Context, Experience, and Feelings: Proximal Drivers of Adolescent Reasoning and Decision Making

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Proximal Drivers of Decision Making

- Context ➔ Perception/Recognition
- Experience ➔ Memory/Habit
- Feelings ➔ Affect/Motivation

Primarily automatic ➔ System I

Higher Order Cognition: Optional
The Case of Day-to-Day Choice

Assumptions:
• Uncertainty-Control Interactions
• Risk $\rightarrow$ both threat and potential

Test case: incremental, easily quantified, immediate outcomes
The Case of Day-to-Day Choice

Demonstration:
Even with randomly determined outcomes

• Different strategies evoke different amounts of higher order cognition
• Higher cognition affords greater control and more opportunities
Passive Choice: Which Option Do I Take?
Active Goal Trajectories: Where Do I Go from Here?
Higher Order Cognition and Choice

Option-focused Choice – Reactive/Passive
- Assumes simultaneous appearance of two or more possible future states
- Control through selection of best option

Goal-focused choice – Proactive/Active
- Assumes self-initiated action focused on identifying advantageous future states
- Control through intervention aimed at improving current state
Simulation Study of Risky Choice Strategies

- 120,000 virtual participants per strategy
- Each participant experienced 36 events involving choices between pairs of two-outcome gambles
- 50/50 odds; mix of negative, mixed, and positive pairs
- After each choice, the selected gamble was played and the outcome added to or subtracted from current assets
- Varied starting points:
  - Poor $600
  - Average $1000
  - Rich $1400
- Ending EV: $1000 for all
Sample Choice Pair

Lottery 1: [Low Risk]
- 50% chance of $0
- 50% chance of +$50

Risk averse choice

Lottery 2: [High Risk]
- 50% chance of -$50
- 50% chance of +$100

Risk seeking choice
Types of Risky Choice Strategies

1. Stable Risk Preferences (passive) or “Risk Attitudes”
   - Always Risk Neutral or Indifferent
   - Always Risk Averse
   - Always Risk Seeking
Distributions of Stable Risk Preferences

Outcomes at Timepoint 36

Number of Participants

-400  -200   0    200    400    600    800    1000   1200   1400   1600   1800   2000   2200   2400

-400  -200  0   200   400   600   800   1000   1200   1400   1600   1800   2000   2200  2400

Random
Distributions of Stable Risk Preferences

Outcomes at Timepoint 36

Number of Participants

Risk Averse
Risk Seeking
Random
Stable Risk Preference Strategies

inflexible but low cognitive effort

highly reliable outcome distributions

capture the extremes
Types of Risky Choice Strategies

1. Stable Risk Preferences (passive)

2. Option-based Risk Preferences (passive)
   - Prospect Theory Value Function
     - Losses $\rightarrow$ RS; Gains $\rightarrow$ RA; Mix $\rightarrow$ RA
   - Risk As Threat
     - Losses $\rightarrow$ RA; Gains $\rightarrow$ RS; Mix $\rightarrow$ RA
Distributions of Lottery-based Preferences

- Risk Averse
- Risk Seeking
- Random
- Prospect Theory
Outcomes at Timepoint 36

Number of Participants

Prospect Theory Distributions for Negative and Positive Worlds

Prospect Theory Distributions for Negative and Positive Worlds

Negative World

Positive World

Risk Averse

Risk Seeking
Risk Outcome Control over Time

Option-based Risk Preference Strategies sensitive to option characteristics, e.g. positive versus negative options

but can only modulate variability, creating symmetric outcome distributions
Distributions of Stable Risk Preferences

Things (out of your control) are going badly; worse outcomes more common.
Things (out of your control) are going well; better outcomes more likely.
Distributions of Stable Risk Preferences

Things (out of your control) are going badly; worse outcomes more common.

Things out of your control are going well; better outcomes more common.

Outcomes at Timepoint 36

Number of Participants

Outcomes at Timepoint 36

-400 -200 0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400

Risk Averse
Risk Seeking
Optimal Hybrid Distribution

Things are going badly; worse outcomes more common.

Things are going well; better outcomes more common.
Optimal Hybrid Distribution

What If You Have Bad Luck:
If things (out of your control) go relatively badly for you in general, that means you will tend to be on the losing side of things, and if that were to happen, you would be better off to be risk averse in your choices so that you prevent more extreme worse outcomes.

What If You Have Good Luck:
If things (out of your control) go relatively well for you in general, that means you will tend to be on the winning side of things, and if that were to happen, you would be better off to be risk seeking in your choices so that you take advantage of more extreme better outcomes.

Can we have it both ways?
Types of Risky Choice Strategies

- Stable Risk Preferences (passive)
- Option-based Risk Preferences (passive)
- Goal-based Risk Preferences (active)
  - Focus on Experience-based Goals
  - Focus on Aspiration-based Goals
Goal-based Risk Preferences

Focus on Experience

- **Use experience to generate outcome trajectory rules**
- **Use how you have been doing previously to respond to upcoming event(s)**
Goal-based Risk Preferences

Outcome Trajectory Rules

- **Expect the Same**
  - If things (out of your control) have been going **badly**, expect them to keep going **badly** and be RA.
  - If things (out of your control) have been going **well**, expect them to keep going **well** and be RS.

- **Expect Change**
  - If things (out of your control) have been going **badly**, expect them to change for the **better** and be RS.
  - If things (out of your control) have been going **well**, expect them to change for the **worse** and be RA.
Outcomes at Timepoint 36

Number of Participants

- Optimal
- Expect the Same (better/worse)
- Expect the Same (Gain/Loss)
- Expect Change (better/worse)
Experience-based Strategies

- control based on monitoring one’s own recent history: whether things are going well or poorly over time
- can create modestly positively skewed distributions
- allow protection if things go badly and opportunity if things go well
- do not require specific goals but do emphasize temporal sensitivity
Aspiration-based Risk Preferences

- **Focus on Specific Goals**
  - Aspiration Levels
  - Define doing **badly or well** based on specific goals
  - Sample goals:
    - Conservative: Be RA if < $1225, else RS.
    - Moderate: Aspirations of $1025 and $975.
    - Liberal: Aspiration of $775.
Outcomes at Timepoint 36

Number of Participants

Aspiration: 1225

Optimal

Outcomes at Timepoint 36
Outcomes at Timepoint 36

Number of Participants

Optimal
Aspiration: 1025
Aspiration: 1225
Outcomes at Timepoint 36

Number of Participants

- Optimal
- Aspiration: 775
- Aspiration: 975
- Aspiration: 1025
- Aspiration: 1225
Risk Outcome Control over Time

- **Aspiration Level Strategies**
  - control based on *longer term goals*: whether things are going as well as you want over time
  - create positively skewed distributions
  - allow protection if things go badly and opportunity if things go well
  - requires specific goals/knowledge and temporal sensitivity
Extreme Outcomes per Strategy

- Risk Averse
- Expect the Same (freq)
- Expect the Same (amt)
- Aspiration: 1225
- Aspiration: 1025
- Aspiration: 1025
- Indifferent (Random)
- Expect Change (win freq)
- Risk Seeking

# Extreme Outcomes (EV+/-1000) (1200 = 1% of Population)

- #Deaths
- #SuperRich
Extreme Outcomes per Strategy

- **#Extreme Outcomes (EV+-1000)**
  - (1200 = 1% of Population)

- **Strategy**
  - Risk Averse
  - Expect the Same (freq)
  - Expect the Same (amt)
  - Aspiration: 1225
  - Aspiration: 1025
  - Aspiration: 975
  - Aspiration: 775
  - Indifferent (Random)
  - Expect Change (win freq)
  - Risk Seeking

- **#Deaths**
- **#SuperRich**
Summary

Goal-based Risk Strategies

- Provide Superior Control of Risks Over Time
- Sensitive to Real World Asymmetries
- Sensitive to short and longer term contingencies
- Can be Effective Without Substantial Knowledge of Environmental Uncertainties/Probabilities
- Point to the Need to Understand How Goal-based Strategies Can Be Used to Encourage Higher Order Cognition
Preferred Changes in Two-Ticket Lotteries

Majority Preference (% High Ticket Moves)

Preferred High Move: Risk Seeking

Preferred Low Move: Risk Averse

Choice (n = 152)

Change (n = 109)
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Collaborators
Chris Hudspeth
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Thank you.

Questions?