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 it is warmer (1).
- This may be because they think weather is climate. On the other hand it may be due to 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

In a lab-based crop-planting decision task, using seasonal climate forecasts we asked:

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, 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	**$300**	**$300**
(Net Gain)	**($200)**	**($100)**
Yield if Drought	**$0**	**$300**
(Net Gain)	**(-$100)**	**($100)**

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

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

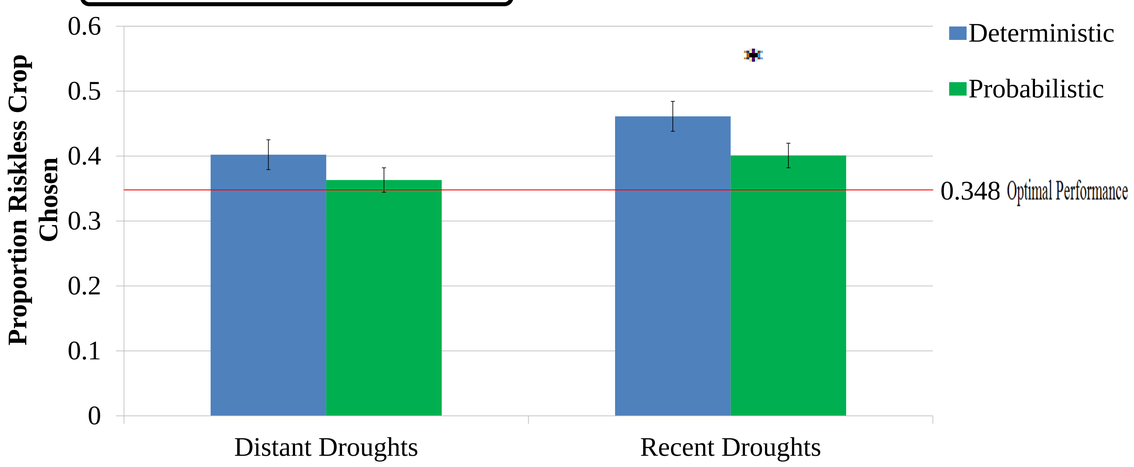
- **Goal:** Maximize budget by minimizing losses
  Starting Budget: $1,000
  Droughts occurred on 14 of 46 trials

- **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 not 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

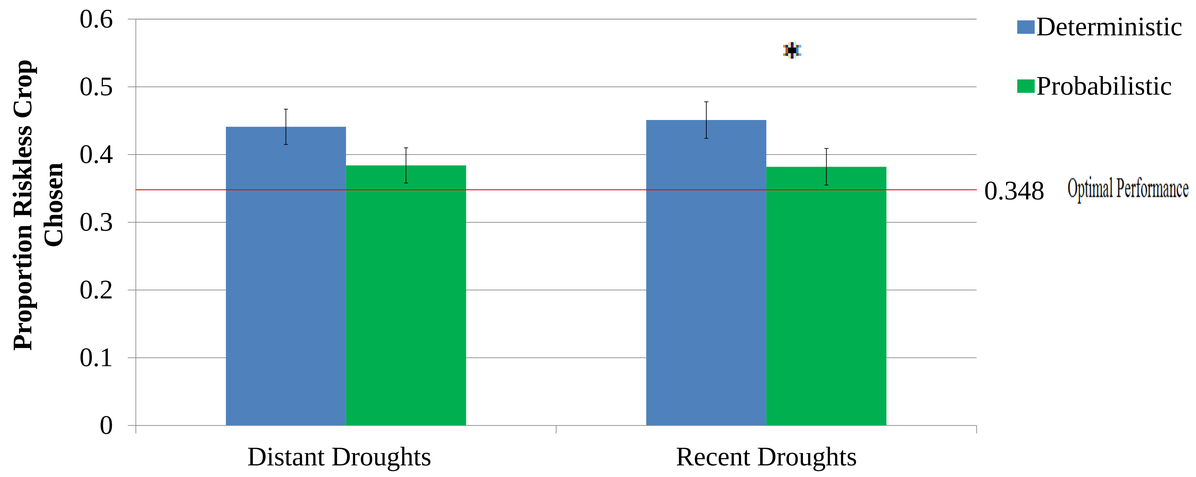
Experiment 2

- Was the greater cautiousness among participants in the recent drought condition in E1 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 (causal reasoning)?

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

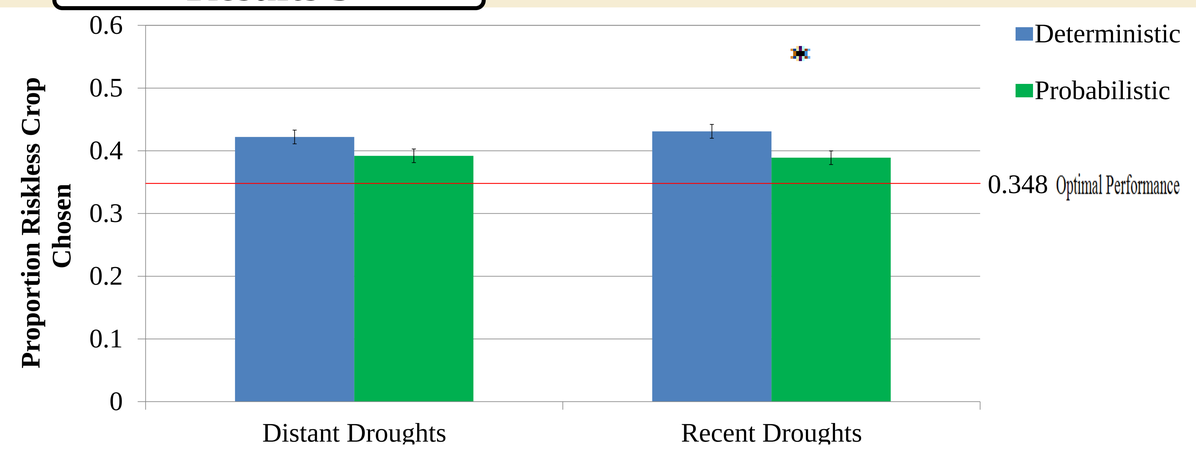
Experiment 3

- E2 suggests the effect of recency persists despite change in time and venue (due to availability, not causal reasoning).
- However the E2 effect size was reduced: Perhaps E1 larger effect due to availability + causal reasoning
- Alternatively, the effect of availability could be reduced over the time of the instruction.

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

- The combined results of these experiments suggest that there is indeed an effect of recent weather events on seasonal climate decisions, causing users to be overly cautious and reducing decision quality.
- However the effect is short-lived and likely due to availability in this experimental paradigm, making droughts seem slightly more likely for a brief period.
- Importantly, probabilistic forecasts reduced the deleterious effect of recent droughts on crop choices suggesting that uncertainty information may improve climate-related decisions.

References

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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.