THE ELLSBERG PARADOX AND THE WEIGHT OF ARGUMENTS

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Standard Approach: Maximize Expected Utility

- Expected utility of an action: the sum of the products of multiplying (1) the probability of each circumstance given an action by (2) the utility for that action

- Maximize expected utility: act so that expected utility is as great as possible.

- If expected utilities of actions are equal, then you should be indifferent.

THE ELLSBERG PARADOX

- Paradox for MEU.

- There is a box with-

  1/3 black balls

  Between 0 and 2/3 green balls

  Between 0 and 2/3 red balls

- There are two choices between bets on a randomly selected ball from the box.

	BLACK	GREEN	RED
A	£100	£0	£0
B	£0	£100	£0

A: "The ball will be black."   **B**: "The ball will be green."

In experiments, most people prefer A to B

	BLACK	GREEN	RED
C	£100	£0	£100
D	£0	£100	£100

C: "The ball will be not be green."   **D**: "The ball will not be black."

In experiments, most people prefer D to C

THE PARADOX

- The EU of betting A is greater than the EU of B iff the EU of C is greater than the EU of D.

- Why A > B?
- Only one possible reason in MEU theory: more likely that the ball will be red rather than green.

- But then why not C > D?

- MEU: combination is irrational

BET A

BET B

BET C

BET D

PROBLEM

Nothing formally wrong or
 intuitively irrational.

Expected utilities CAN be equal.

Conservative solution?

EVIDENTIAL PROBABILITY

- Developed by Henry E. Kyburg (1928-2007)
- Provides a system whereby all probabilities are derived from information about relative frequencies.

- Single probability for given evidence.

- Evidential probabilities can be imprecise.
- When information is imprecise.

SPECULATION AND DECISION

- How do we get a decision-theory with Evidential Probabilities?

- Speculate relative frequency information that is consistent with the Evidential Probabilities.

- Bet *as if* we knew the relative frequencies.

EXAMPLE

- Tossing Gömböc: very imprecise prob.
  - Maybe [0, 1]

- Tossing a 1 euro coin: relatively precise prob.
- Like [0.49, 0.51]

- Many would speculate: 0.5 (1/2)

SPECULATION AND DECISION

There is a pre-theoretical distinction between-

(1) Making decisions based on evidence.

(2) Making decisions based on speculation.

A difference of degrees – measure with Evidential Probabilities.

A tie-breaker *if* expected utilities are equal.

IMPRECISION AS A DECISION TOOL

- Bet with even odds.

- Gömböc or coin?

- Coin, because less speculation.

THE ELLSBERG PARADOX
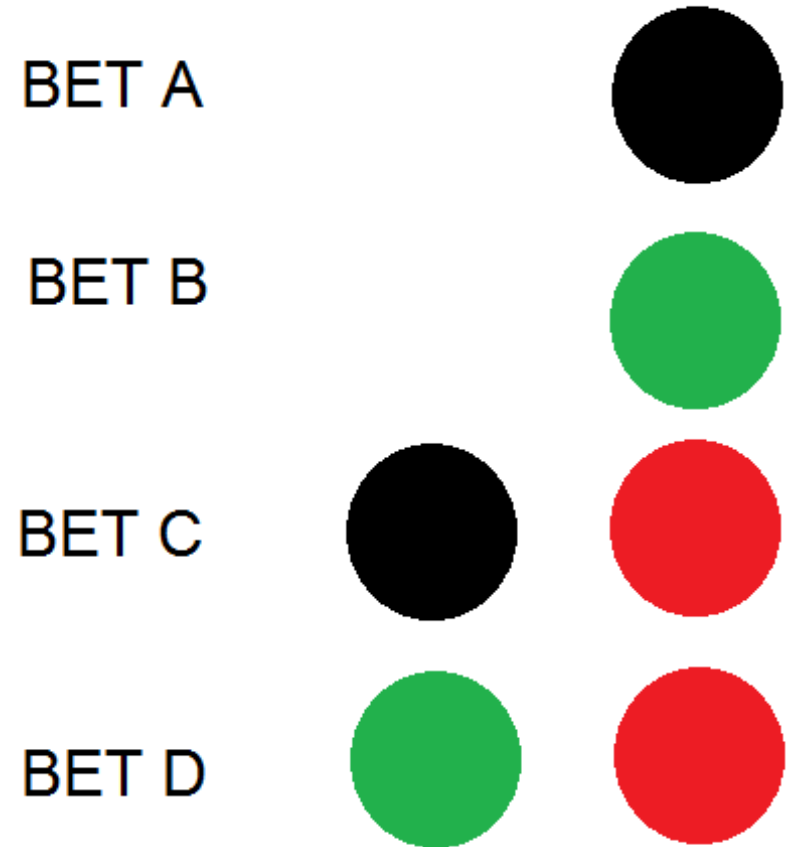
You know that 1/3 balls are black and that [0, 2/3] are green.

You might speculate that 1/3 are green.

EU for each choice is equal.

A is less speculative than B.

D is less speculative than C.

BET A ⚫

BET B 🟢

BET C ⚫ 🔴

BET D 🟢 🔴

WEIGHT OF ARGUMENTS

- John Maynard Keynes: quantity of relevant evidence (in an argument for some action) matters.

- But how?

- It can help us choose when expected utilities are equal.

CONCLUSIONS

A conservative response to
the Ellsberg Paradox?

- Yes.

Is Evidential Probability AND
precise decision theory?

- Yes.

Does the Weight of Argument matter? Sometimes.