

1 ☐ An aside: Overconfidence bias

✓ When is it most likely to occur?

- Accuracy: Lichtenstein & Fischhoff (1977)
 - Greatest when accuracy is near chance (50%).
 - It's more likely with general knowledge questions of moderate or extreme difficulty.
 - Diminishes when accuracy increases up to about 80%.
 - People become slightly underconfident when accuracy increases even higher.
- Sample size: Griffin & Tversky (1992)
 - Overconfident with small sample sizes
 - Underconfident with large sample sizes

2 ☐ Overconfidence bias: *when*, cont.

✓ Base rate: Griffin & Tversky (1992)

- Overconfident with low base rates
 - Low base rates should make it unlikely that the outcome will occur unless there is a lot of confirming evidence, but people ignore base rate.
- Very underconfident with high base rate
 - High base rates should make it very likely that the outcome will occur unless there is a lot of disconfirming evidence, but people ignore base rate.

3 ☐ Overconfidence, cont.

✓ Robust across response modes.

- Doesn't matter whether you use percentages, verbal ratings, 95% intervals, or odds – people still show overconfidence.

✓ Who isn't overconfident?

- People with lots of training and who have received accurate feedback.
 - Weather forecasters
 - But, only if trained in probability forecasting (Daan & Murphy, 1982)
 - Oddsmakers in sports

4 ☐ Overconfidence across domains

✓ Note – physicians, psychologists, jurors, automobile mechanics, geotechnical engineers, nuclear regulatory commission, NASA engineers, economists predicting a recession, *inter alia*, all show overconfidence (e.g., Lawrence et al, 2006).

- In some of these domains (e.g., engineering, recession prediction), event is so rare that there are few opportunities to calibrate one's judgments.
- In others, failure is not immediately obvious (patients improve even when you're wrong).

5 ☐ How do you decrease overconfidence?

✓ Extensive training with feedback

- Note: outcome feedback doesn't help if lots of randomness in outcomes (“chasing noise”); running averages may work better.

✓ But, some limited studies have shown that considering reasons why you might be wrong helps.

- Careful in interpretation of these studies – could be due to demand characteristics.

6 ☐ Overconfidence - Summary

✓ People are overconfident in their judgments of their own knowledge/expertise.

✓ Overconfidence is highest when data is limited (small sample size, low base rate, low

knowledge, low validity of source).

- ✓ Small degrees of underconfidence occur when data is extensive (large sample size, high base rate, high knowledge, high validity of source).
- ✓ Extensive calibration training reduces overconfidence.

7 ☐ Behavioral traps

- ✓ A behavioral trap is a situation in which you begin a promising course of action that later proves undesirable.
 - It's a trap when it's difficult to escape from this course of action.

8 ☐ A Taxonomy of traps

- ✓ Ignorance traps
 - Deterioration traps
 - When to bail when things go south?
 - Probability discounting
 - Certain smaller vs. uncertain later.
- ✓ Time delay traps
 - Sooner smaller vs. Larger later.
- ✓ Investment traps
 - Don't throw good money after bad.
- ✓ Collective traps
 - What's good for you in the short run may prove problematic for the collective in the long run.

9 ☐ Ignorance traps

- ✓ This occurs when one can't foresee the consequences of an action.
 - Your stocks may go up or go down.
 - A course turns out to be less interesting or relevant than you thought.
 - A game you bought turns out to get old very quickly.
 - A stock doesn't do as well as you had hoped.
- ✓ In essence, a choice involves uncertainty but not necessarily probabilistic.
 - Hence, the issue is more general than (but related to) the earlier issue of *certainty effects* and probability.

10 ☐ Types of Ignorance Traps

- ✓ Choice between A of known value vs. B of uncertain value.
 - B's value may be uncertain due to little knowledge.
 - E.g., you honestly don't know the *true* value of a stock, relationship, degree, business plan.
 - No known research on this topic.
 - B's value may be uncertain because your situation and/or opinions may change.
 - Deterioration Trap
 - B's value may be uncertain because the outcome is probabilistic.
 - Probability discounting

11 ☐ Deterioration traps

- ✓ Costs and benefits change over time
 - Change is gradual – starts out looking good but then deteriorates.
 - Question – when do you bail?
- ✓ Examples
 - Drug use
 - Dot-com stocks
 - Relationship goes downhill
 - Work more or retire early

- ✓ Two relevant laboratory methods
 - Progressive schedules of reinforcement
 - Foraging

12 ☐ Progressive schedules

- ✓ Two reinforcement schedules in place, one of which starts out better and then gets progressively worse, other has fixed payoffs.
 - Question - when to switch?
 - Typically, scientists only report “steady state” behavior (e.g., Wanchisen et al., 1994; Hackenberg & Axtell, 1993).
 - Steady state occurs once they know the payoff schedules and people approximate normative behavior.
 - Need to know early choices while ignorant of payoffs.

13 ☐ Foraging

- ✓ Involves resource collection across “patches”
 - One patch is richer - what happens when it starts to become depleted? When do you switch and try another patch with unknown resource richness?
- ✓ Very little human work in this domain
 - Again, scientists usually only report steady state behavior.
 - Pirolli (2005) information foraging on the web
 - When will people terminate a search and use different key words?
 - Goldstone et al. (2005) and Goldstone & Ashpole (2004): Human foraging for patchy resources in a virtual environment.

14 ☐ Probability discounting: When the future is uncertain

- ✓ Example: Would you rather have \$10 with certainty or \$15 with 80% likelihood?
 - Interestingly, the task is the same as that typically studied using prospect theory.
 - Probability discounting describes uncertain outcomes as “discounted” due to their uncertainty.
 - However, the nature of the discounting is different from that offered by prospect theory.

15 ☐ Hyperbolic probability discounting (Green & Myerson, 2004)

- ✓ Where v is the discounted value, V is the value of the reinforcer, Q is the odds against the reward $[(1-p)/p]$, and h is a constant determining the degree of discounting.

16 ☐

17 ☐ Probability Discounting...

- ✓ Yes, people prefer certain to uncertain outcomes.
- ✓ Yes, uncertain outcomes are discounted
- ✓ The reason why studies of probability discounting don't show the certainty effect at the low end may be due to:
 - They only compare certain to uncertain, not one uncertain to another uncertain.
 - Lowest probabilities examined are $> 5\%$
 - Uncertain outcomes have higher values in typical discounting task (\$10/100% vs. \$20/50%), and prospect theory's value equation decreases the larger value more.
 - They plot using an “odds” x-axis which hides the downturn.

18 ☐ Time delay traps

- ✓ Immediate small rewards vs. Later larger rewards.
 - Dieting, drug use, exercise, studying, condom use, premarital sex, credit cards....
 - It's a time delay trap only when the future reward has a known value (otherwise it's an ignorance trap).
- ✓ Note the power of temporal contiguity in judging the consequences of an action.

- It's easier to identify the cause of an effect when the cause and effect are temporally contiguous.

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20 Mazur's formalization of temporal discounting

- ✓ Where v is the discounted value, V is the value of the reinforcer, d is the delay between choice and reward, and k is a constant determining the degree of discounting.

21 Temporal discounting

22 A Novel Preparation: Deciding when to “cash in”

- ✓ In prior work on delay discounting, participants faced with choice between smaller sooner and larger later.
- ✓ In an alternative task, outcome is gradually improving and participant must decide when to cash in (Young, Webb, & Jacobs, in prep).
 - Video game players used a weapon that “charged up” at different rates.
 - Impulsive behavior - shooting sooner rather than later (shorter median IFIs).
 - Charge rate either discouraged or encouraged impulsive behavior.

23 Recharge functions

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25 Economic impact for individuals and groups

- ✓ Individuals
 - Failing to get a good education
 - Failing to invest for retirement
 - Credit card use
- ✓ Corporations
 - Failure to invest in research & development
 - Failure to invest in personnel development
 - Failure to invest in infrastructure

26 Differences in discount rates

- ✓ Heavy drinkers discount more rapidly
 - (Petry, 2001)
- ✓ Smokers discount more rapidly
 - (Bickel et al., 1999)
- ✓ Heroin addicts discount more rapidly
 - (Kirby, Petry, & Bickel, 1999)
- ✓ Elderly discount more slowly
 - (Green, Fry, & Myerson, 1994)
 - This occurs even though the future is more uncertain for them!

27 Investment traps

- ✓ Honoring sunk costs
 - You and a friend have made a nonrefundable \$100 deposit on a condo for the weekend. As you begin to drive you both admit that neither of you are in the mood to go and would find

staying home more enjoyable. Would you still go so that you wouldn't *waste* the \$100?

- Let's rephrase - Would you rather spend \$100 to be where you didn't want to be or where you wanted to be?

28 ☐ Sunk costs are costs already incurred and not refundable.

✓ *Decisions to put more money or time toward an endeavor should not consider sunk costs!*

29 ☐ Example 1

- ✓ The completion of the Tennessee-Tombigbee Waterway Project was under discussion in Congress. Two senators were quoted as saying that terminating project in which \$1.1 billion has been invested would be a waste of funds.
- ✓ But, both senators agreed that value of the project, if completed, would be *less than the money yet to be spent completing it*.

30 ☐ Assessing future value

- ✓ Stress is on making decisions based upon the future value of that decision, not on the past.
 - Future value may include more than just money.
 - The perceived impact on the political careers of the senators involved can also enter into the decision.
- ✓ Future costs and value are assumed known.
 - Otherwise, it is an ignorance trap.

31 ☐ Example 2

- ✓ Consider Vietnam. Barry Goldwater as Sec of Defense wrote: "We could not simply walk away from an enterprise involving two administrations, five allied countries, and 31,000 dead as if we were switching off a TV channel."

32 ☐ Example 2, cont.

- The kindest interpretation is that because the leaders of other nations honor sunk costs, the US would have suffered a severe blow to its prestige if it failed to do so.
- If indeed abandonment of sunk cost negatively affects reputation then it may be wise not to do so.
 - Reputational damage, however leads to *future* problems, and it is only with respect to such future consequences should sunk costs make a difference.

33 ☐ Example 3

- ✓ Consider grad school. A student has been in grad school for 7 years, is deep in debt is still floundering and has come to the conclusion that she doesn't really want an academic career or any career for which the PhD is necessary.
 - Does she leave or honor sunk costs?
 - Only if she considers the impact to reputation great enough should she honor sunk costs.

34 ☐ Arkes & Ayton (1999)

- ✓ They found that humans honor sunk costs, but animals do not!
 - I guess once again, lower animals are smarter than us...
- ✓ Why?
 - They propose that people are overgeneralizing the rule "waste not, want not."

35 ☐ Rule use

- ✓ There is a lot of evidence that people try to extract general, verbal rules or hypotheses and then apply them to novel situations.
- ✓ But, the use of rules or hypotheses can be detrimental to performance in some circumstances (Weir, 1964; Jacobs & Potenza, 1991; Rosenfarb et al, 1992).

36 ☐ Rosenfarb et al. (1992)

- ✓ Told one group to form rules during learning, gave one group rules, and said nothing to the third group.
- ✓ When the contingencies changed, the rule groups were very slow to respond by changing their own behavior.
 - Children, who have less sophisticated rule learning skills, are less susceptible to honoring sunk costs than adults.

37 ☐ Summary

- ✓ In making judgments one *should* only consider future costs and future benefits.
 - But, costs may need to be defined broadly enough to include reputational damage.
- ✓ Sometimes a lack of sophistication is best!

38 ☐ Collective traps

- ✓ Traps involving group behavior
 - Sometimes, only thinking about yourself undermines what is best for the group
- ✓ Examples
 - The prisoner's dilemma
 - The tragedy of the commons
 - Aka "N-person prisoner's dilemma"

39 ☐ The prisoner's dilemma

- ✓ Situation: two suspects caught.
- ✓ Dilemma – confess or not to confess (rat on your partner or not?).
 - Confession guarantees your punishment won't be too bad.
 - If you don't confess and your compatriot does, then you're up a creek.
 - But if both keep quiet, you're free.
- ✓ Best option – both keep quiet.

40 ☐ Prisoner's dilemma - table form

Your sentence would be...

41 ☐ Temptation to defect for both parties creates the dilemma

- ✓ It's rational for you to confess (defect) to minimize the average sentence if possibility of partner confessing (defecting) is high enough
 - Greater than 67% for the table shown previously.
- ✓ Ignorance about partner's tendency actually improves cooperation (Shafir & Tversky, 1992)
 - When subjects told...
 - partner defected, 97% of subjects then defected;
 - partner cooperated, 84% still defected;

- it isn't known what partner did, only 63% defected.

42 ☐ The tragedy of the commons

- ✓ There's a shared resource.
 - If everyone plays fair, everyone benefits.
 - But, if you are the only cheater, you benefit more (in the short run) than if you played fair.
- ✓ Social norms or laws typically arise to prevent people from being self-serving.
 - Butting in line, cheating on your insurance, copying software or music, not taking care of your lawn.

43 ☐ Tragedy of the commons as a multi-player prisoner's dilemma

- ✓ If everyone cooperates, all benefit.
- ✓ But, if one defects and others cooperate, then the defector benefits more than the others.

44 ☐ The problem of immediacy again

- ✓ An additional feature of some commons dilemmas is that the benefits of defecting are immediate and the costs to others are in the future.
 - This compounds a collective trap with a time delay trap.

45 ☐ Tragedy in the real world

- ✓ Examples
 - Pollution control
 - Overfishing
 - Overgrazing
 - Ozone depletion
 - Foreign aid
 - Trade - free trade vs. tariffs
 - Political campaigns - go negative?
- ✓ Solution?
 - Laws to preserve the greater good and punish the defectors
 - But, laws must be fairly applied and enforcement costs the collective - there's the rub

46 ☐ How to escape the traps

- ✓ Make future outcomes more immediate by vividness, elaboration, etc.
- ✓ Make probabilistic outcomes more certain by aggregating across many such decisions.
- ✓ Establish a limit ahead of time.
 - How much money you're willing to lose in stocks/gambling.
 - Minimum grade in a class before you decide you should drop.
- ✓ Create structure to limit choice
 - For example: Laws, No Internet access, Don't install video game on computer

47 ☐ How to escape, cont.

- ✓ Evaluate current decisions afresh – ignore the past (sunk costs).
 - If you can't forget the past, you're doomed to repeat it.
 - You may need a second decision maker who is not invested in the sunk costs.
- ✓ Consider overall good (e.g., for society), not just what's best for you.
 - Stable societies will provide lots of future good outcomes for you.
 - Thus, serving the collective can be best for the individual - selfishness still can motivate better behavior!