

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

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Adolescents and Young Adults:
Social, Behavioral, and Biological Influences on Learning**

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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 → both threat and potential

Test case: incremental, easily quantified,
immediate outcomes

The Case of Day-to-Day Choice

Demonstration:

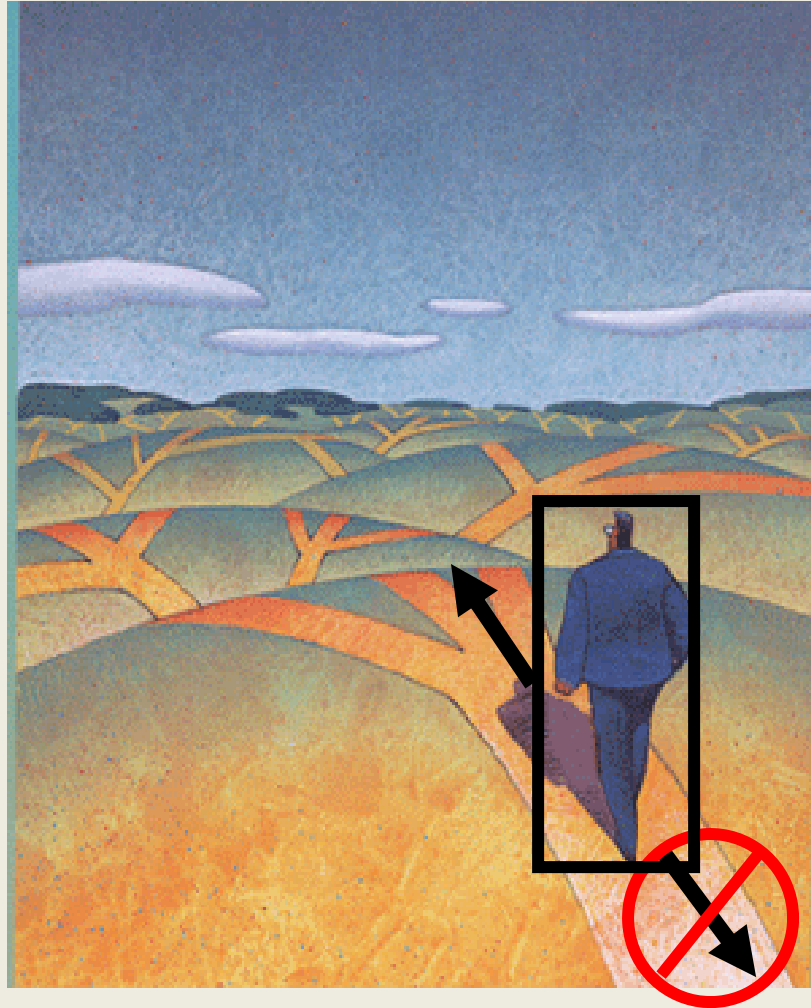
Even with randomly determined outcomes

- **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

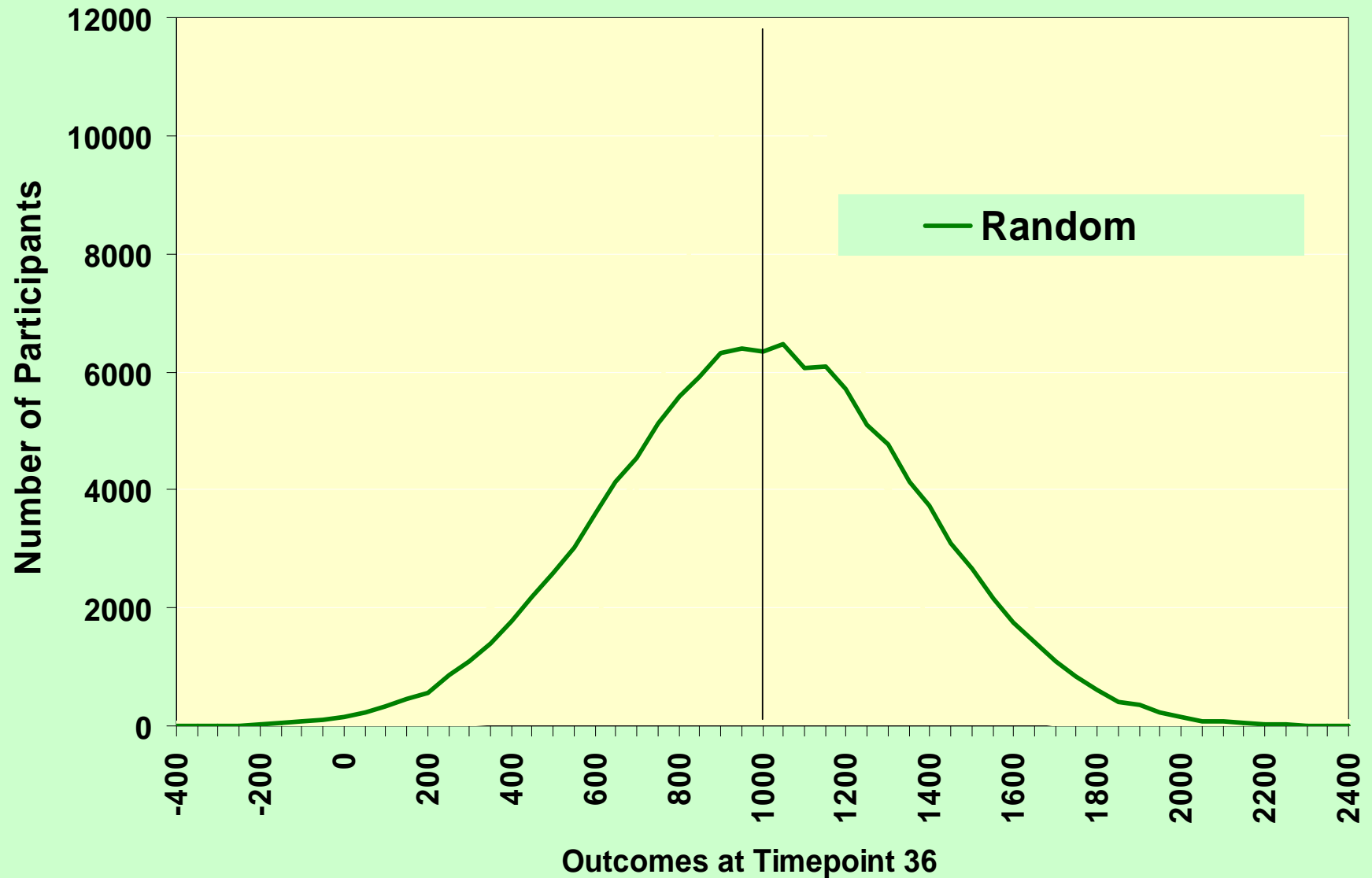
Risk seeking choice

Types of Risky Choice Strategies

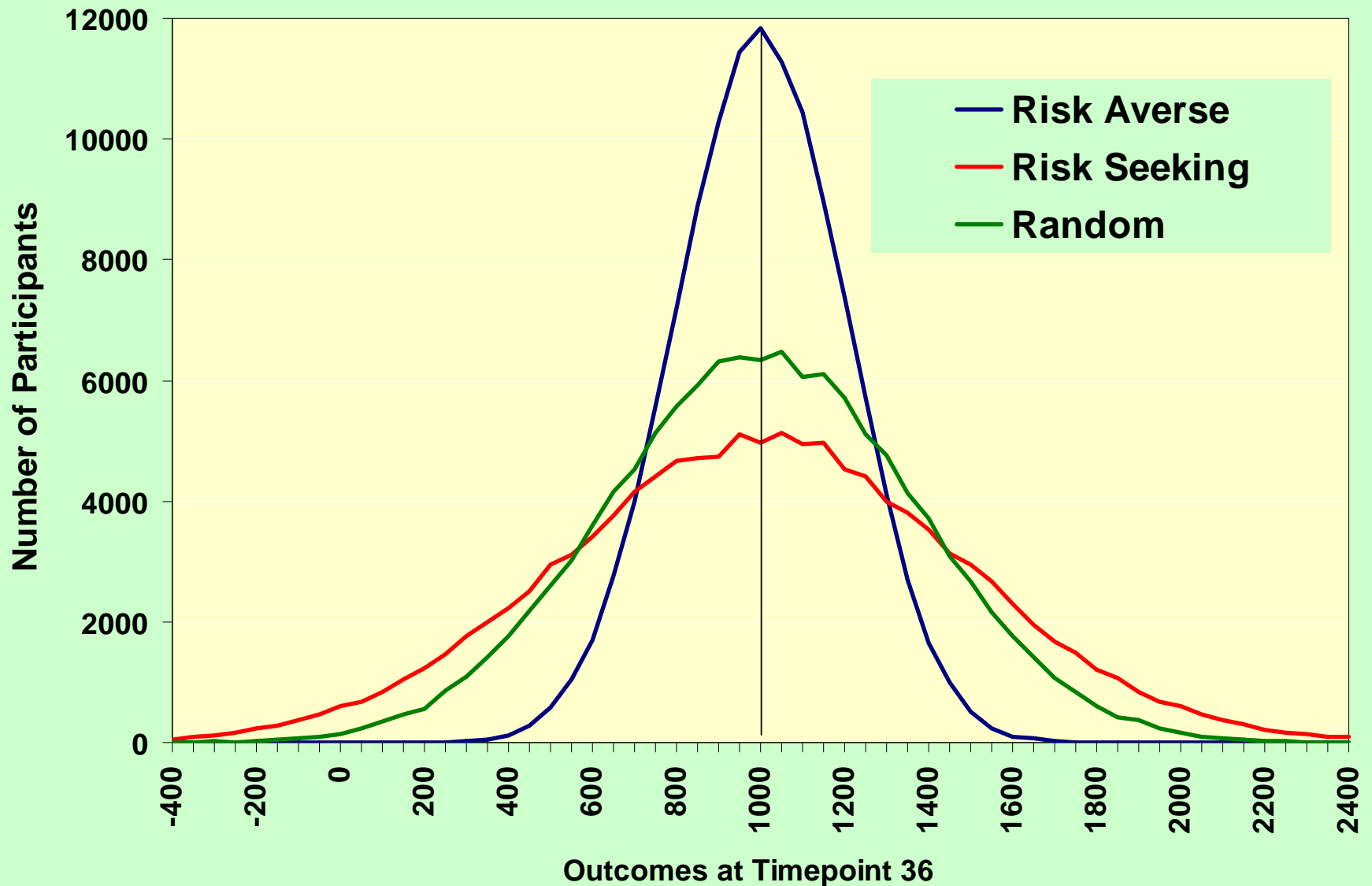
1. Stable Risk Preferences (passive) or “Risk Attitudes”

- ☐ **Always Risk Neutral or Indifferent**
- ☐ **Always Risk Averse**
- ☐ **Always Risk Seeking**

Distributions of Stable Risk Preferences



Distributions of Stable Risk Preferences



Risk Outcome Control over Time

- ❖ **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)

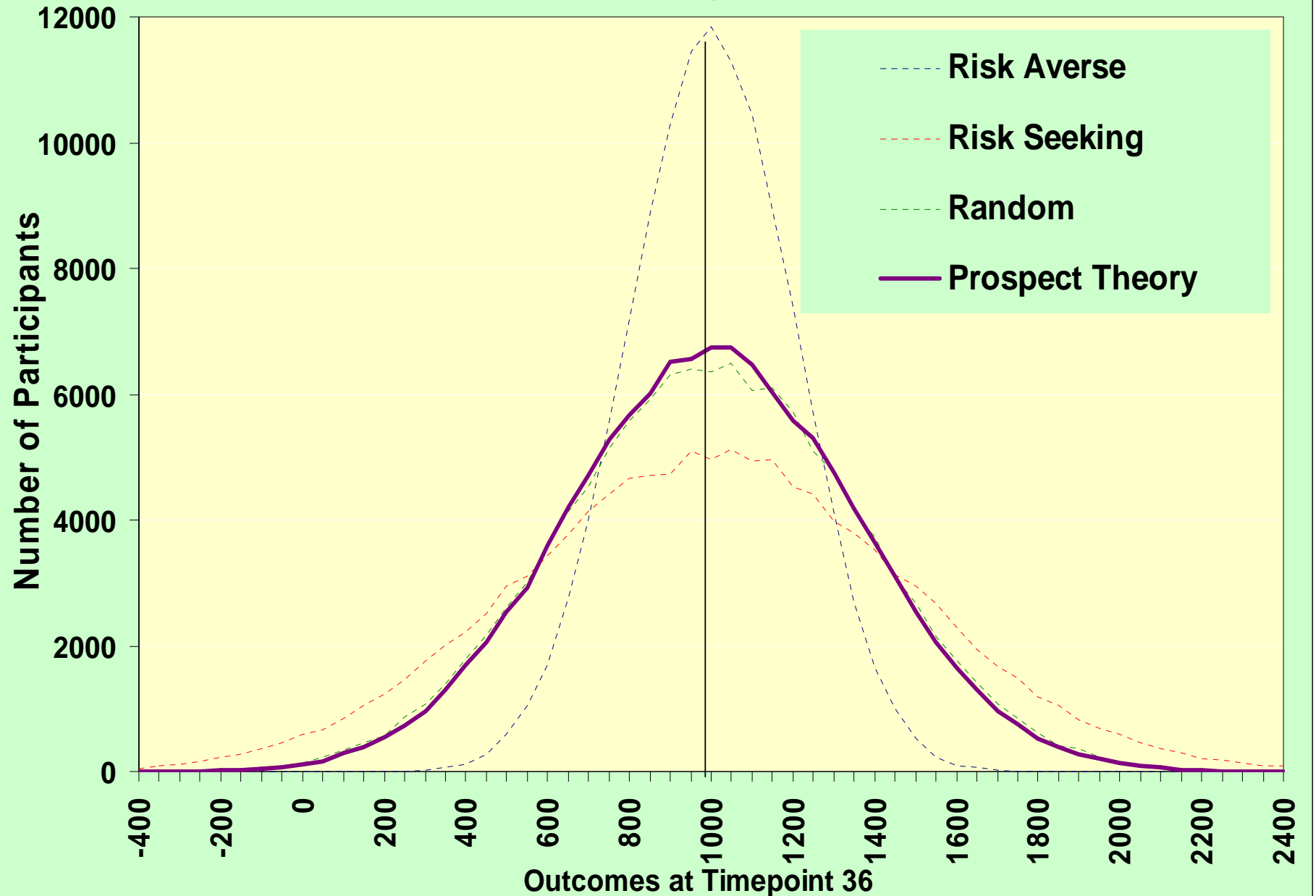
☐ **Prospect Theory Value Function**

Losses → RS; Gains → RA; Mix → RA

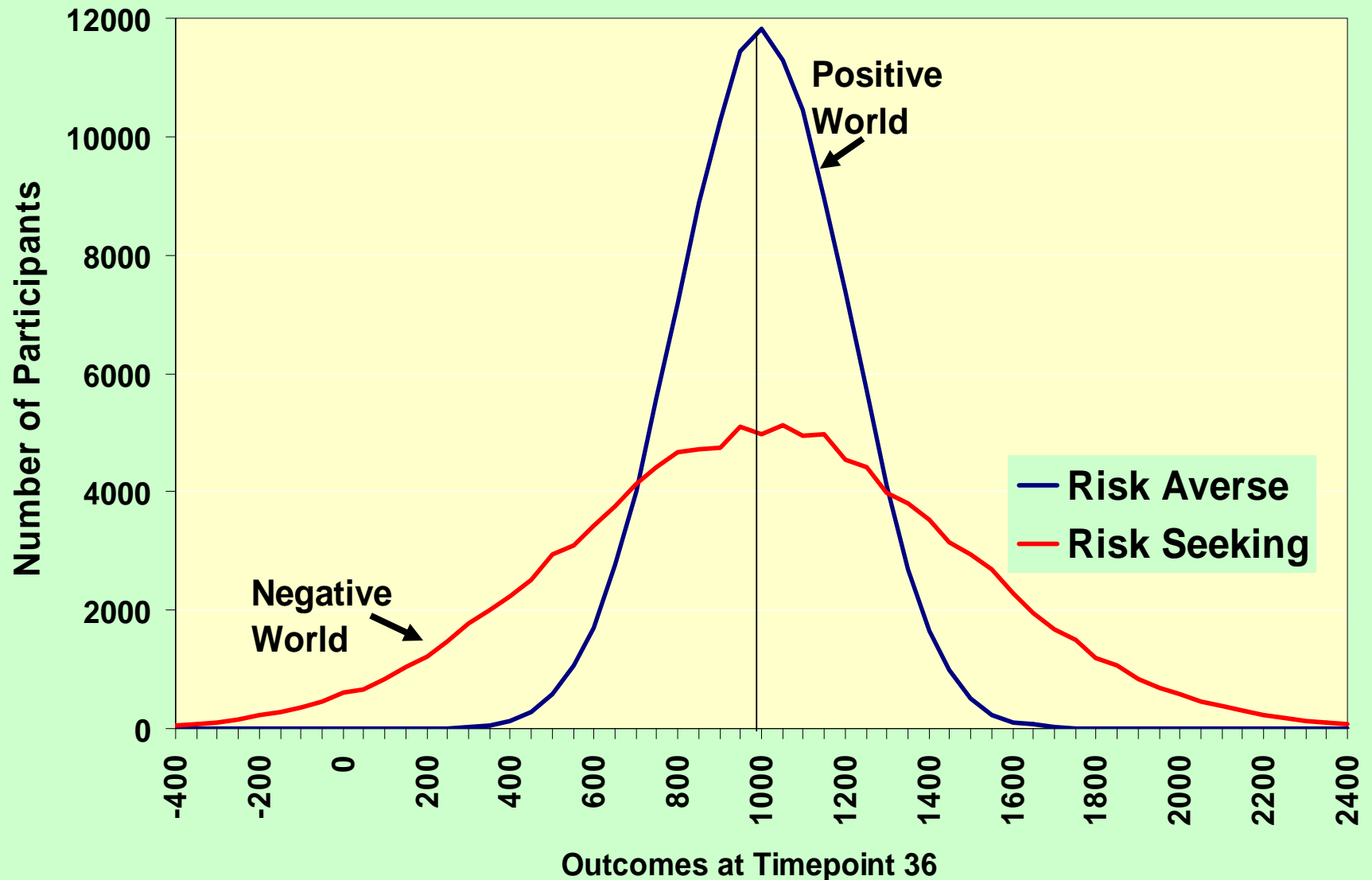
☐ **Risk As Threat**

Losses → RA; Gains → RS; Mix → RA

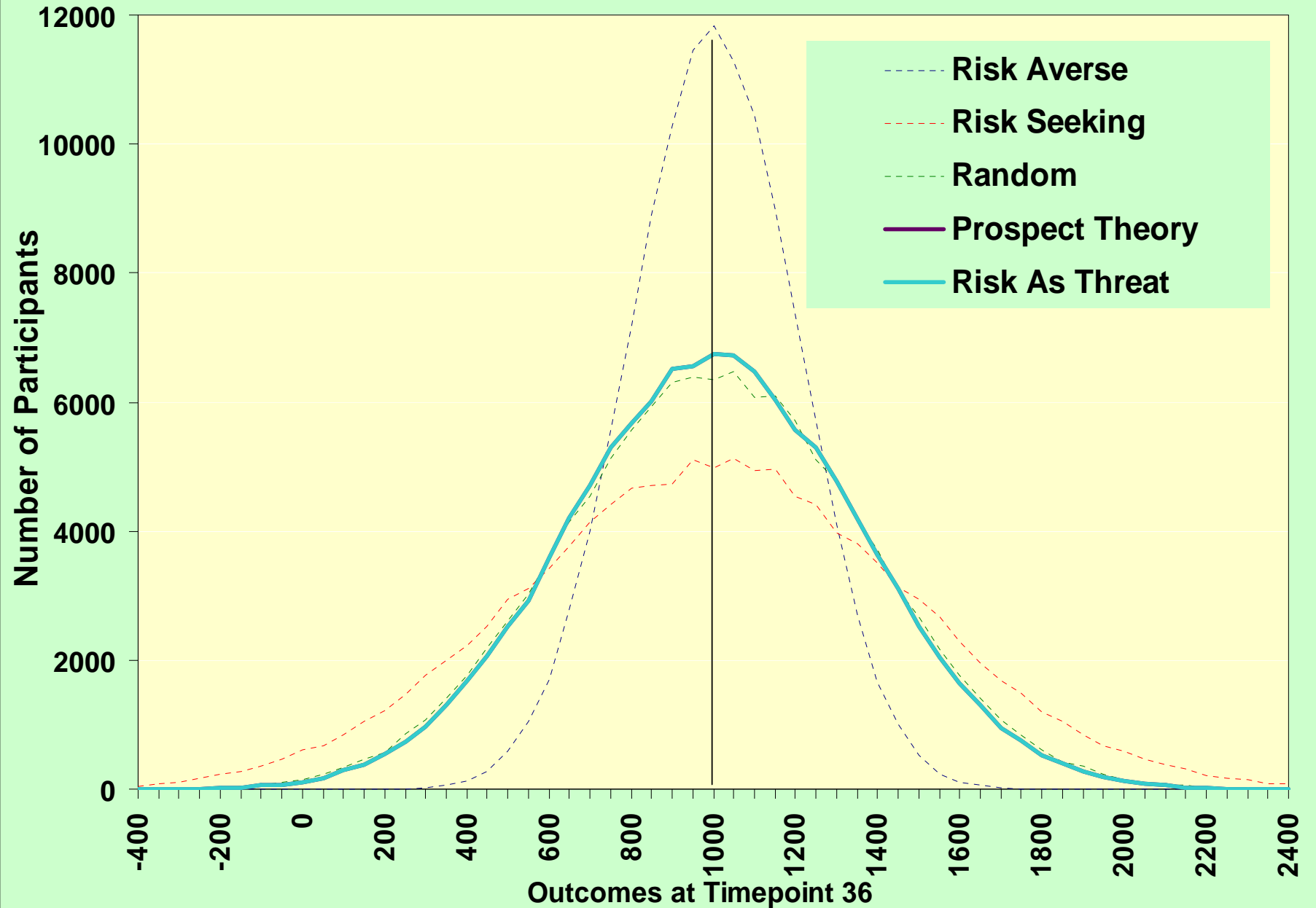
Distributions of Lottery-based Preferences



Prospect Theory Distributions for Negative and Positive Worlds



Distributions of Lottery-based Preferences



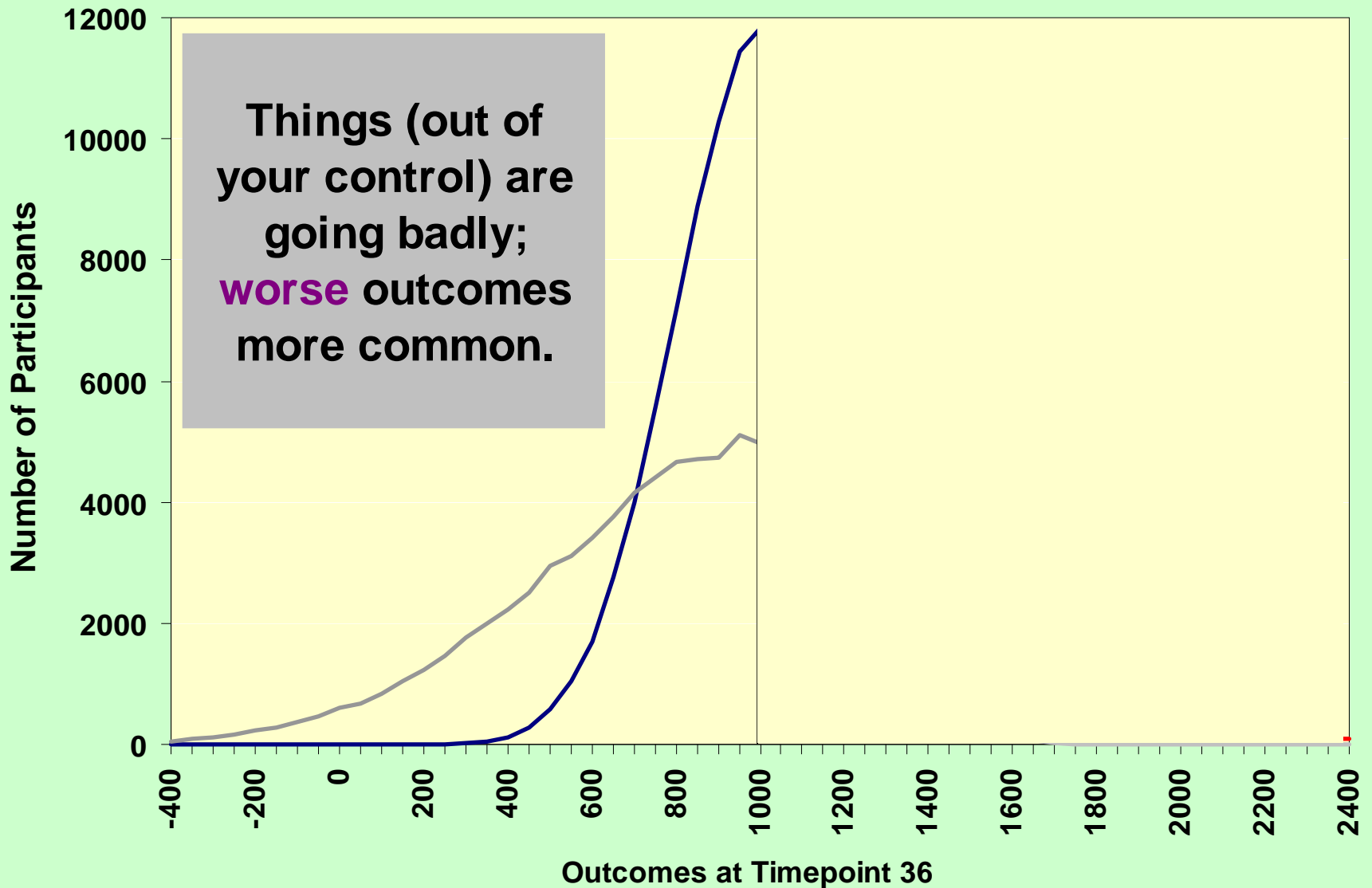
Risk Outcome Control over Time

Option-based Risk Preference Strategies

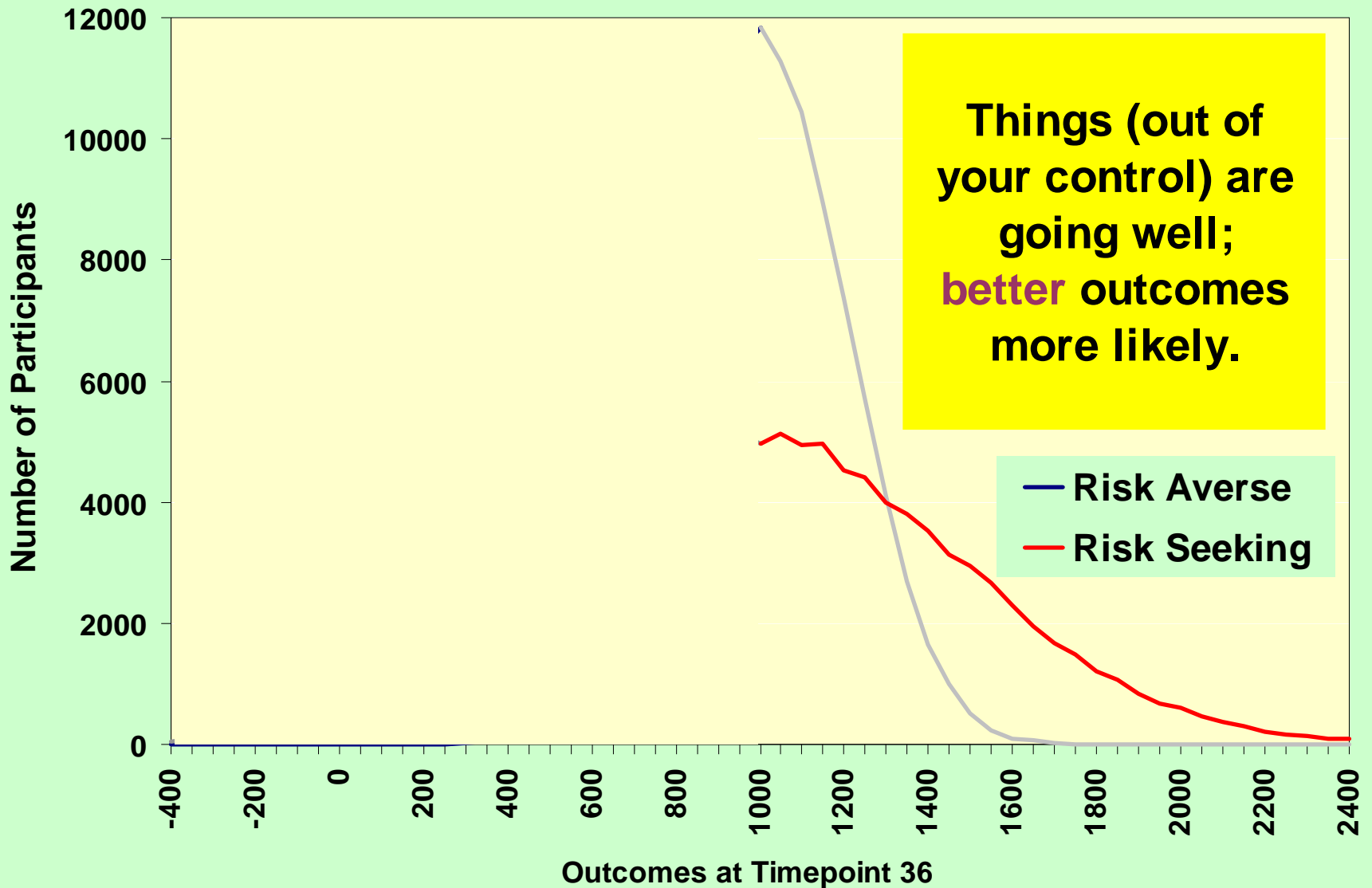
sensitive to option characteristics, e.g.
positive versus negative options

but can only modulate variability, creating
symmetric outcome distributions

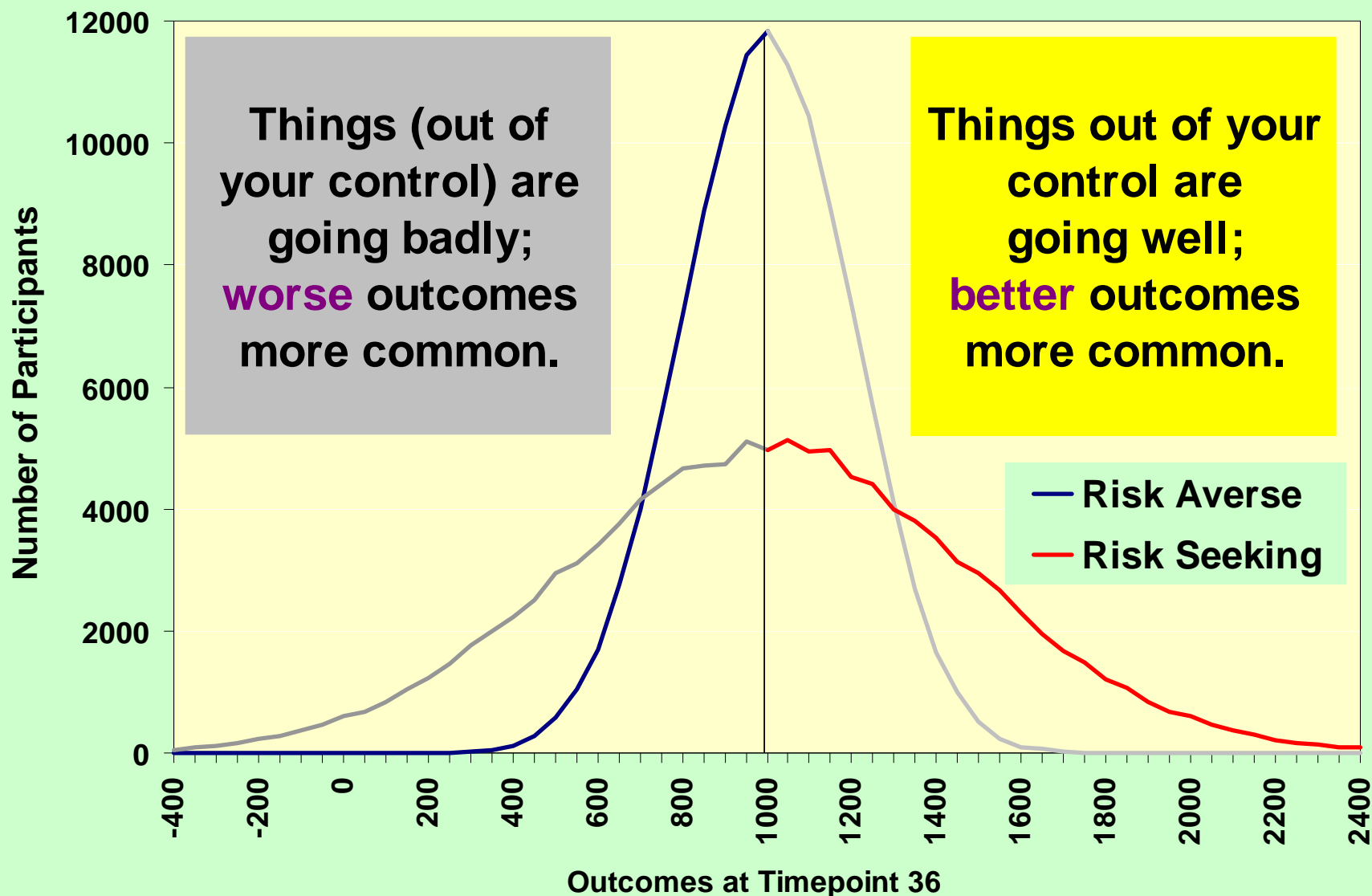
Distributions of Stable Risk Preferences



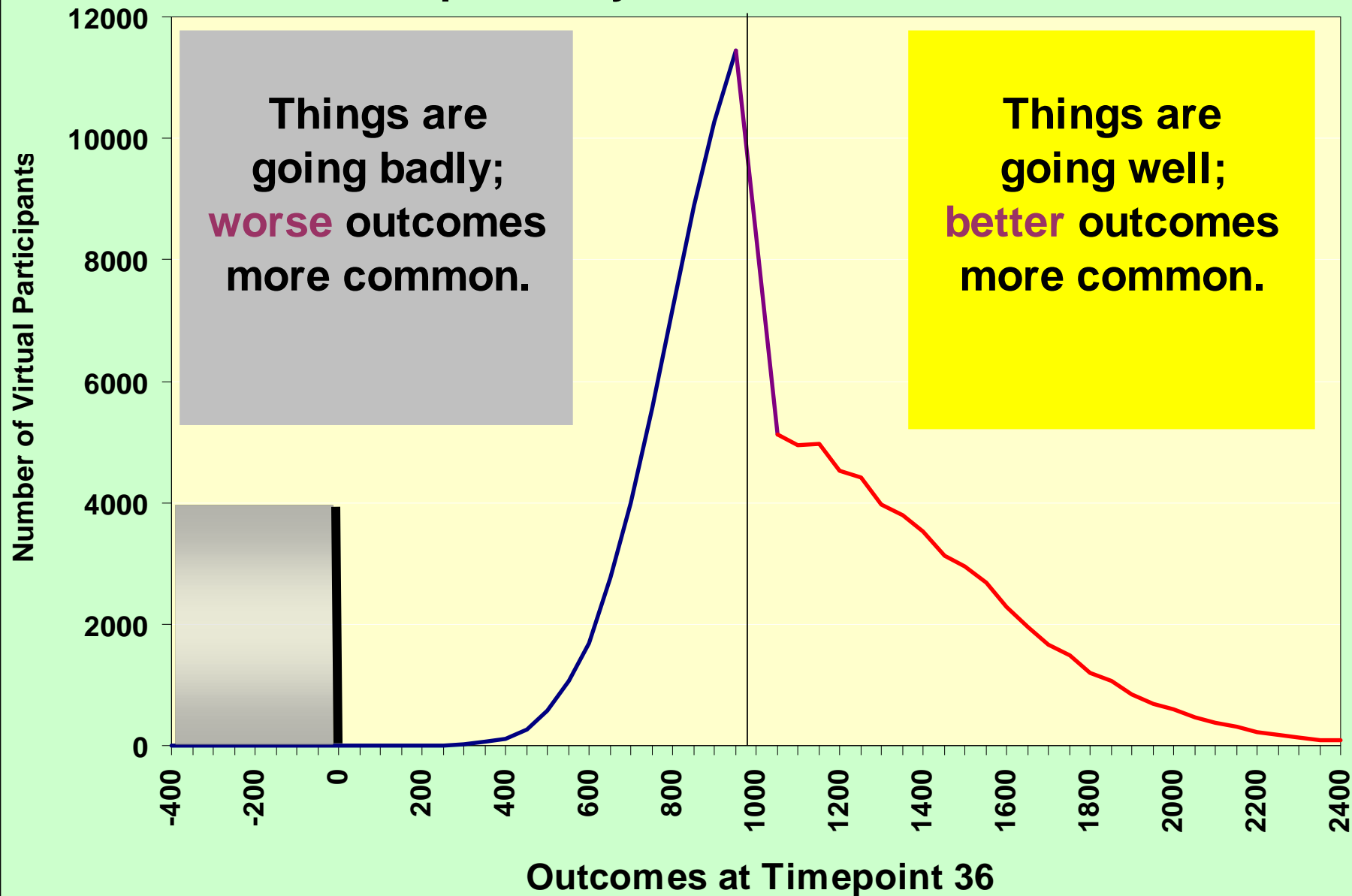
Distributions of Stable Risk Preferences



Distributions of Stable Risk Preferences



Optimal Hybrid Distribution



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

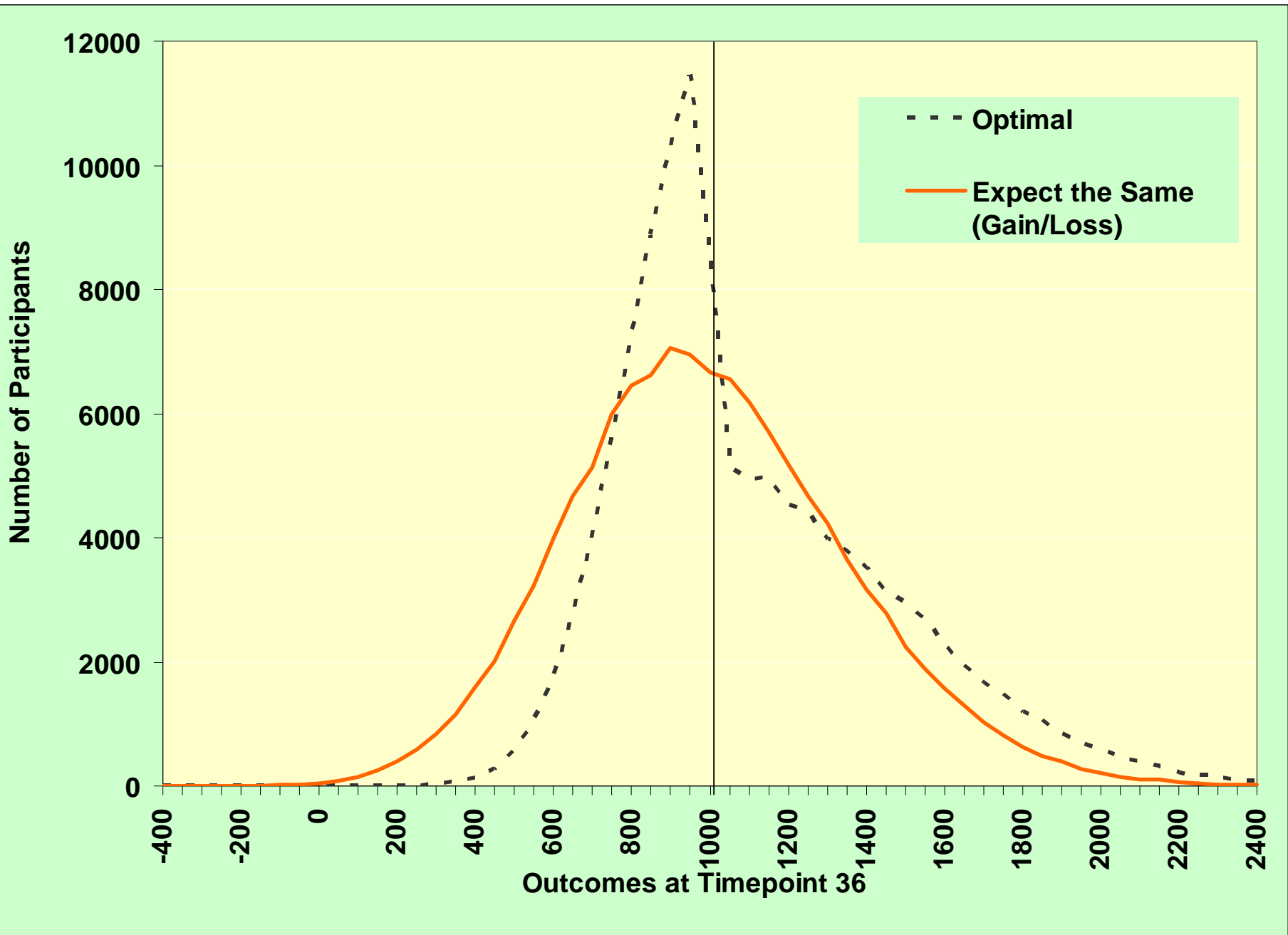
Outcome Trajectory Rules

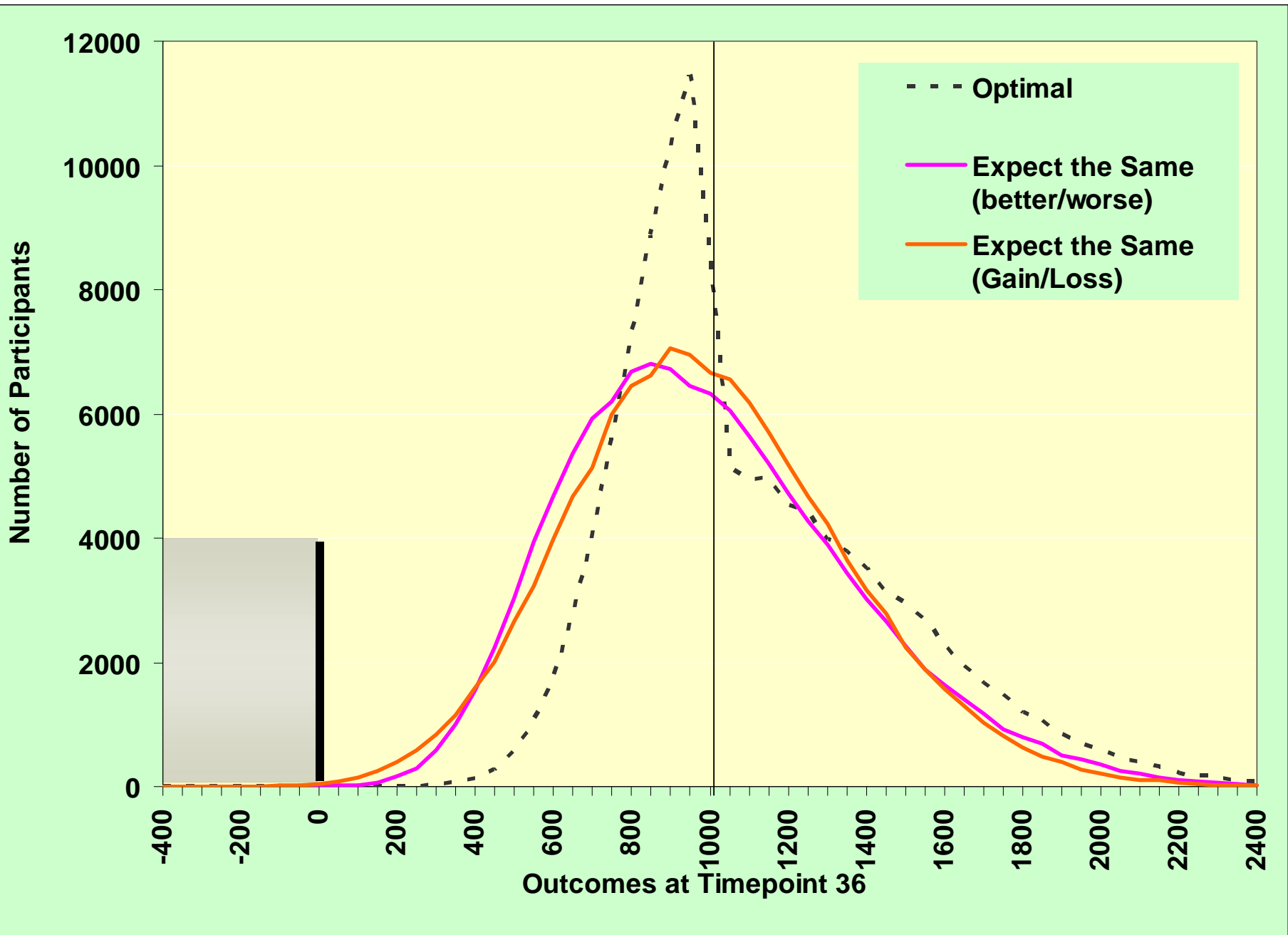
■ Expect the Same

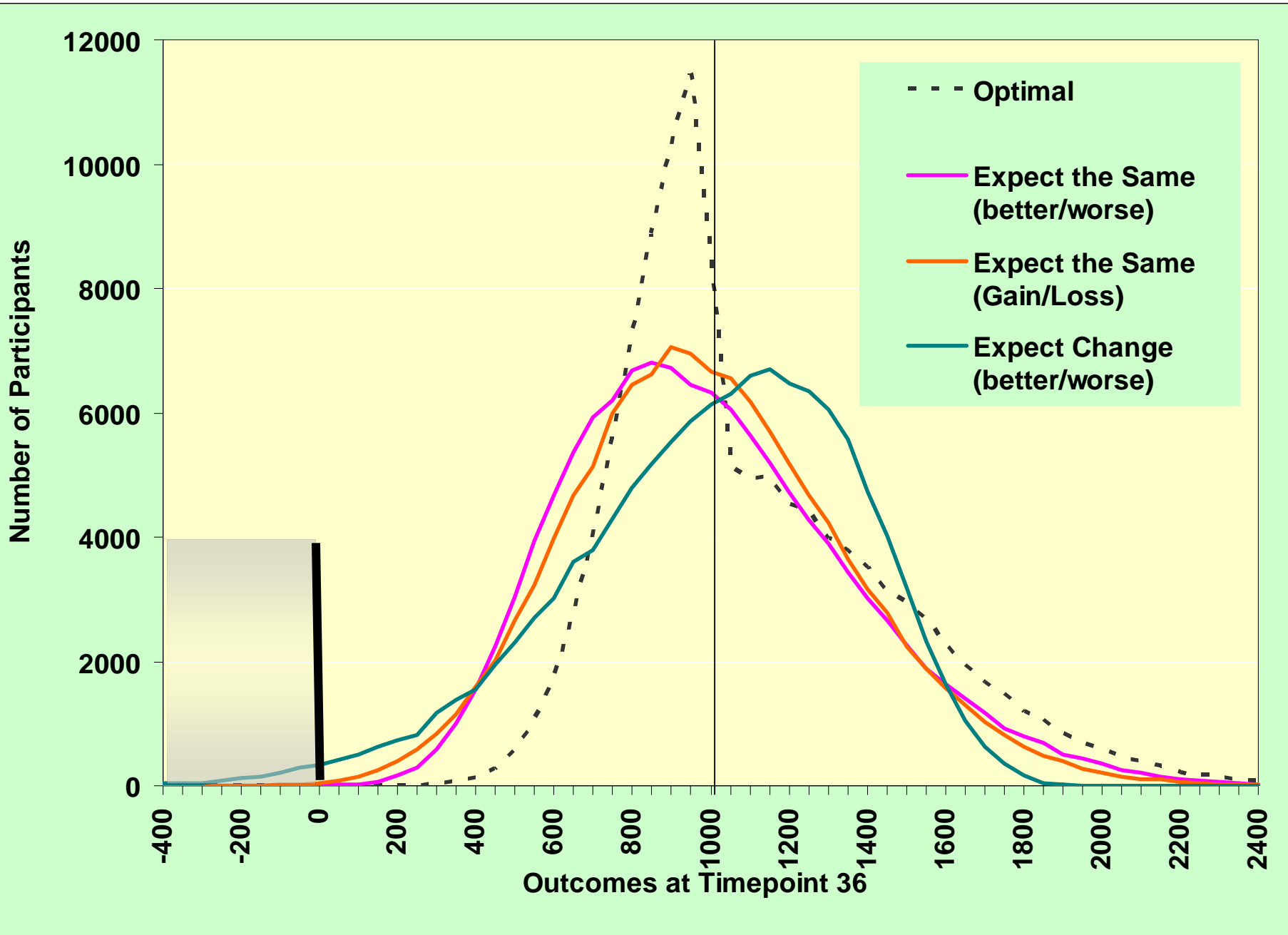
- ❖ If things (out of your control) have been going badly, expect them to keep going badly and be RA.
- ❖ If things (out of your control) have been going well, expect them to keep going well and be RS.

■ 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.







Risk Outcome Control over Time

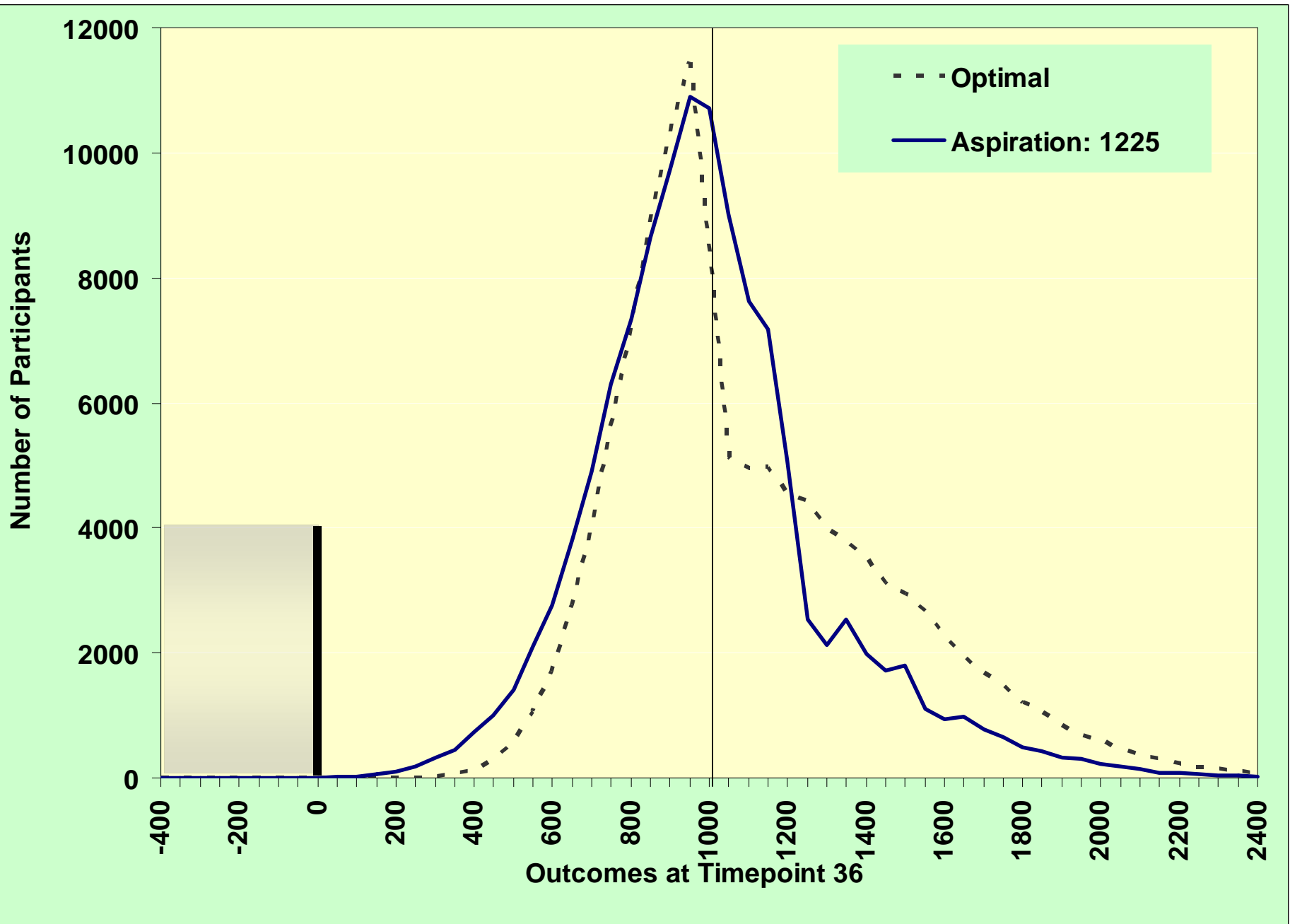
❖ Experience-based Strategies

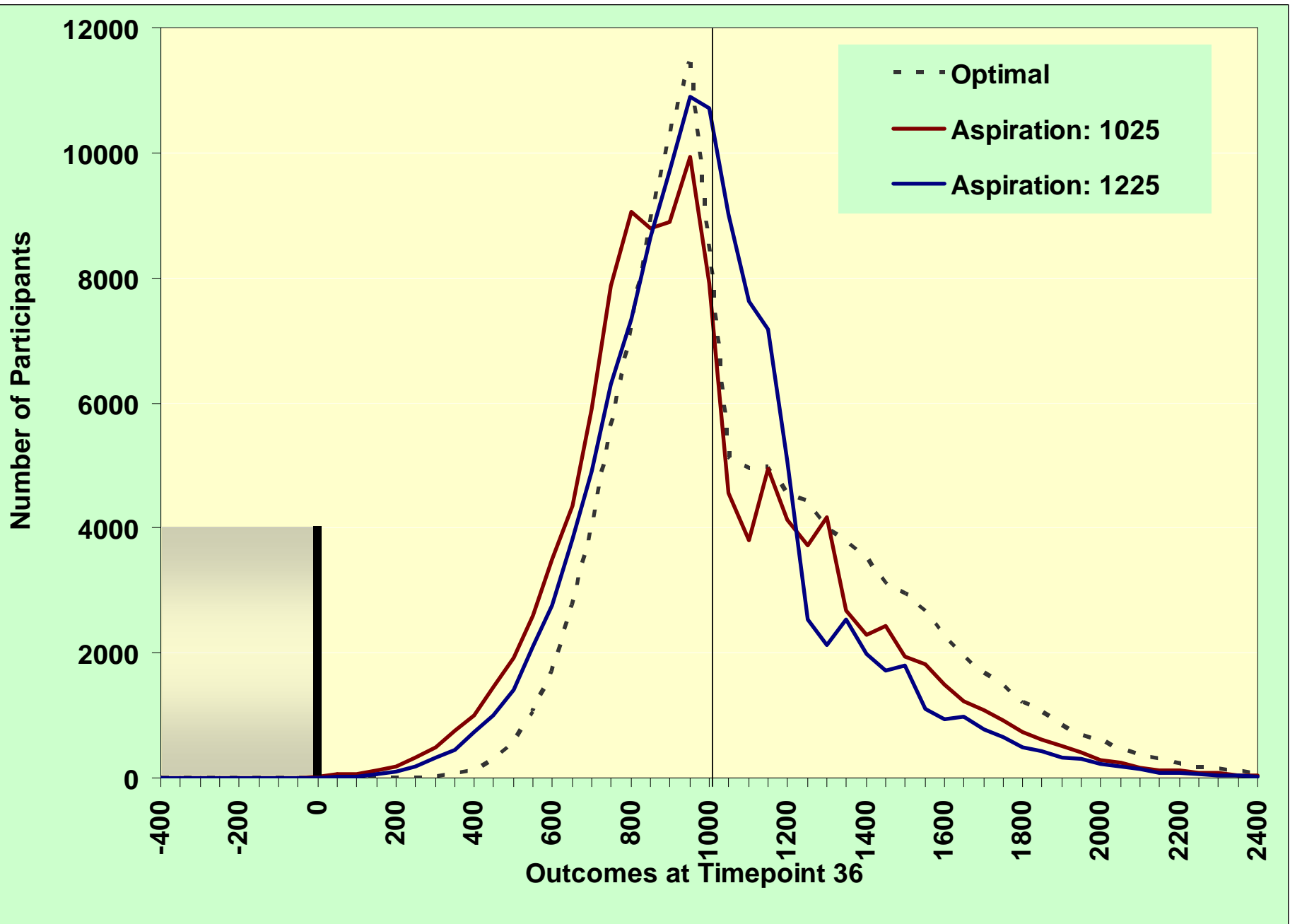
- control based on monitoring one's own recent history: whether things are going **well** or **poorly** over time
- can create modestly **positively skewed** distributions
- allow **protection** if things go badly and **opportunity** if things go well
- **do not** require specific **goals** but **do**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

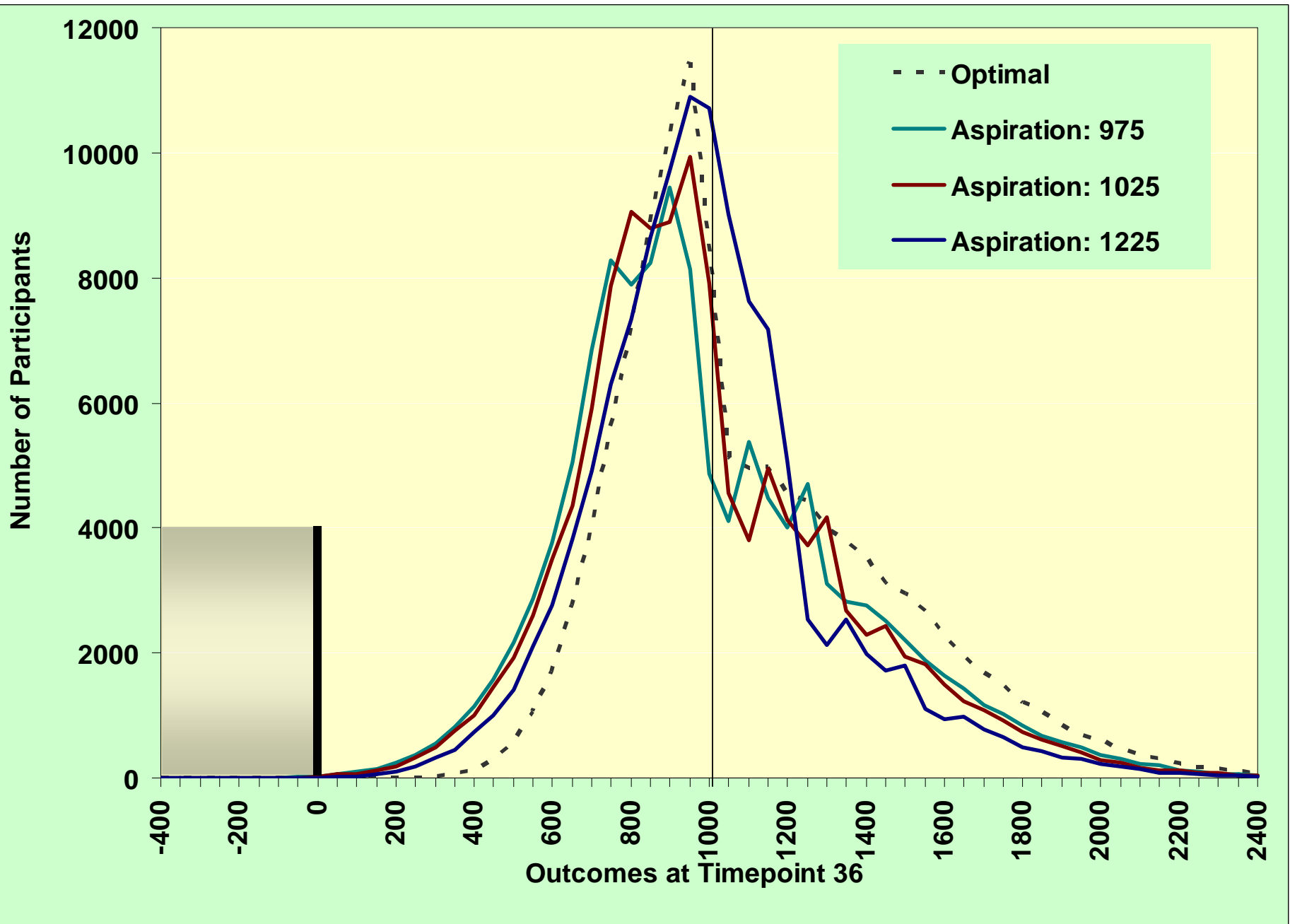
Aspiration-based Risk Preferences

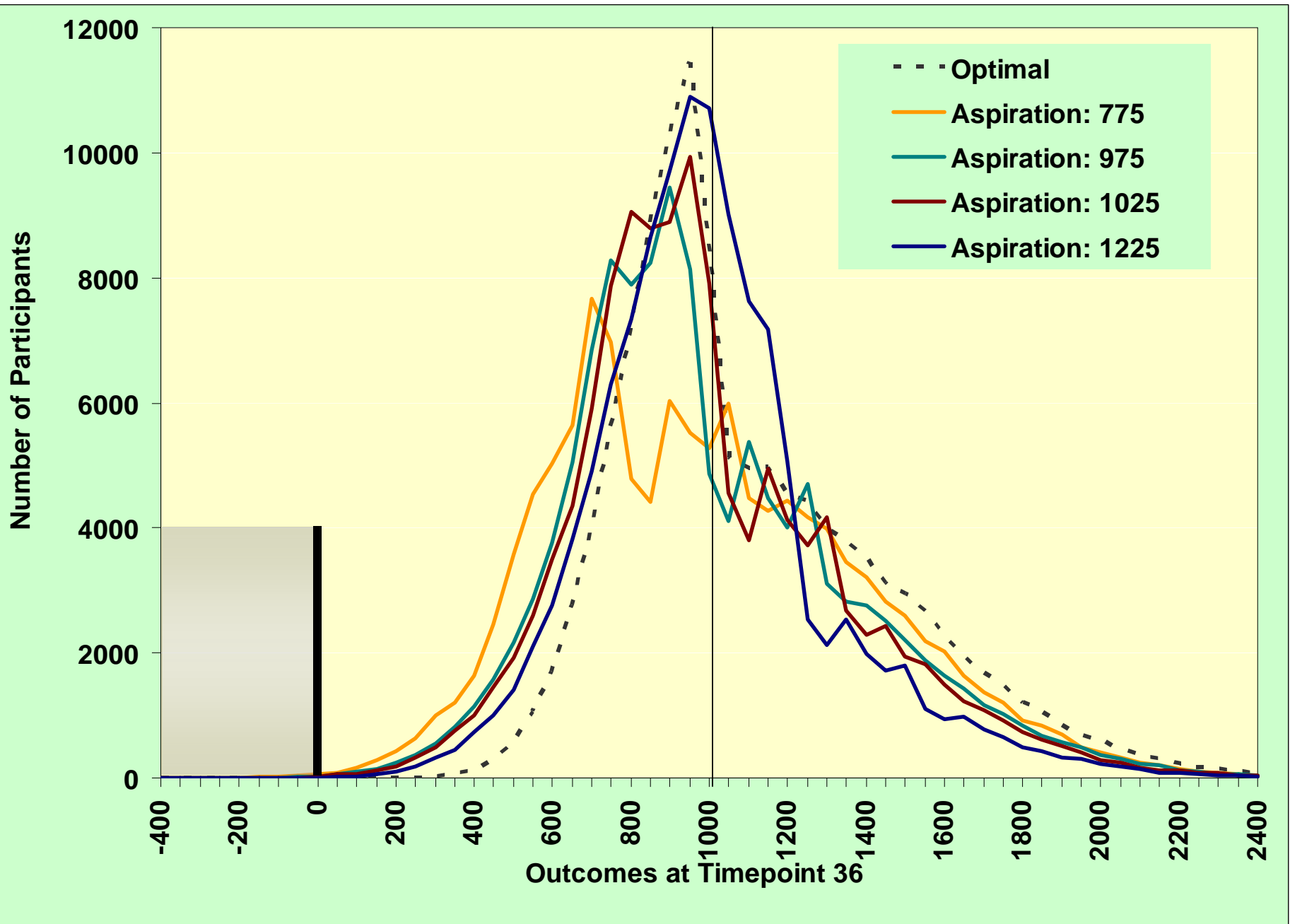
❖ Focus on Specific Goals

- **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 $\$775$.







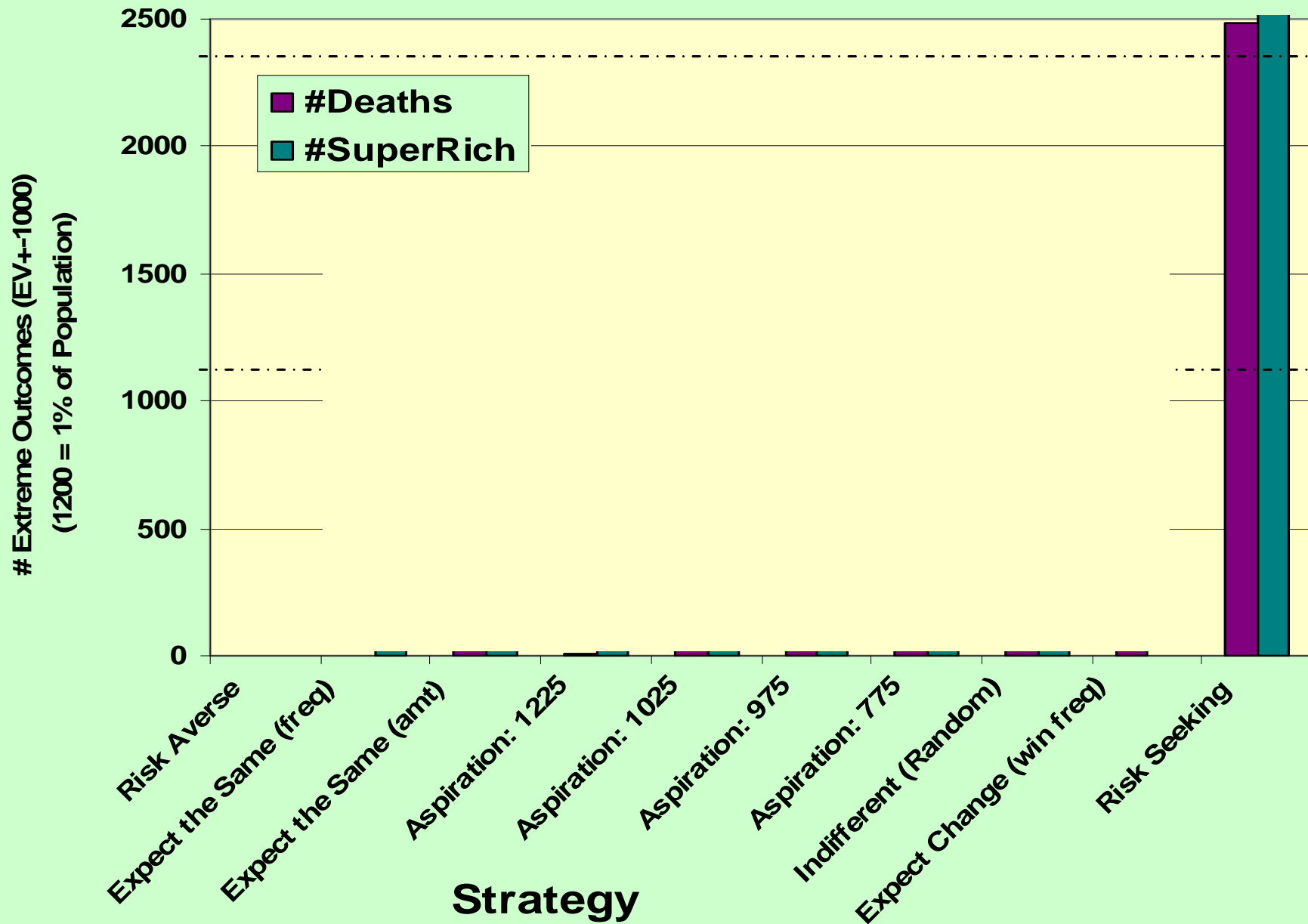


Risk Outcome Control over Time

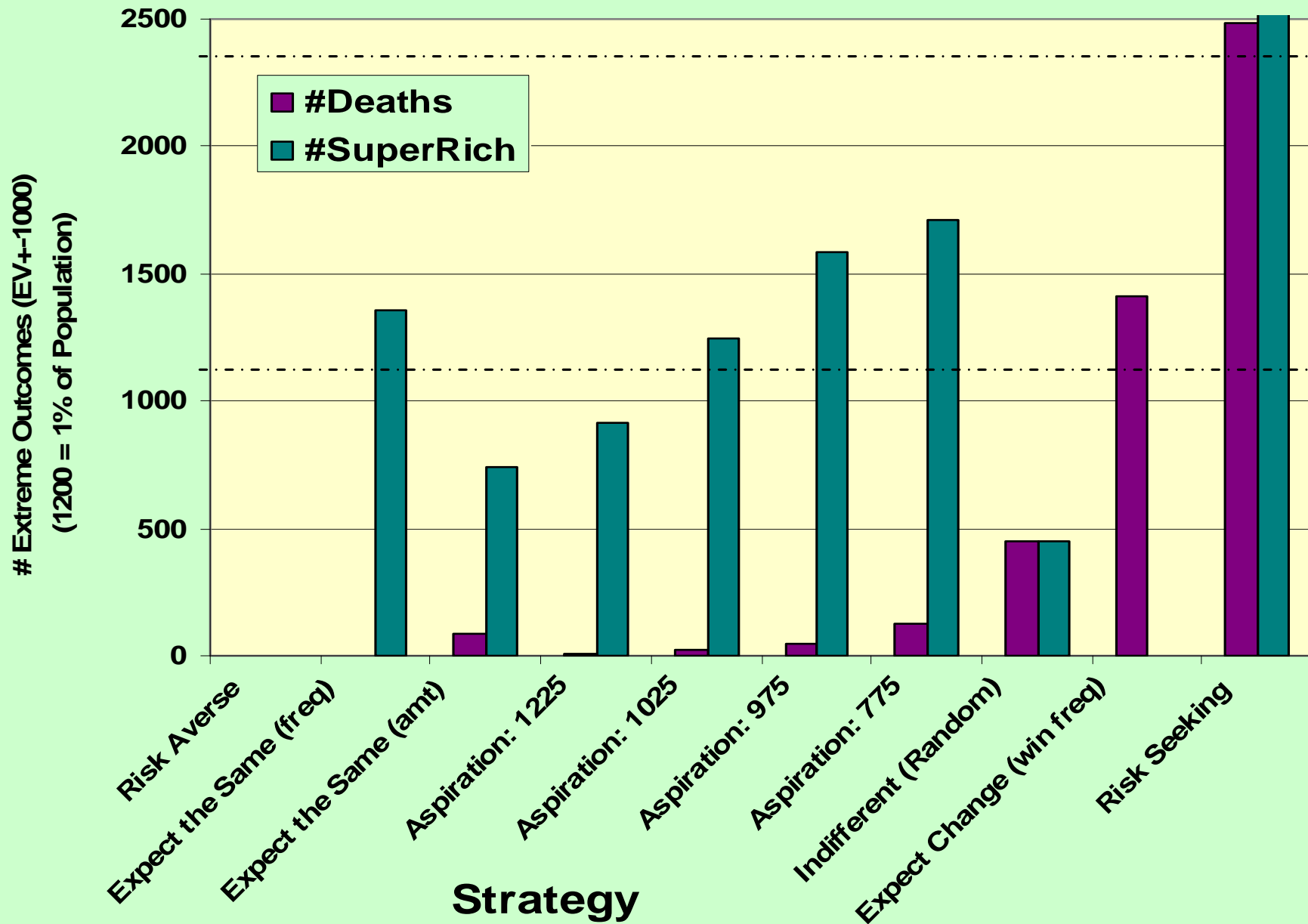
❖ Aspiration Level Strategies

- 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



Extreme Outcomes per Strategy

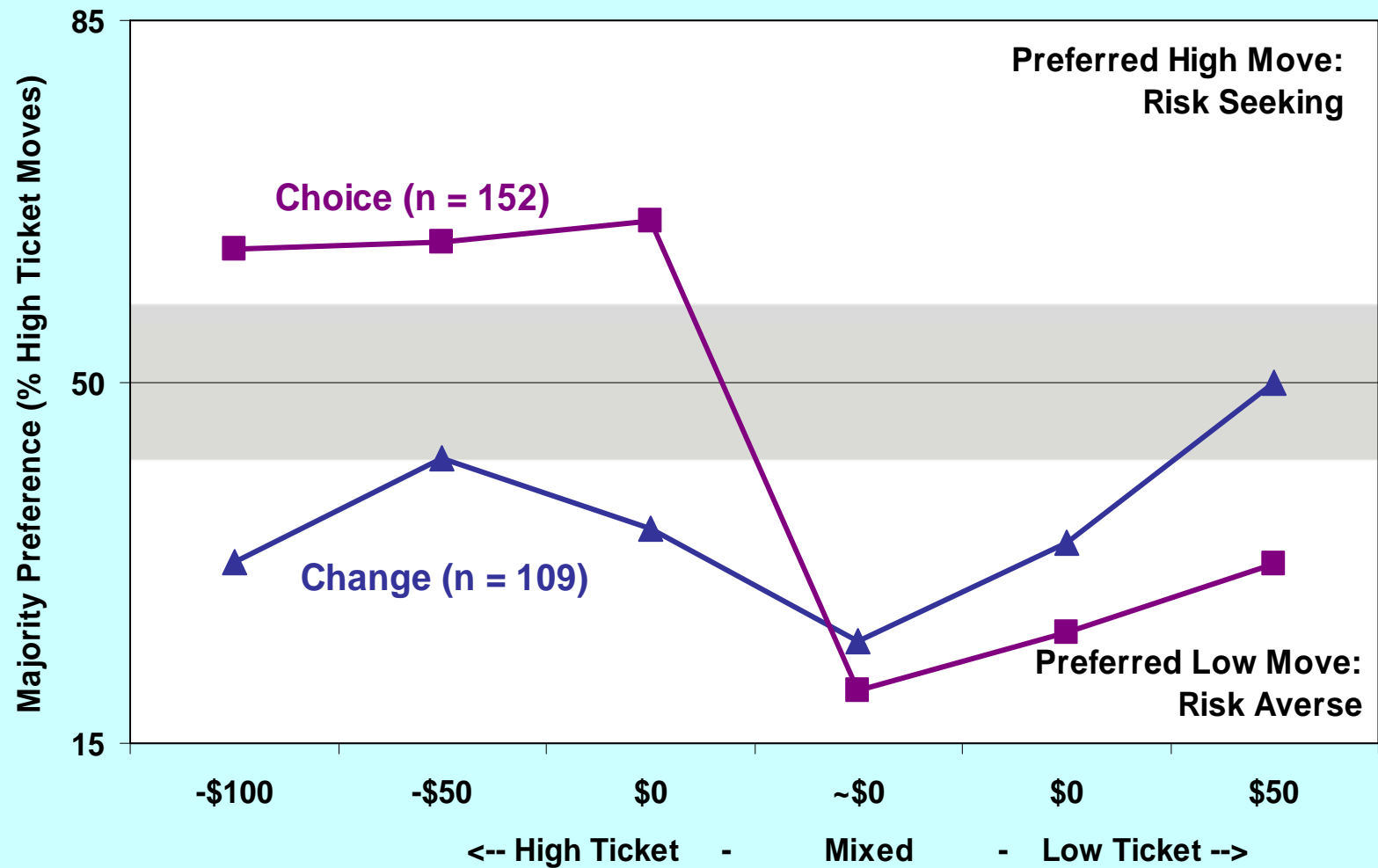


Summary

❖ **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



	Default (System I)	
Context	Perception/ Recognition (reference dependence)	
Experience	Familiarity/Habit	
Feelings	Affect/Motivation/ Reward System (fixed/performance)	

	Default (System I)	Higher Order Cognition (System I + II)
Context	Perception/ Recognition	Strategic Search and Opportunity Seeking
Experience	Familiarity/Habit	Active Feedback Loop
Feelings	Affect/Motivation/ Reward System (fixed/performance)	Goal Striving: Success/Failure (growth/learning)

Collaborators

Chris Hudspeth

Nate Decker

Moumita Mukherjee

Thank you.

Questions?