# “Thinking, Fast and Slow”

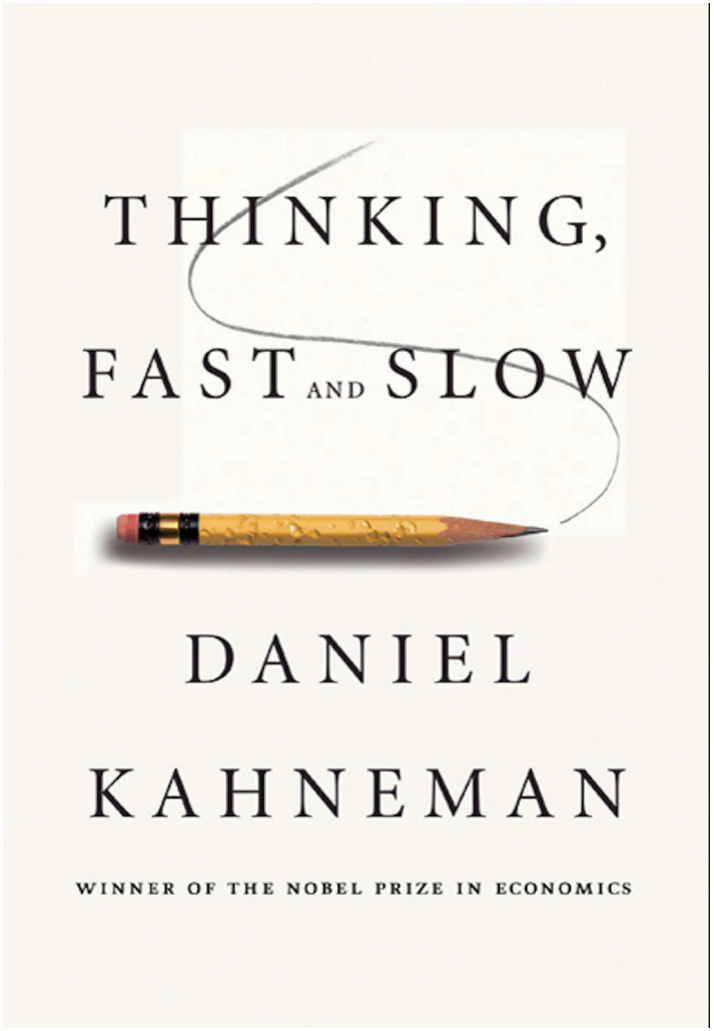
## Evolutionarily Old and New Modes of “Thinking”

Book: Daniel Kahneman
Colloquium: Chris Comiskey

October 31, 2018

# The Book

- Understand people a bit better.
- Understand yourself a bit better.
- I read it twice.



# Introduction

## Kahneman, Evolution, the Brain...

- If you don't "believe" in evolution...
- Kahneman: Behavioral Economics, behavioral psychology, decision making
- Introducing: modular theory of mind
  - *Kind of* like apps
  - Apps that interact, compete, interrelate, self-manage(?)
  - Not a physical partition of brain
  - e.g. small heat robot
  - Different parts of the brain evolved at different times, with new functions added on later, melding with existing ones...

# Thinking, “Fast and Slow”

## Old and New

- Kahneman calls them “System 1” and “System 2”
- Evolutionarily old and new
  - Old: amygdala (?) — fast circuitry; closer to the stock exchange
  - New: prefrontal cortex — reflection, abstract thinking, etc.
- Not the same thing—equating amygdala/prefrontal to fast/slow—but that’s the idea behind the more complex underlying brain reality.

# Fast and Slow: System 1 and System 2

- Evolutionarily: old System 1, and new System 2
- e.g.
  - System 1: “I can’t believe that f****r cut me off!! I’ll club him!!”
  - System 2: “Then again, maybe he really needed to get over; plus, I don’t want to go to jail.”
- e.g. 2
  - System 1: Recognizing emotions in facial expressions
  - System 2: 17*34 = ?

# What's the point?

- Cognitive biases.
- Humans commit systematic errors of (rational) thinking.
- We're irrational in systematic ways.
- Middle three (of five) sections of book:
  - Heuristics and Biases
  - Overconfidence (personal favorite)
  - Choices

# Heuristics and Biases

## Statistical Thinking

- What is a heuristic? A rule of thumb, more or less. (!!)
- Kahneman and Tversky – best friends, walks, thought experiments of a kind; so, here we go...
- “A study of new diagnoses of kidney cancer in the 3,141 counties of the United States reveals a remarkable pattern. The counties in which the incidence of kidney cancer is lowest are mostly rural, sparsely populated, and located in traditionally Republican states in the Midwest, the South, and the West. What do you make of this?”
- What *do you* make of this?

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- What *do you* make of this?
- Statistical thinking is hard
- Were you using System 1 or System 2? Are you sure?

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- What *do you* make of this?
- Statistical thinking is hard; were you using System 1 or System 2?
- What about the counties with **highest** incidence of kidney cancer?

- Counties with **highest** incidence of cancer:
  - "...mostly rural, sparsely populated, and located in traditionally Republican states in the Midwest, the South, and the West."
- Hmmm...

- Counties with **highest** incidence of cancer:
  - "...mostly rural, sparsely populated, and located in traditionally Republican states in the Midwest, the South, and the West."
- Associative, causal-relationship-seeking, story-telling System 1 goes bananas!
- Answer: small samples yield extreme results more frequently.
- What's happening (with System 1) in these situations *instead* of statistical thinking? (or whatever other System 2 operations)
- Let's look at one example System 1 pair in action...

# Heuristics and Biases

## e.g. Substitution, Availability

- Question: which is more likely cause of death, and by what ratio?
  - Lightning or botulism?
  - Accidents or diabetes?
  - Disease or accident?
- We'll come back to this.

# Heuristics and Biases

## e.g. Substitution, Availability

- Dynamic: brain is lazy, and a System 1 heuristic is easier than calling on System 2.
- Substitution heuristic: replace a hard question with an easier one
- e.g. Substitution heuristic, and availability bias

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  - How likely is your plane to crash?
  - How likely is a school shooting at the local school?

# Heuristics and Biases

## e.g. Substitution, Availability

- Substitution heuristic: if a question is too hard, answer an easier one!
- e.g. substitution heuristic, availability bias
  - How likely is your plane to crash?
  - How likely is a school shooting at the local school?
- Common answer much higher than true answer because:
  - Substitution—answer easier question: how easy is it to recall instances of such events?
  - Availability bias—quite easy, b/c media coverage makes crashes and shootings easy to recall
  - Ease of recall replaces actual likelihood estimation $\rightarrow$ people think these events are more likely than they are.

# Heuristics and Biases

## e.g. Substitution, Affect

- Which is more likely cause of death, and by what ratio?
  - Lightning or botulism? lightning:botulism =
  - Accidents or diabetes? diabetes:accident =
  - Disease or accident? disease:accident =

# Heuristics and Biases

## e.g. Substitution, Affect

- Which is more likely cause of death, and by what ratio?
  - Lightning or botulism? lightning:botulism = 52:1
  - Accidents or diabetes? accident:diabetes =
  - Disease or accident? disease:accident =

# Heuristics and Biases

## e.g. Substitution, Affect

- Which is more likely cause of death, and by what ratio?
  - Lightning or botulism? lightning:botulism = 52:1
  - Accidents or diabetes? accident:diabetes = 1:4
  - Disease or accident? disease:accident =

# Heuristics and Biases

## e.g. Substitution, Affect

- Which is more likely cause of death, and by what ratio?
  - Lightning or botulism? lightning:botulism = 52:1
  - Accidents or diabetes? accident:diabetes = 1:4
  - Disease or accident? disease:accident = 18:1
- Example of affect heuristic — emotional response as probability estimator.

# Overconfidence

## Causality vs. Chance

- People systematically overestimate their understanding of events, and underestimate the role of chance.
- Kahneman references *Fooled by Randomness*, by Nassim Taleb
- Personal favorite
- e.g. wealth (pet peeve of mine)
- $\rightarrow$ “Geography is destiny.” -Jack Ryan (Amazon show)

# Overconfidence

## Hindsight Bias

- e.g. Narrative fallacy.
- We tell good stories. And we believe them.
- Why did Google succeed?
  - Geniuses, timing, etc.
- What didn't happen?

# Overconfidence

## Hindsight Bias

- Narrative fallacy. Why did Google succeed?
- Hindsight bias: we drastically overestimate how well we understand how and why things happened the way they did.
- The true test: was it predictable in advance?

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- Hindsight bias: we drastically overestimate how well we understand how and why things happened the way they did.
- The true test: was it predictable in advance?
- Google's founders tried to sell for $1 million, one year in, and failed.
- Our brains don't deal well with non-events.

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- e.g. Imagine: pinpointing three precise pre-fertilization moments—there was a 1/8 chance of a 20th century without Hitler, Stalin, or Mao Zedong.

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- e.g. 2: In November of 2006 I couldn't decide–for Thanksgiving, should I visit my cousin in Chicago or friend in San Francisco?
  - There was a 50/50 chance I would/not meet my wife.

# Choices

## The Prospect of Losses and Gains

- Prospect theory (Nobel Price)
  - The *prospect* of losses, gains $\rightarrow$ irrationality
- Losses loom larger than gains
- People are risk averse at the prospect of a loss
- e.g. Fill in the blank to make the wager worth it to you:
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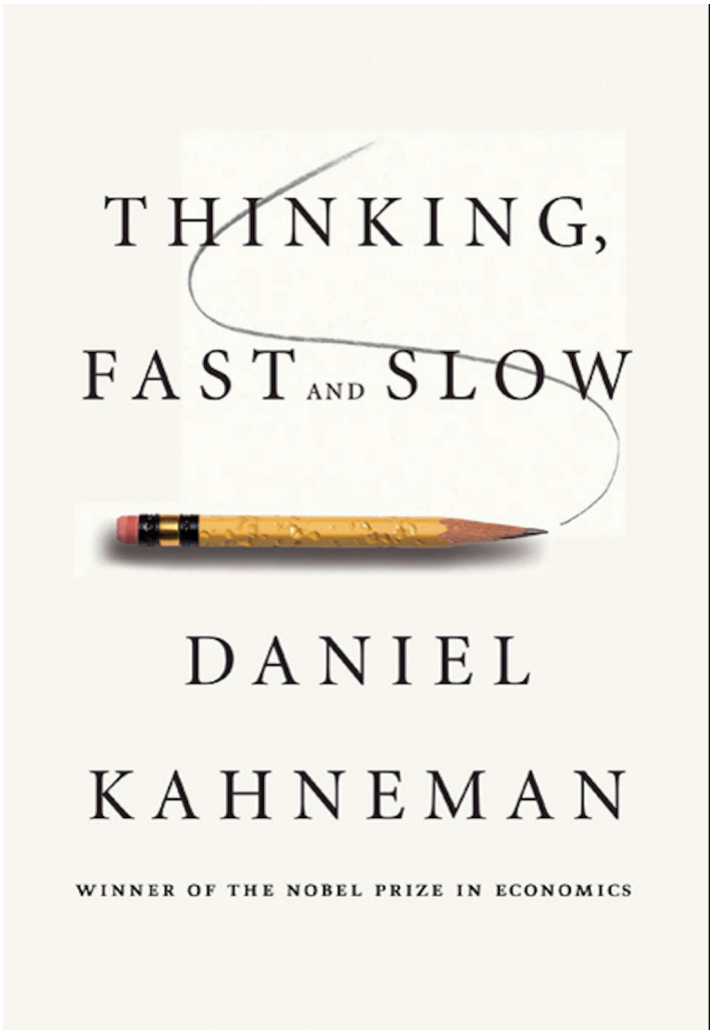
# Thinking, Fast and Slow

- Awesome book
- Some takeaways:
  - We're not quite as rational as we think we are
  - Beware of overconfidence; illusion of understanding, hindsight bias
  - We're associative, causality seeing machines
  - Emotional creatures, emotions influence thinking more than we're consciously aware of; heuristics, substitution
- Thumbtack anecdote



# Live Well and Prosper