

## Actuaries As Humans

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5 December 2008

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### What is it all about?

- How our brains work
- We are still cavemen!
- Errors in probability and forecasting
- Errors in decision making
- Enormous dangers for actuaries



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### Framing

1. Do you get headaches frequently, and if so, how often?  
✓ 2.2 per week
2. Do you get headaches occasionally, and if so, how often?  
✓ 0.7 per week

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## Framing: It really matters

### Surgery

Of 100 people having surgery, 10 die during surgery or the post operative period, 32 die by the end of first year and 66 die by the end of 5 years

### Radiation

Of 100 people having radiation therapy, none die during treatment, 23 die by the end of one year and 78 die by the end of 5 years

44% chose radiation

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## Framing: It really matters

### Surgery

Of 100 people having surgery, 90 live through the post-operative period, 68 are alive at the end of the first year and 34 are alive at the end of 5 years

### Radiation

Of 100 people having radiation therapy, all live through the treatment, 77 are alive at the end of one year and 22 are alive at the end of 5 years

18% chose radiation

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## Insurance

### Option 1

A 100% chance of losing \$50

### Option 2

A 25% chance of losing \$200, and a 75% chance of losing nothing

80% chose Option 2

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Insurance

Option 1

An insurance premium of \$50 to avoid a 25% chance of losing \$200

Option 2

A 25% chance of losing \$200, and a 75% chance of losing nothing

65% chose Option 1

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Anchoring



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Anchoring

1 x 2 x 3 x 4 x 5 x 6 x 7 x 8 512

8 x 7 x 6 x 5 x 4 x 3 x 2 x 1 2,250

40,320

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Anchoring

Price in booklet (\$)	Recommended Selling Price
119,900	117,745
129,900	127,836
139,900	128,530
149,900	130,981

Source: Pious (1993)

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Anchoring and actuaries



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Prospect theory

**Option 1**  
80% chance of winning \$4,000 and  
20% chance of winning nothing

**Option 2**  
100% chance of winning \$3,000

80% choose Option 2

People are risk averse

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## Prospect theory

### Option 1

80% chance of losing \$4,000 and  
20% chance of losing nothing

### Option 2

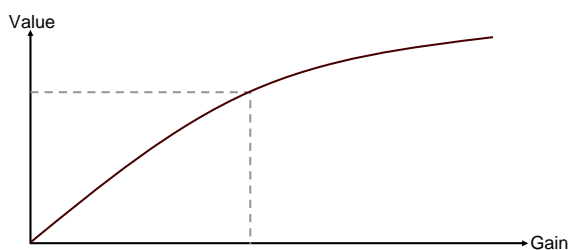
100% chance of losing \$3,000

90% choose Option 1

People are risk seeking where losses are involved

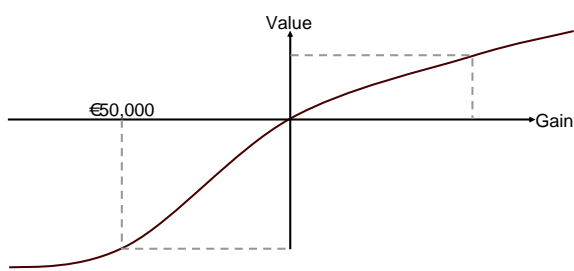
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## Prospect theory



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## Prospect theory



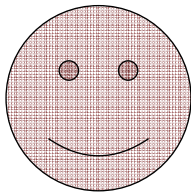
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## Prospect theory

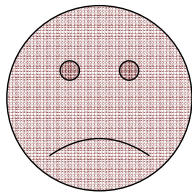
Losses are weighted twice as much as gains

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## Valence



68.2%



57.5%

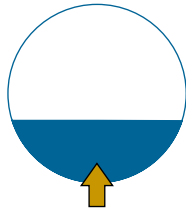
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## Representativeness

- Linda is 31, single, outspoken and very bright. She majored in philosophy. As a student she was deeply concerned with issues surrounding equality and discriminations
- Is it more likely that Linda
  - Works in a bank
  - Works in a bank and is active in the feminist movement

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## Representativeness



90% think it is more likely Linda is here

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## Availability bias



30 times

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## What happen after you have made an estimate?



Confidence of people  
about to place bet  
**3.48**

Confidence of people who  
have already placed bet  
**4.81**

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## How people make choices

- Framing
- Primary – immediate decision
- Recency – later decision

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## Presentation of options



\$169.99

50%



\$239.99

50%

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## Presentation of options



\$169.99

20%



\$239.99

40%



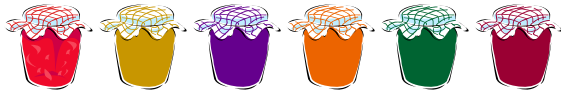
\$469.99

40%

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## Making choices



30%

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## Making choices



3%

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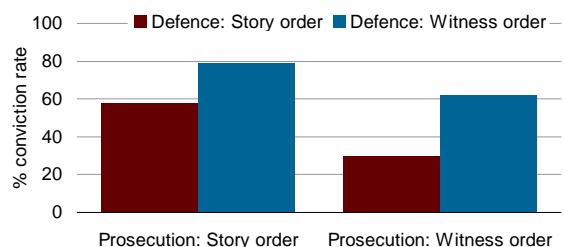
## Overconfidence

### Answers

- Martin Luther King's age at death 39 years
- Length of the Nile River 4,187 miles (6,738 km)
- Number of countries are members of OPEC 13
- Number of books in the Old Testament 39
- Diameter of the moon 2,160 miles (3,476 km)
- Weight of an empty 747 390,000 lb (176,901 kg)
- Birth year of Mozart 1,756
- Gestation period of an Asian elephant 645 days
- Air distance from London to Tokyo 5,959 (9,590 km)
- Deepest known point in the ocean (in feet) 36,198 feet (11,033 m)

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## Stories



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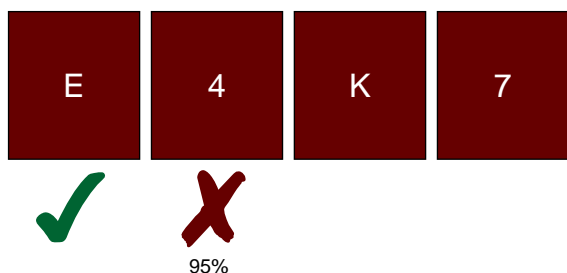
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## Approach to evidence



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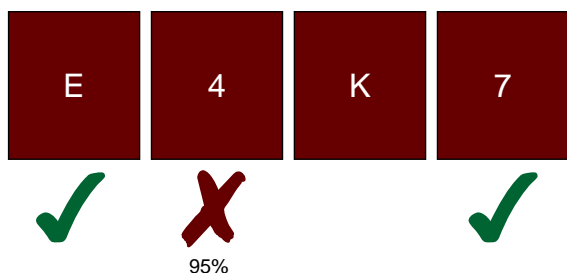
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## Confirmation bias



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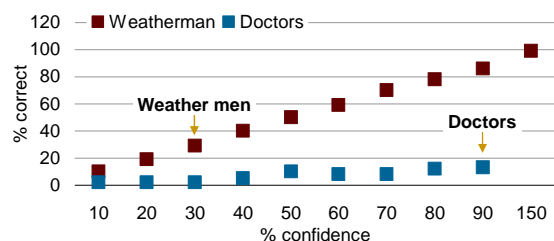
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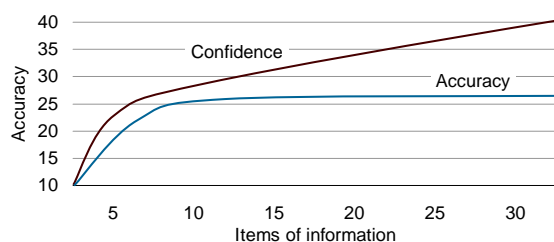
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## Overconfidence



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## Overconfidence



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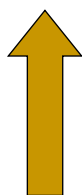
## Self attribution bias

- Good outcomes are our own skill
- Bad outcomes are bad luck

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## Overconfidence

- Difficult ✓
- Low predictability ✓
- Slow feedback ✓



Actuaries may be the worst

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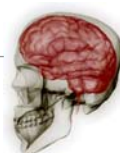
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## Why?

Emotional – System 1



Reflective – System 2



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## Dealing with biases



Let's get a group together

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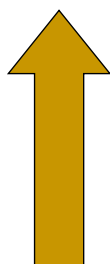
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## The problems of groups

- Confidence
- Framing effect
- Availability heuristic
- Anchoring
- Representativeness



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## Conformity

A

B C D

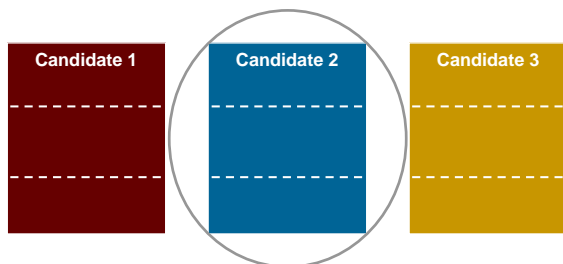
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## Conformity

- 18 rounds
- 12 rounds unanimous agreement on wrong answer
- Only 25% resisted in all rounds

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## The problems of groups – information exchange



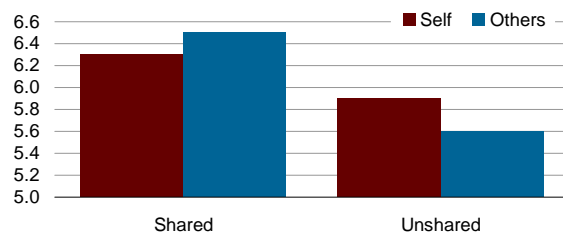
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## Why don't groups share information

- Repetition and discussion
- Social pressure
- Cascades
- Rewards!

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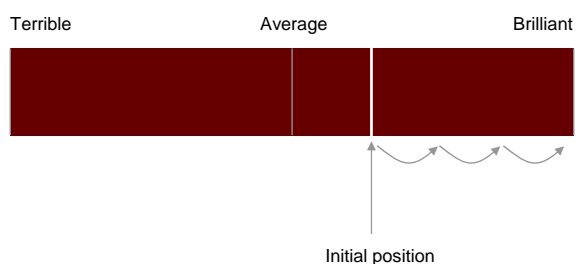
## Social pressure – the rewards for conforming



Source: Wittenbaum et al

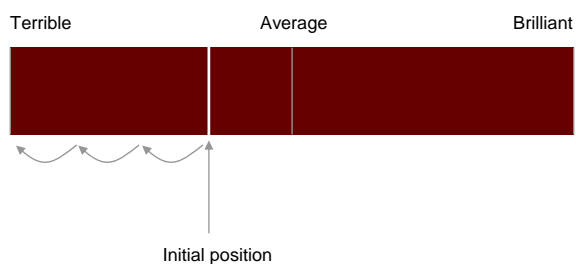
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## Group polarisation



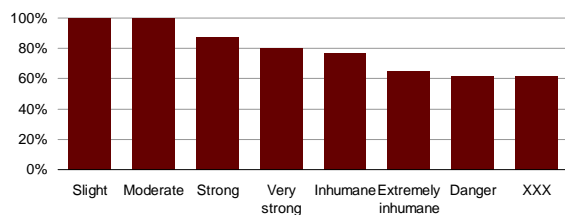
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## Group polarisation



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## The danger of authority: Obedience



Source: Milgram

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International Milgram Studies

Milgram	USA	Obedient at highest level
Milgram		62.5
Ancona et al	Italy	85
Kilham et al	Australia	40
Burley et al	UK	50
Miranda et al	Spain	90
Meeus et al	Holland	92

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Top tips for better decisions

- You know less than you think you do
- Be less certain in your views
- Listen to those who don't agree with you
- Think carefully how information is presented to you and how you present it - NUDGE
- You are overconfident! More experience makes it worse.
- Watch out for anchoring and framing
- We all hate losses more than we like gains
- Focus on facts, not stories
- Groups decisions are not always better

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Remember...



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