

# The Psychology of Trading

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# *Motivation*

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## Behavioral Vs. Rational Finance:

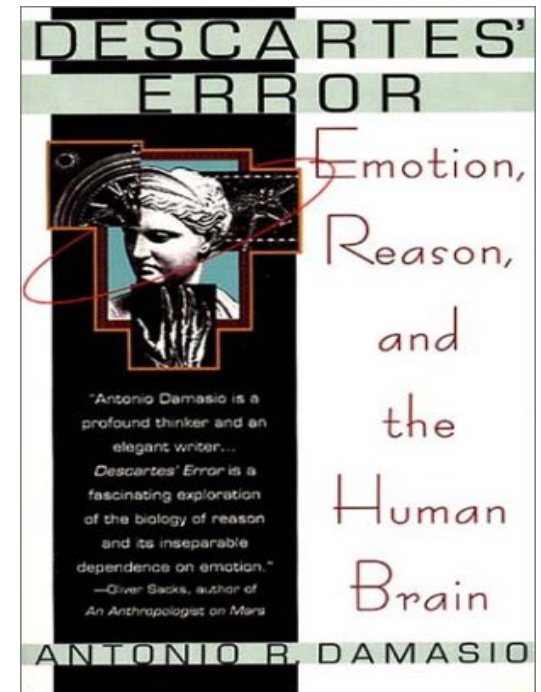
- Efficient Markets, “No Free Lunch”
- Cognitive and Behavioral Biases
  - Loss Aversion, Anchoring, Framing
  - Overconfidence
  - Overreaction
  - Herding
  - Mental Accounting

# Behavioral Vs. Rational

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Patient Elliot Had Frontal Lobe Damage:

- No Impact on IQ or Logical Functions
  - Perceptual Ability
  - Past Memory
  - Short-Term Memory
  - Learning
  - Language
  - Arithmetic
- But Behavior Was Quite Irrational!



# *Behavioral Vs. Rational*

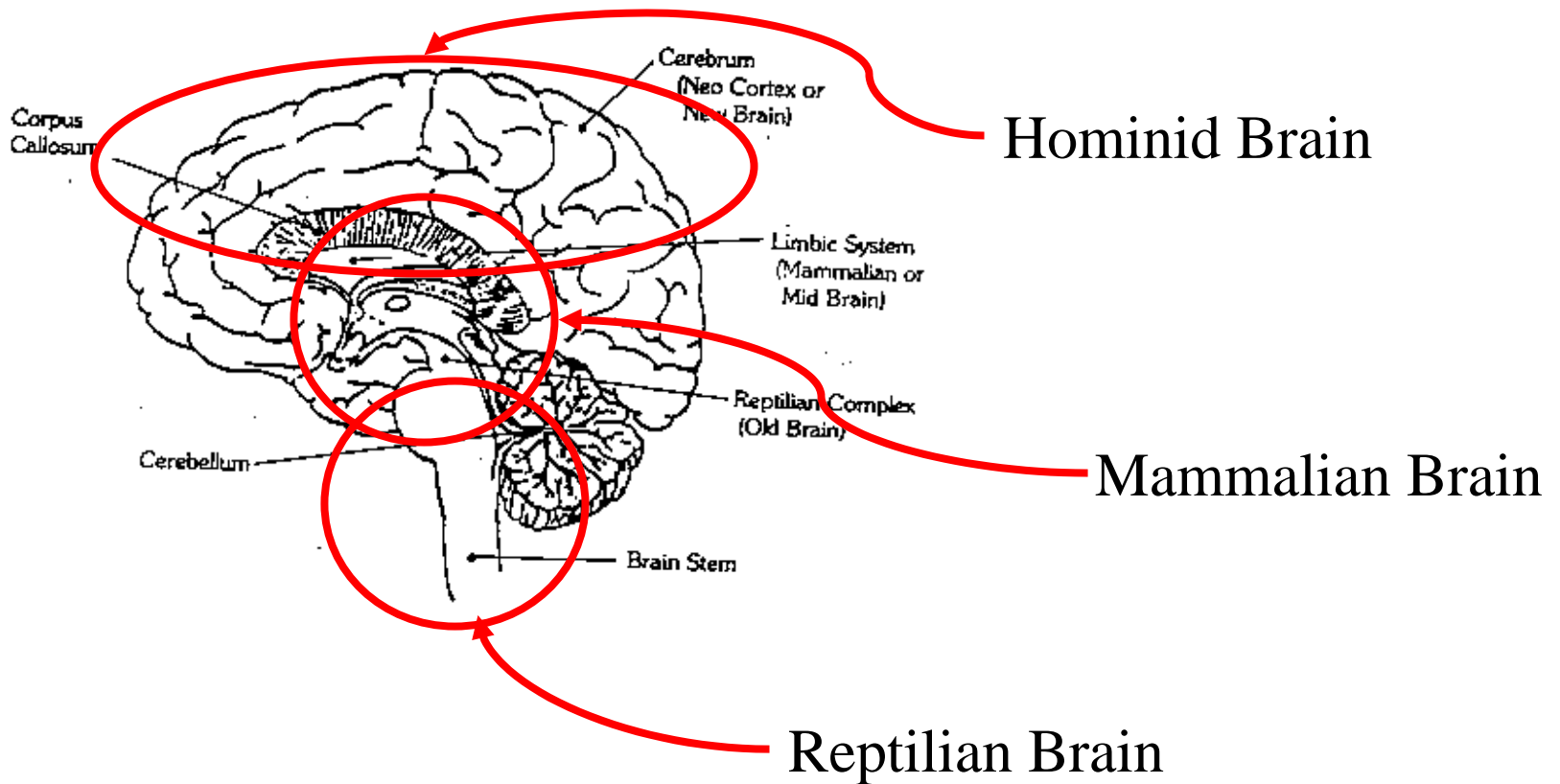
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No Reaction to Emotional Stimuli:

- *“to know, but not to feel.”*
- Impaired Emotional Response  $\Rightarrow$  Irrationality
- Serious Implications For Decisionmaking
- What Do We Mean By Rational?
- New Insights From The Neurosciences Literature

# *The Triune Model of the Brain*

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# *The Triune Model of the Brain*

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The Three Brains Have Different “Priorities”:

- Reptilian Brain Comes First
- What About Mammalian vs. Hominid Brains?

Emotional Stimulus Can Short-Circuit Hominid Brain

- Too Flustered To Speak
- “The Gift of Fear”, G. de Becker

# *The Triune Model of the Brain*

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Say the colors of the following word:

**RED**    **GREEN**    **BLUE**    **YELLOW**    **ORANGE**

**BLUE**    **BROWN**    **RED**    **GREEN**    **PURPLE**

**PINK**    **BLACK**    **BLUE**    **YELLOW**    **GREEN**

# *The Triune Model of the Brain*

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Say the colors of the following word:

**RED**      **GREEN**      **BLUE**      **YELLOW**      **ORANGE**

**BLUE**      **BROWN**      **RED**      **GREEN**      **PURPLE**

**PINK**      **BLACK**      **BLUE**      **YELLOW**      **GREEN**

# *The Triune Model of the Brain*

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Preferences Are Produced By The Three Brains

- Logical Reasoning Produced by Hominid Brain
- Emotional Stimulus Overrides Hominid Brain
- Preferences May Not Be Stable Over Time
- Preferences May Not Be Stable Over Circumstances
- But Lack of Emotion Leads To Irrational Behavior
- Rationality  $\Leftrightarrow$  Proper Balance of Three Brains

# *Current Research*

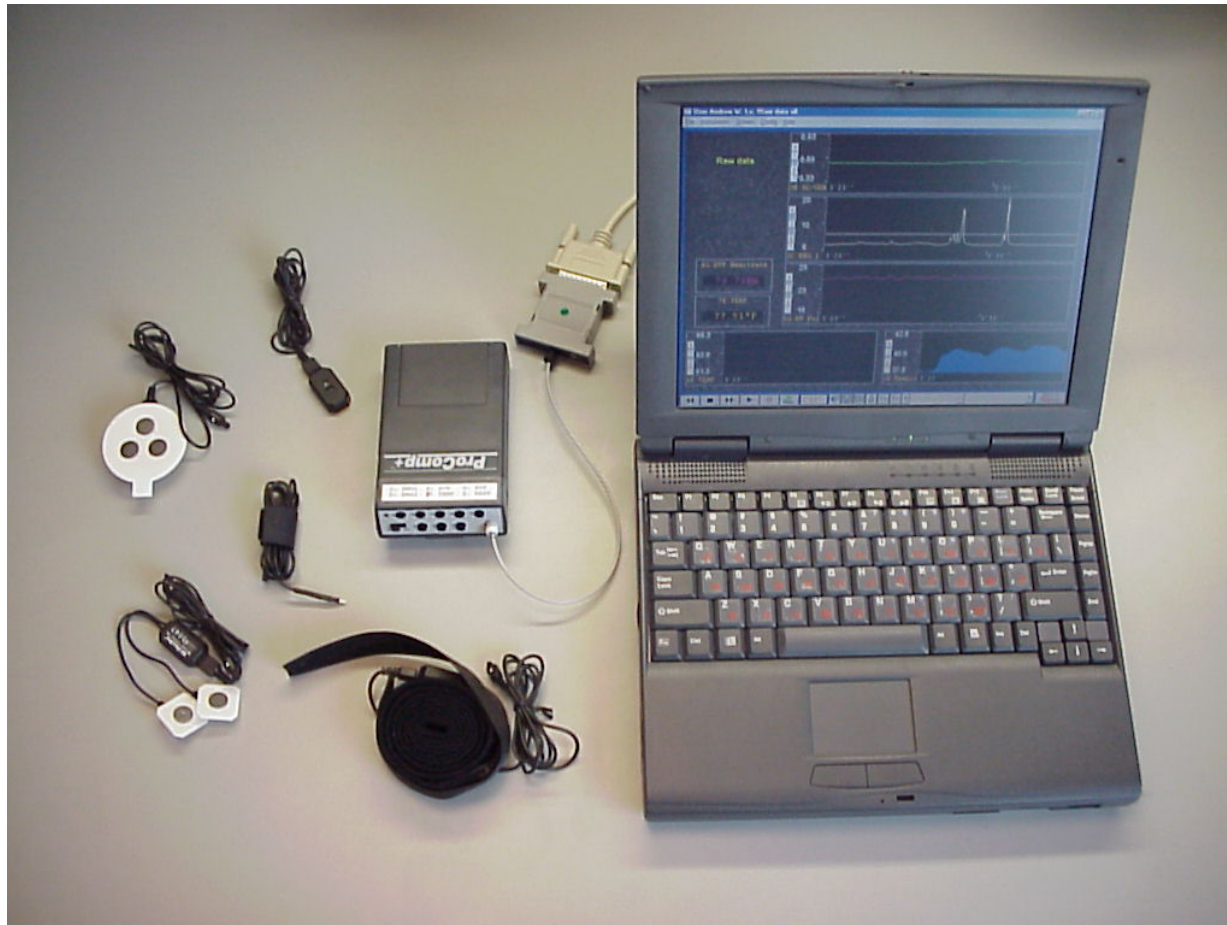
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## Six Projects:

- Evolutionary Underpinnings of Behavior
- Statistical Analysis of the Power of Selection
- The Dynamics of the Hedge Fund Industry
- **Psychophysiology of Risk Processing**
- **Psychological Profiles of Day-Traders**
- A Cognitive Map (fMRI) of Risk Preferences

# *Study A: Psychophysiology*

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# *Study B: Day Traders*

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## An On-Line Study:

- Sample of 80 Volunteers (Day-Traders)
- Participants in On-Line Training Program
- Offered By Linda Bradford Raschke
- Our Study Was Unrelated To Program
- Psychological Profiles, Emotional States
  - Common Personality Traits for Traders?
  - Importance of Emotional State for Trading?

# *Study B: Day Traders*

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## Subjects Asked To Complete Following Surveys:

- **Initial:**
  1. Personality Traits (IPIP-NEO) Survey
  2. Zung Depression (SDS) and Anxiety (SAS) Surveys
  3. Demographics Survey
- **Daily (Five Weeks):**
  1. Emotional State (UWIST MACL) Survey
  2. Trading Performance
- **Final:**
  1. Zung Depression (SDS) and Anxiety (SAS) Surveys
  2. Internality, Powerful Others and Chance (IPC) Survey

# *Current Findings*

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- Emotions are present, even for experienced traders
- More controlled in experienced traders
- Too much emotion related to lower P&L
- Too little emotion related to lower P&L
- High internality scores related to lower P&L
- Low chance scores related to lower P&L
- Suggests a “zone” for optimal trading

# *The Adaptive Markets Hypothesis*

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**Biological**, Not Physical, View of Markets:

1. Individuals Act In Self-Interest
2. Individuals Make Mistakes
3. Individuals Learn and Adapt (Heuristics)
4. Competition Drives Adaptation and Innovation
5. Natural Selection Shapes Market Ecology
6. Evolution Determines Market Dynamics

But Where Do Heuristics Come From?

# *The Adaptive Markets Hypothesis*

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Simon's Notion of "Satisficing":

- Heuristics, Not Optimization
- Develop Mental Models To Simplify Decisions
- Learning Is A Key Evolutionary Adaptation
- Cost: Leads To Certain Biases And Regularities
- How Do We Know Where To Stop Optimizing?

Answer  $\Rightarrow$  **Evolutionary Forces**

# *The Adaptive Markets Hypothesis*

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Consider Getting Dressed:

- 5 Jackets, 10 Pants, 20 Ties, 10 Shirts, 10 Pairs of Socks, 4 Pairs of Shoes, 5 Belts
- 2,000,000 Possible Outfits!
- Takes 1 Second To Evaluate Each Outfit
- How Long To Get Dressed?
- 23.1 Days!

How Do We Get Dressed So Quickly?

# *Some Evolutionary Arithmetic*

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How Powerful Are Evolutionary Forces?

- Consider Drawing 9 Random Letters
- How Likely is “CAPMLIVES”?
- 1 Out of  $26^9 = 5,429,503,678,976$
- Suppose Initial Draw Is: “TJIXOMSFZ”
- How Long Before “CAPMLIVES”?

# *Some Evolutionary Arithmetic*

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Suppose 10 “Offspring” Are Produced:

- For Each Offspring:
  - Each Letter Unchanged With Prob 99/100
  - Changed With Prob 1/100 To Another Letter
  - If Changed, 25 Equally Likely Possibilities
- “Best” Offspring is Parent of Next 10
  - “Best” Means Closest Match (Fittest)
  - In Case of Ties, Randomize

# *Some Evolutionary Arithmetic*

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Probability of At Least 1 Offspring With At Least One Match:

$$P(\text{incorrect letter} \rightarrow \text{correct letter}) = 1/100 \times 1/25 = 0.0004$$

$$\begin{aligned} P(\text{all letters remain incorrect in 10 copies}) &= (1 - 0.0004)^{9 \times 10} \\ &= 0.9646 \end{aligned}$$

$$P(\text{at least 1 match}) = 1 - 0.9646 = 0.0354$$

Generations Before At Least 1 Match:

$$1/0.0354 = 28$$

# *Some Evolutionary Arithmetic*

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How Many Generations From 0 to 9 Correct?

- Add  $0 \rightarrow 1, 1 \rightarrow 2, \dots, 8 \rightarrow 9$
- Approximately 751 Generations
- Not Bad, For “Trial and Error”
- Evolutionary Forces Can Be Substantial!





# Conclusions

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- **Fear** and **Greed** do drive Wall Street
- That may not be a bad thing
- Possible explanation for “intuition”
- Irrational behavior  $\Leftrightarrow$  emotions gone wild!
- Modeling rationality may involve multiple minds
- Supports the Adaptive Markets Hypothesis

$\Rightarrow$  The Zen of Trading

# *Additional References*

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