

# Insights from behavioral economics for HIV Research

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# Theorems Slide 1

$$\tanh x = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$

$$\cosh^2 x - \sinh^2 x = 1. \quad \cosh^2 x = \frac{1}{1 - \tanh^2 x}.$$

$$\cosh(x \pm y) = \cosh x \cosh y \pm \sinh x \sinh y.$$

$$\sinh(x \pm y) = \sinh x \cosh y \pm \cosh x \sinh y.$$

$$\cosh^2 x = \frac{1}{2}(\cosh 2x + 1), \quad \sinh^2 x = \frac{1}{2}(\cosh 2x - 1).$$

$$\arcsinh x = \log\{x + \sqrt{x^2 + 1}\}.$$

$$\operatorname{arccosh} x = \log\left\{x \pm \sqrt{x^2 - 1}\right\} \quad (x \geq 1).$$

“ ...just kidding!

“ The only equation needed today:

” Behavioral Economics  $\neq$  Economics as you may know it...

- . ‘Traditional’ economics has its place (cost-effectiveness analysis, price setting),
- . Behavioral economics focuses on decision making and may offer new insights to HIV research

## Motivating example– organ donations

Fraction of drivers who are organ donors:

Germany: 12%

Austria: 99%

What is the difference?

Expensive information campaigns?

Drivers getting paid for donations in Austria?

” No, the difference is this:



Whether people have to check the  
box

Opt in versus opt out of donating organs

Thaler and Sunstein (2009): *Nudge*

## Motivating example 2

### Save tomorrow

Saving = adherence to a thrifty lifestyle

Most people do not save enough

But many want to, yet they would rather save tomorrow and spend today

Behavioral economics idea: sign people up for automatic deductions from future pay raises

Huge impact: savings rates rose from 3 to 13%; program rolled out at many large companies now

Thaler and Benartzi (2004)

For those who “need” to leave early, I will argue that...

1. Behavioral economics offers a systematic way to think about incentivizing behavior
2. Barely used in HIV research: wide open field for novel interventions
3. Example given: a currently ongoing NIMH-funded intervention in Uganda using behavioral economics to improve ARV adherence



## My argument:

1. People often know what is good for them



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1. People often know what is good for them
2. But they often have difficulty sticking to this decision



## “ Medication adherence



” Overeating



” Alcohol abuse



” Smoking



” Saving





” Conference attendance





## My argument:

1. People often know what is good for them
2. But they often have difficulty sticking to this decision
3. Behavioral economics can help us think why motivation often does not translate into action



## Behavioral change is key

- “ Many health problems neither medical nor scientific but behavioral (Rice, 2013)
- “ Unhealthy behaviors responsible for 40% of premature deaths in U.S. annually (Schroeder, 2007)
- “ Compliance for chronic diseases ~50% (WHO, 2003)

# What is behavioral economics?

- “ Different from traditional economics that assumes that people
  - . “...can think like Albert Einstein, store as much memory as IBM’s Big Blue, and exercise the willpower of Mahatma Gandhi” (Thaler and Sunstein, 2008)
- “ The insight that people do not always behave rationally (i.e. in their best interest)
- “ Studies systematic mistakes in decision-making

# Key behavioral biases

1. In forming decisions:

## **Bounded rationality**

Salience: Information most readily available is typically used

Anchoring: seemingly irrelevant information matters; defaults!

Framing: how questions are posed matters in surveys

Optimism and overconfidence: 90% of the population think they are above-average drivers; can lead to not enough precaution being taken and hence risky behaviors

# Key behavioral biases

2. In sticking to these decisions:

## **Bounded willpower**

Loss Aversion: people hang on to things at a loss, can lead to inertia: Defaults!

Status quo bias: researchers tend to sit in the same seats at conferences 😊  
people tend to stick with TV programs as they don't want to change channel

Overconfidence: people do not take precautions to guard them against their own behavior

Myopia: people give in to temptations at the expense of long-term goals

Herding behavior: people follow others in their decisions

# Important for many health behaviors: Myopia (the role of temptation)

People have problems with self-control

Oldest documented example: Ulysses tying himself to the mast to avoid the Sirens



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In econ lingo: people are *dynamically inconsistent*

i.e. people make choices that they later regret, but lack the will to resist a current benefit (i.e. ice cream) at the cost of long-term benefit (obesity)

Planners vs. Doers / Hot-Cold Empathy Gap, mindlessness

## Important for many health behaviors: Overconfidence

Asking patients **with adherence problems** in Uganda:

How likely is it that you will forget at least one dose of ARV over the next week:

How likely is it that other clients will forget at least one dose of ARV over the next week:



## Important for many health behaviors: Overconfidence

Asking patients **with adherence problems** in Uganda:

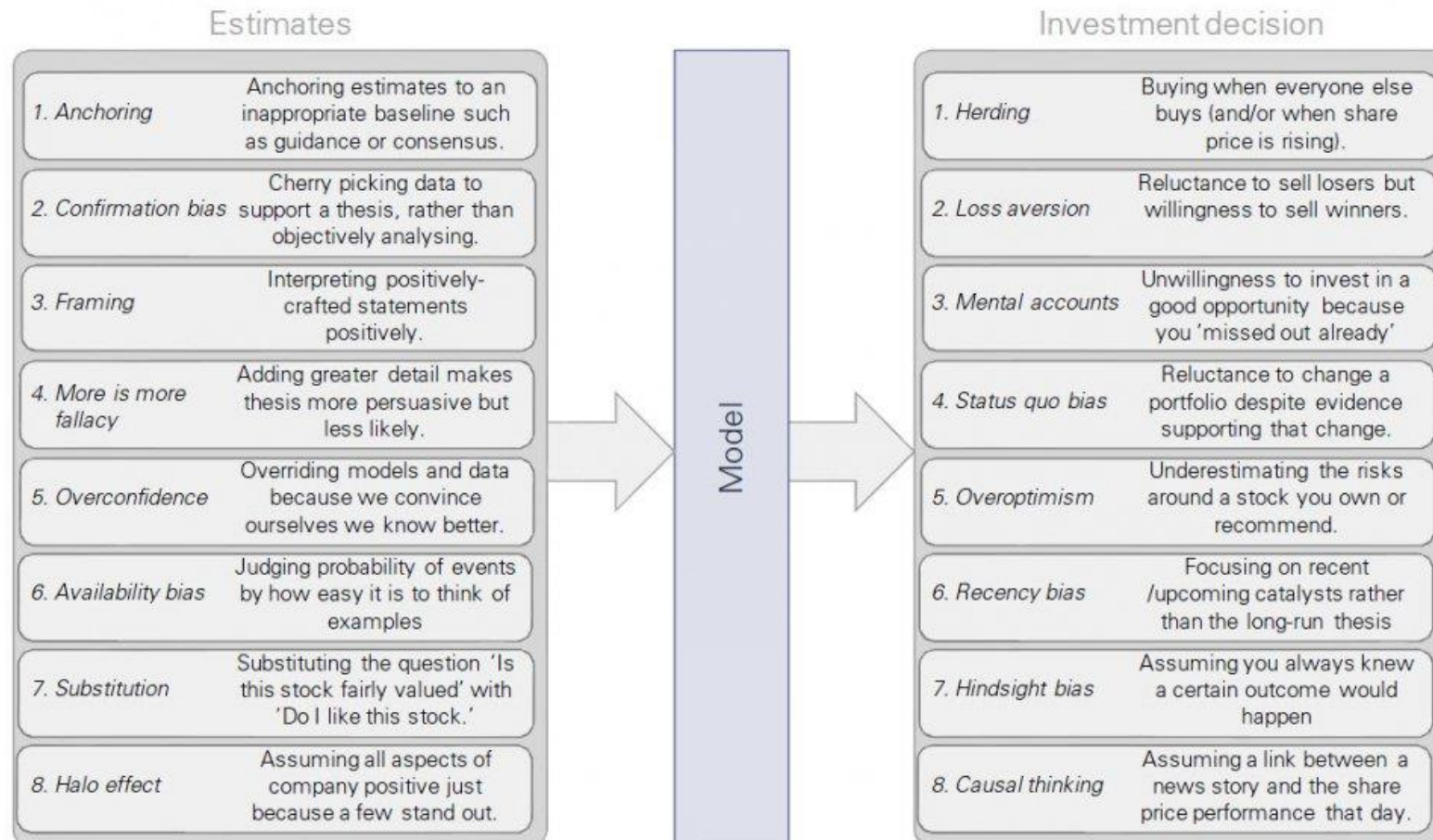
How likely is it that you will forget at least one dose of ARV over the next week:

71%: Very unlikely

How likely is it that other clients will forget at least one dose of ARV over the next week:

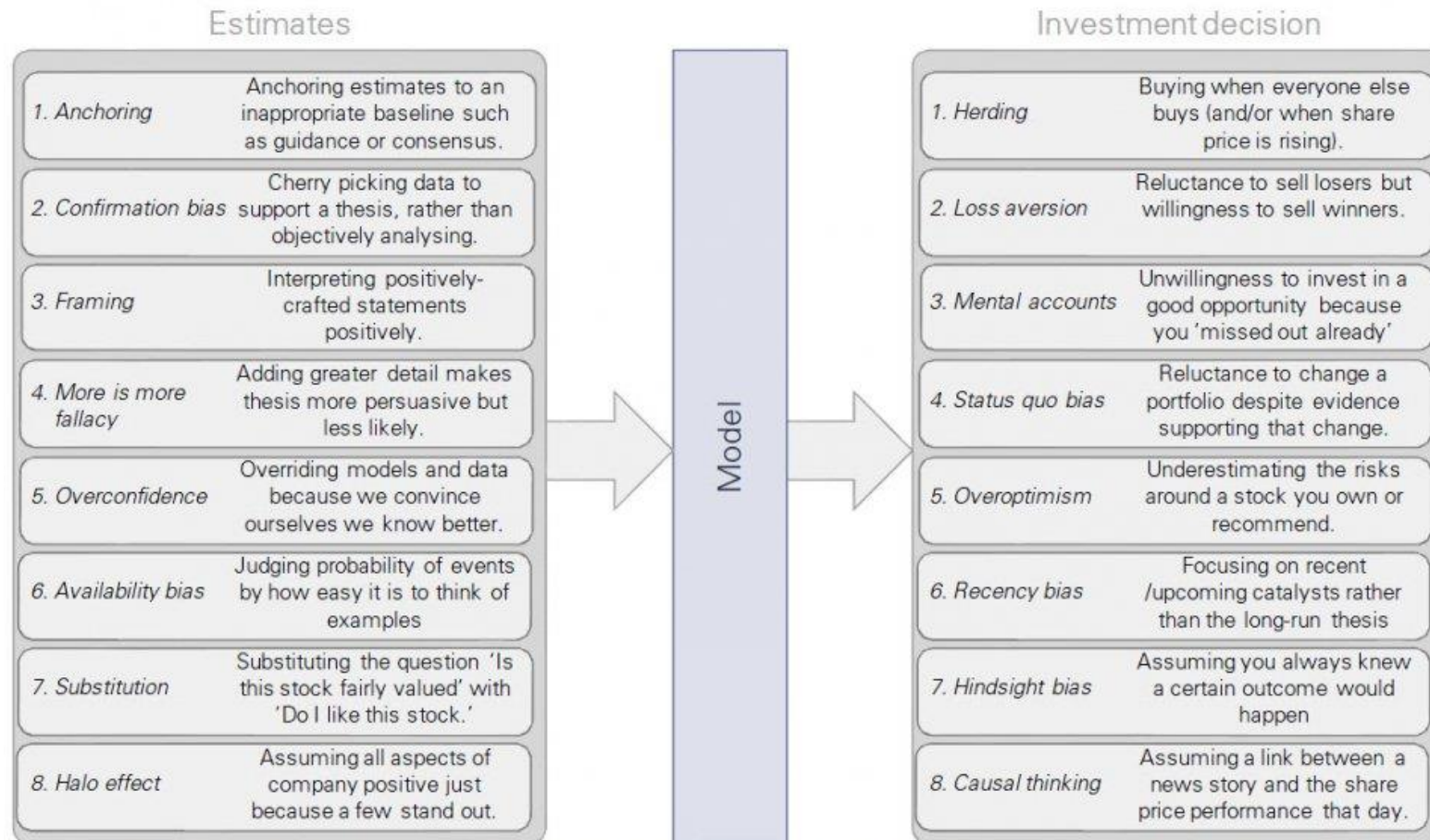
18%: Very unlikely

# These insights have been used in many fields...



Source: Goldman Sachs Research, Kahneman 'Thinking, fast and slow', Montier 'Behavioural investing: a practitioners guide to applying behavioural finance'.

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# Why behavioral economics in HIV research?

We know that people make best decisions when:

- . Decision is easy to make (simple decisions)
- . Good feedback about results of healthy behavior
- . Benefits of an action easy to observe

Aspirin-example

Unfortunately, HIV does not fit these criteria

These criteria can serve as entry points for behavioral economics interventions

## Characteristics of ARV adherence that make it difficult to adhere

HIV is a **chronic** disease with daily costs yet and a long-term benefit (survival)

Behavioral economics: people weigh net present value of costs and benefits but don't stick to their decisions (myopia) or don't take enough precautions to adhere (overconfidence)

Potential interventions to overcome this bias: nudge people to prepare the environment for good adherence (habit formation), make current benefits more salient, ...

## Characteristics of ARV adherence that make it difficult to adhere

The benefits of ART are largely **invisible** (absence of disease).

Behavioral economics: people fail to observe the positive effects of ART but they do experience the (current) negative side effects etc. (salience).

Potential intervention: make benefits visible (fitbit)

## Characteristics of ARV adherence that make it difficult to adhere

” **Little (and often wrong) learning** about the effectiveness of ARV

- . Side effects send signal that drugs may be bad for you
- . See other people on ARV fall sick or die [not knowing about their likely lack of adherence]
- . ARV causes an *absence* of disease; drug holidays often no observable negative effect

## Which (behavioral economics) interventions have been used in HIV research ?

- “ Conditional cash transfers for recent prevention efforts in sub-Saharan Africa  
(Baird et al., 2012, deWalque et al., 2012; Kohler and Thornton, 2012)
- “ Contingency management and voucher reinforcement interventions, mainly in substance abuse populations in the US
- “ Most of these focus on financial incentives, but there is little work on underlying biases and how to address them



## Rewarding Adherence Program (RAP) – the Basics

- “ NIMH-funded 3-year R34 at one clinic in Uganda’s capital Kampala
- “ Clients in previous studies complained of treatment fatigue
- “ Research question: how can we design a program to offer some fun to participants and get some more tangible benefit?
- “ Constraint: severely resource-constrained environment

## RAP – idea and justification

- “ Starting point: Ugandans like to play the lottery (and more importantly, winning something)
- “ How can we use the desire to win for designing a study to improve ARV adherence?
- “ “Adherence lottery”: win if you show healthy behavior

## Predecessor U.S. study

- “ Small sample: incentivizing warfarin adherence among ten volunteers
- “ Higher stakes: daily chance to win 3-5 USD
- “ Hi-tech: MEMS caps electronically transmitted information, immediate feedback by SMS message
- “ U.S. setting

“ Volpp et al. (2008)

## RAP implementation

- “ Low-tech measurement: clients eligible for the prize drawing if come in on their scheduled clinic day
- “ Low-tech prize drawing: drawing cards out of a bag, win when “6”
- “ Small payouts: expected value of prize over the six drawings in one year: 2-3 USD.

## RAP – drawing a prize



## RAP – idea and justification

“ Insights from psychology and behavioral economics:

- Myopia: providing immediate benefits of a healthy behavior  
Operant conditioning / Contingency management; Conditional Cash transfers); variable rewards found more effective
- Loss aversion (people know if they are not allowed to enter the prize drawing)
- Optimism: leads to enrolment in the program
- Mood: adding a fun element associated with adherence

## RAP – study design

- “ 2 intervention groups (n=50 each), 1 control group (n=50)
  - one group eligible if come on the day they are scheduled
  - one group eligible based on 95% MEMS-measured adherence
  - control group: usual care, will participate in RAP after year 1
  
- “ Expected value of prize: ~2 USD per year, six drawings per year

## RAP – perception

” Some quotes from focus groups

“...having to take [the drugs] till death...may start to skip doses.” (young male client)

“[Giving prizes] is fun and helps to boost one’s morale.”  
(community leader group)

“[The program] is important. Its good.” (young female client)

“It’s a good motivator. It’s an incentive, this time we will take the medication.” [young male client]



## Preliminary evidence on behavioral biases in the sample

- “ Tying to the mast: 97% use some aid to remember their medication
- “ Information: 18% know the name of their ARV
- “ Only 6% remember more than 3 numbers out of 5 being read out to them

## Preliminary evidence on behavioral biases in the sample

- “ 53% are impatient (prefer current reward to higher reward in the future)
- “ 21% are risk-seeking
- “ 45% can calculate the percentage of adherence over 1 month if forgetting 7 pills on a 2-pill regimen

## Conclusion

- “ Tried to convince you that behavioral economics may be a valuable tool to think about adherence issues
- “ Pointed out main behavioral biases that are in the way of better adherence
- “ Indicated some potential projects that could be implemented and tested (is anyone game?)
- “ Presented preliminary results from an ongoing project in Uganda based on some of these insights

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Thank you!

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## Priorities for future research

- “ How to sustain behavioral change: DeFulio and Silverman (2012) review 5 studies with post-intervention data; all fail to keep up effects
- “ Research on use of incentives in HIV populations has focused on U.S., projects in low and middle-income countries needed (Galarraga et al., 2013); also, most of these studies are on populations with substance abuse problems (DeFulio and Silverman, 2012).
- “ Related: cost-effectiveness