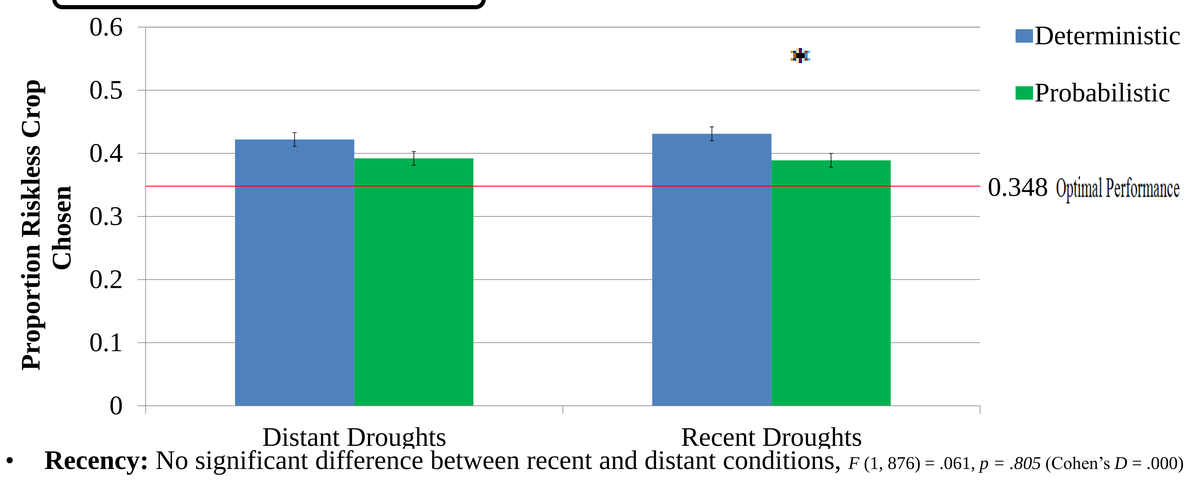
Experiment 3

- The reduction in the effect size in cautiousness in experiment 2 suggests that participants in experiment 1 were operating under the assumption that the time or region they were operating in was particularly prone to droughts.
- Alternatively, the effect of recent droughts on cautiousness could be short-lived such that the reduction in effect size could have been explained by the time required to read and process the information participants were given.

Experiment 3: Method

- Procedure: Identical to Experiment 1 except
  - After trial 23 participants were asked to imagine that for the following trials they were in the same calendar year as before and operating in the same region for a new set of farmer-clients.

Results 3



- **Recency:** No significant difference between recent and distant conditions, F (1, 876) = .061, p = .805 (Cohen's D = .000)
- **Forecast:** Reduced cautiousness in probab. than deter. condition, F (1, 876) = 10.985, p < .001 (Cohen's D = .22)
- * Probabilistic forecasts significantly reduced cautiousness in recent droughts condition, p = .006

Conclusions

- Recent droughts caused users to make more conservative and poorer quality decisions in experiment 1.
- While the result of experiment 2 suggests participants in experiment 1 believed the region and time they were operating in was drought-prone results of experiment 3 did not support this theory.
- Thus, although there is a recency effect on cautiousness the effect might be short-lived. A replication of experiment 1 with a greater sample size might add support to this claim.
- Probabilistic forecasts reduced the deleterious effect of recent droughts on crop choices suggesting that climate-related decisions involving monetary gambles might be helped when uncertainty information is available.

References

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3. Kahneman, D, & Tversky, A (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica, Vol. 47, No. 2*, pp. 263-292.
4. Joslyn, S, & LeClerc, JE (2012). Uncertainty forecasts improve weather-related decisions and attenuate the effects of forecast error *Journal of Experimental Psychology: Applied, 18*, 126-140.