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# Intra-Psychic Influences on Health Related Behavior

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ISBT II

# Outline

- “Truths” about behavior change
- It’s all a reflex
- It’s a socially-modified reflex
- It’s mostly rational
- It’s bounded rationality (and how brain is wired)
- It’s emotions (somatic marker hypothesis)
- Some work-arounds

# Truths about behavior change



Canadian Institutes of Health Research, IHDCYH

# “Truths” about behavior change

- Change is difficult
  - Our brains are wired to preserve behaviors that have been learned (though maybe reversible more than we thought)
- Family members and others in the social environment are powerful forces
- Many structural features of the environment promote behaviors that we wish to initiate or stop

# Example of food

- Conditioned responses related to eating very hard to extinguish
- Eating is a social activity that usually takes place in the company of others
- The environment has a huge influence on what we eat

# Lunch Line Redesign

- Put nutritious food at beginning rather than middle of line
- Give healthy foods appealing descriptive names, ie, “creamy”
- Choice of healthy foods rather than only one offered
- Keep sweet treats in opaque-covered container
- Decrease bowl size for cereal
- Use trays to encourage non-compact food
- Put salad right before register rather than off to side
- Ask, “do you want salad?”
- Cash-only cookies
- Speedy checkout if no cookies

For *New York Times* infographic

[http://www.nytimes.com/interactive2010/10/21/opinion/20101021\\_Oplunch.html](http://www.nytimes.com/interactive2010/10/21/opinion/20101021_Oplunch.html)

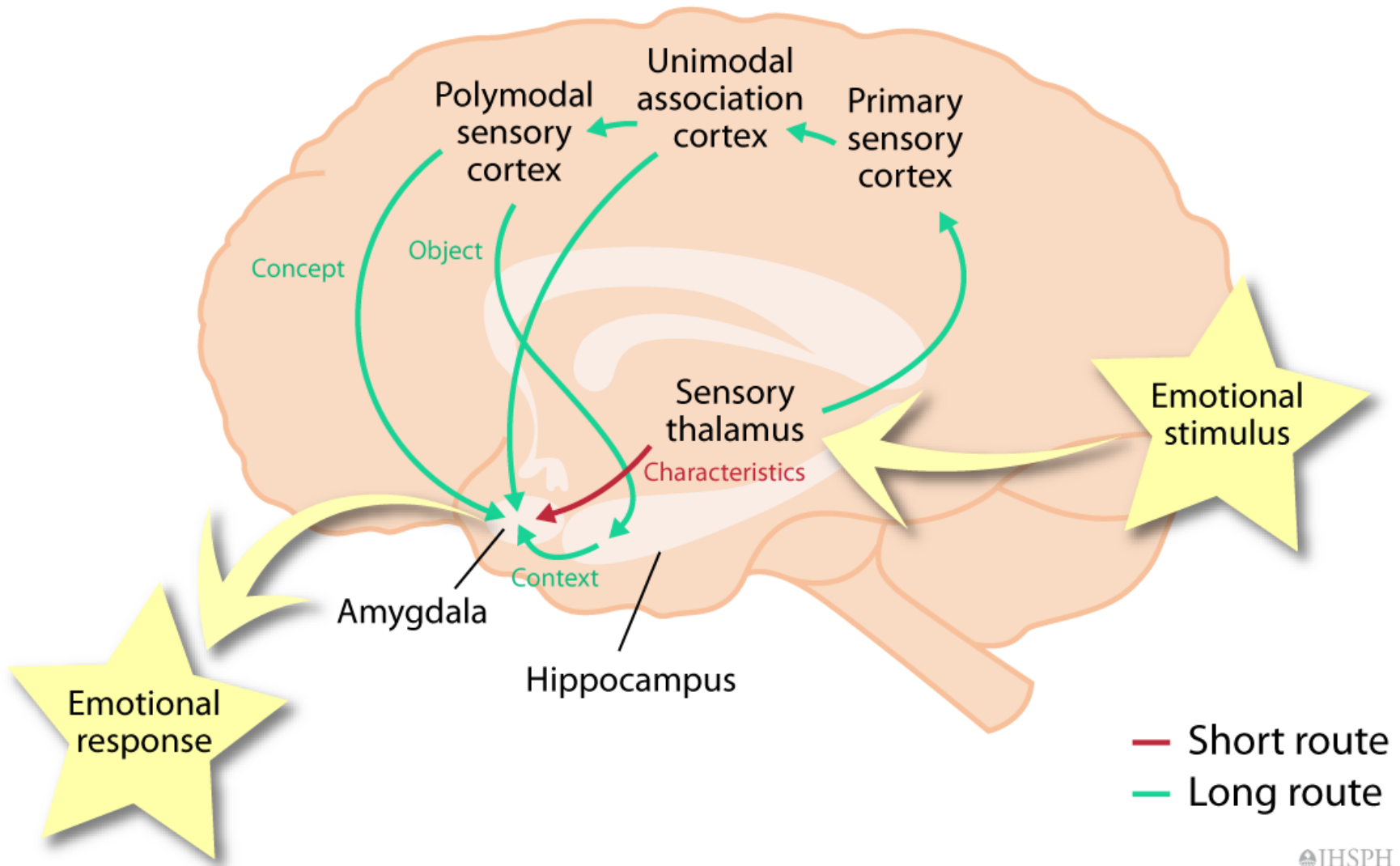
1. It's all reflexive



# Classical conditioning

- “Pavlov’s dog”
  - Food is the unconditioned stimulus (US) (also called “stimulus control”)
  - Bell was neutral but now is the conditioned stimulus (CS)
  - Salivation was UR then becomes the conditioned response (CR)
- Common examples? Martin and Dubbert?

# Short and Long Routes to Memory and Response



# Operant conditioning

- Behaviors (“operants”) positively or negatively re-enforced by reward or punishment
  - Re-enforcers consistent and immediate
  - Contracts can make them explicit
  - Can include setting one’s own goals and anticipating setbacks
- “Shaping” – start desired change at level where likely to succeed, provide lots of positive reinforcement

# Operant conditioning

- Generalization training
  - Moving the behavior to multiple settings
- Fading external re-enforcement to self-monitoring (or a combination)
- Relapse prevention
  - Anticipating environmental changes that will remove cues or change re-enforcers
  - Anticipating barriers
  - Development of coping mechanisms for setbacks

# Stimulus control

- Want to develop new response to old stimulus that is resulting in an unwanted behavior
  - Use reward to favor the new stimulus
  - Fade the reward
- Example: eat when fatigued and nervous
  - Alternative: take a brisk walk
  - Reward: put money in “piggy bank” at end of walk
  - Fade reward as able to eat less

# Extinction

- Is the conditioned behavior ever gone?
  - No longer happens spontaneously or with stimulus
- Desensitization
  - Present stimulus
  - Reward delay or non-response
  - Punish response
- But often returns in new setting

# Using behavioral interventions

- Overt, easily measurable behaviors
- Opportunities for learning
- Clear understanding of re-enforcers

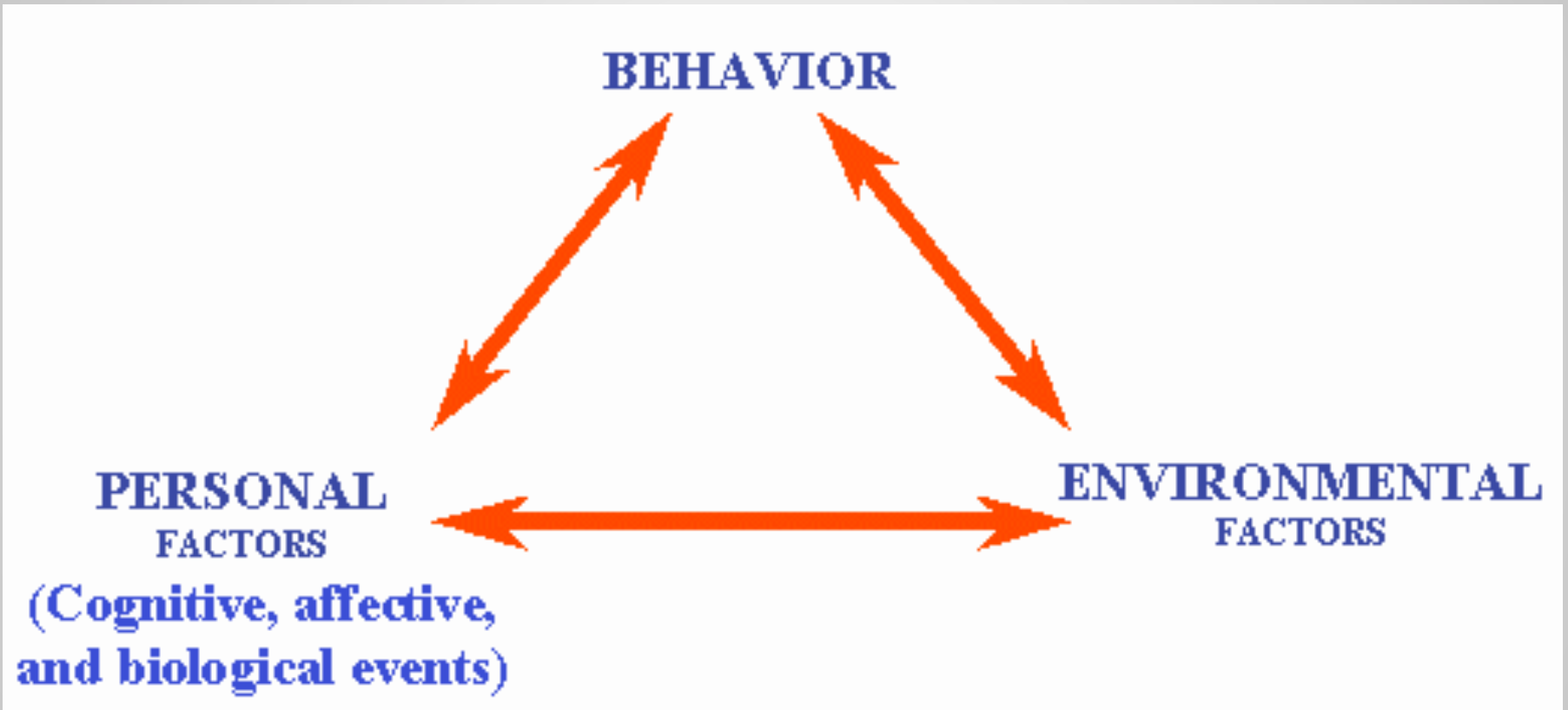
## 2. Socially-modified reflexes



# Society cognitive theory

- Albert Bandura 1960's
- Advances:
  - Re-enforcement could be and was often vicarious
  - Learning can take place by watching others
  - Humans not just reactive to the environment
    - Have their own potentially unique goals
    - Able to act on the environment
    - Use cognition to construct their reality

# Social cognitive theory



Source: Pajares (2002). Overview of social cognitive theory and of self-efficacy. 12-8-04. From <http://www.emory.edu/EDUCATION/mfp/eff.html>.

# Social cognitive theory

<i>Concept</i>	<i>Definition</i>	<i>Potential Change Strategies</i>
<b>Reciprocal determinism</b>	The dynamic interaction of the person, behavior, and the environment in which the behavior is performed	Consider multiple ways to promote behavior change, including making adjustments to the environment or influencing personal attitudes
<b>Behavioral capability</b>	Knowledge and skill to perform a given behavior	Promote mastery learning through skills training
<b>Expectations</b>	Anticipated outcomes of a behavior	Model positive outcomes of healthful behavior
<b>Self-efficacy</b>	Confidence in one's ability to take action and overcome barriers	Approach behavior change in small steps to ensure success; be specific about the desired change
<b>Observational learning (modeling)</b>	Behavioral acquisition that occurs by watching the actions and outcomes of others' behavior	Offer credible role models who perform the targeted behavior
<b>Reinforcements</b>	Responses to a person's behavior that increase or decrease the likelihood of reoccurrence	Promote self-initiated rewards and incentives

# 3. It's mostly rational

# Health Belief Model

- Based on “value expectancy theory”
- Combination of behaviorism and cognition
- Developed in 1950’s to understand response to TB screening

# Hochbaum 1958 data on TB screening

## 1. Perceived susceptibility

- could you have TB even if you felt well?

## 2. Perceived benefits of screening

- would an X-ray be able to find the TB?
- would early detection and treatment make a difference?

### • % obtaining X-ray:

- if “yes” to (1) and (2) 82%
- if “no” to (1) and (2) 21%

# Main components of the HBM

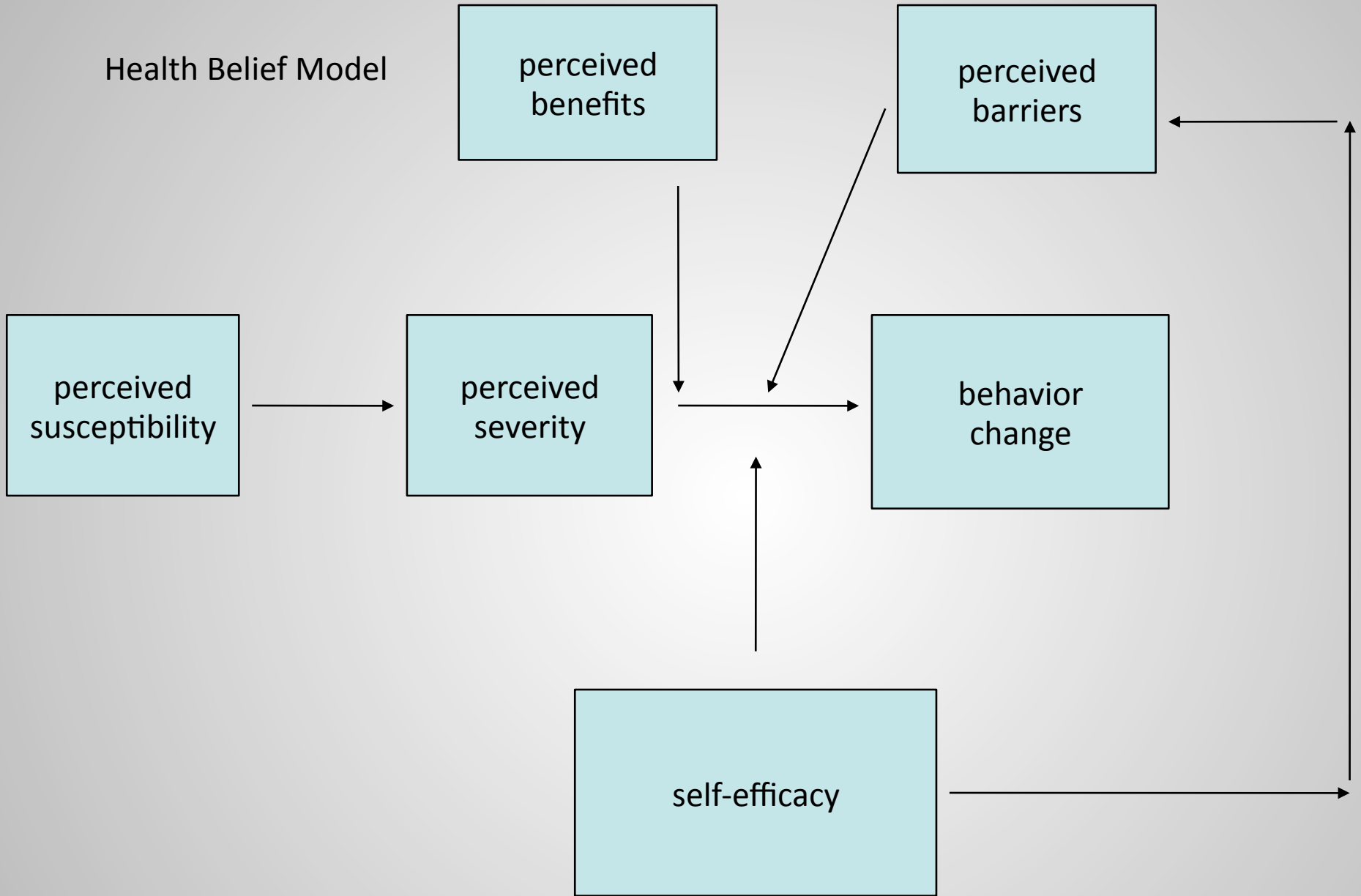
- Perceived susceptibility
  - your chances of getting the condition/problem
  - try to personalize as much as possible
  - work on accurate perception
- Perceived severity
  - how serious will the consequences be?
  - try to make as specific and individualized as possible

# Main components of the HBM

- Perceived benefits
  - what would be the outcome of acting?
  - with regard to the specific action that is proposed
- Perceived barriers
  - can be psychological or material
- Self-efficacy (added later)
  - confidence in ability to take action
  - may vary greatly with specific behaviors



Health Belief Model



# 4. Just how rational? “Bounded rationality”

## a. Cognitive limits on data manipulation

- Observation: persuasive messages that target complicated actions less likely to succeed
  - Complications can be social or practical – common issue is need for multiple steps, integrating large amounts of data, varying opinions, multiple probabilities
  - Too many choices lead people to choose poorly or not choose at all
- Are there really just 7 chunks?

# Limits on data processing

- Experiment with betting on horses
  - 10 more parameters versus 5
    - Increased confidence
    - No increase in accuracy
    - Decreased reliability
  - Additional information not used
- Availability bias
  - Focus on most recently or frequently encountered relevant issue

# Education and “pre-processing” as alternatives

- FDA labelling
  - Standardization of report
- “Consumer Reports” grids
  - Data simplification
  - Expert opinion
  - Graphical presentation

## b. Problems with “framing”

Tversky and Kahneman: decisional frame is "decision-maker's conception of the acts, outcomes, and contingencies associated with a particular choice"

Any given decision problem can be framed in more than one way. They compare it to a visual image: for example, height of two mountains -- relative height varies with the direction you look from, but we know that the mountains aren't changing despite the illusion

# Gain versus loss

- Imagine that you just found \$50. You have to pick one of the following options (A or B)
- Gambit A (sure outcome)
  - Keep \$20
  - Lose \$30
- Gambit B (gamble)
  - Gamble that has 40% chance of keeping all \$50 and 60% chance of losing all \$50
- “Framing” A as “keep” increases likelihood of going for the sure option

# Gain versus loss

- One way frames may work is through an initial “emotional” evaluation of the choice
- Takes action of a different brain area to over-ride that initial emotional choice
- Activity in yet a third area relates to the general tendency a person has to be able over-ride the initial emotional evaluation

Kahneman and Frederick, Trends in Cognitive Sciences 2006



# Gain versus loss

- Positive and negative “utilities” get different weights
  - Losses weighted relatively more strongly than gains, and so they are avoided
  - Displeasure of losing 100 > pleasure of getting 100
- Re-interpretation of probabilities
  - Low probabilities associated with bad outcomes are over- weighted relative to high probability needs
  - Chose health plan with great catastrophic coverage but high co-pay for preventive care

## c. Other violations of utility model

- a. Values often formed in discussion  
Co-constructed in discussion with/reaction to others
- b. Relative versus absolute differences: 10-20 bigger than 100-120  
(frequent issue with large purchases)
- c. Difficulty anticipating future needs or how values may change

# Perceived vulnerability

- Key factor in nearly all health behavior theories
- Seem to be good examples of applications to behavior change campaigns
  - Smoke detectors (at least buying it)
  - Cancer screening

# Variable VMPC sensitivity to cognitive input

- Brain structure (old:new/posterior:anterior) relates to sensitivity to information – speed and saliency of response
- Time: present/frequent versus distant/infrequent
- Specificity: concrete versus abstract
- Probability: greater versus lesser

# VMPC-isms

- Losing \$1000 tomorrow is harder to contemplate than losing \$2000 next year
- Credit is more abstract than real money (charging \$20 seems less of a loss than handing over a \$20 note)

# 5. Somatic marker hypothesis

- May relate to emotional valences associated with frames

# What/why emotions

- Part of homeostatic, regulatory mechanisms
  - Linked to neural and hormonal responses
- Reflect the state of the body as it is or as it might be in the future
- Linked to/trigger complicated “reflexes” that include physiologic and behavioral changes

# What/why emotions

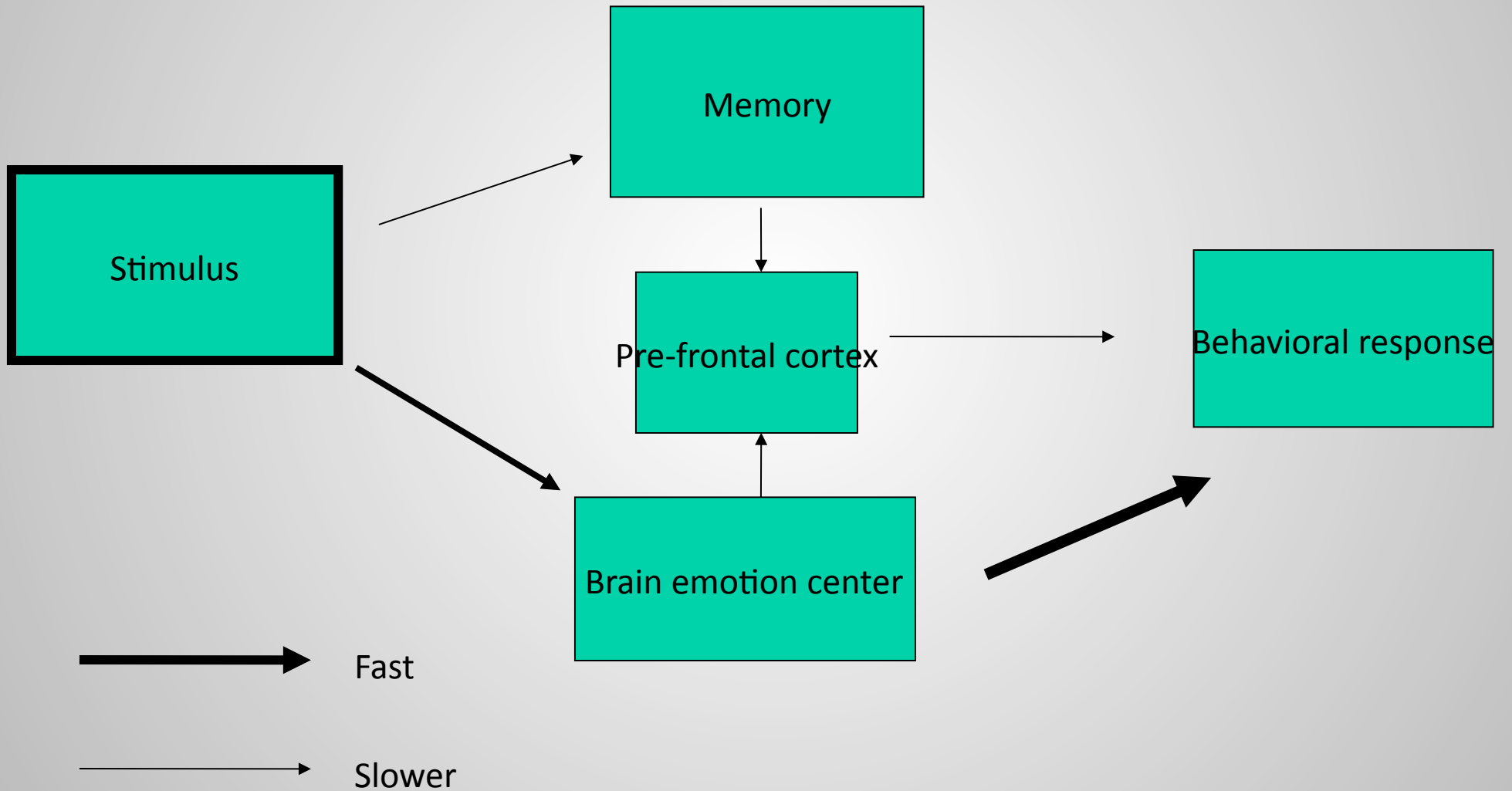
- Primary: fear, anger disgust, surprise, sadness, happiness
- Social emotions: sympathy, embarrassment, shame, guilt, pride, jealousy, envy, gratitude, admiration, indignation, contempt
- “Gut” feelings are the basis of human “logic”
  - Create the link between what we “know” and what we “do” by giving that knowledge emotional value



# Emotions and learning

- Brain highly adapted to rapidly and unconsciously assigning emotional value to situations, things, people
- Emotional learning is very hard to erase
- Behavioral triggers based on emotions compete with information coming from memories and “facts”

# Behavioral pathways



# How do emotions alter thinking?

- Working memory
  - What is seen as salient input from the outside
  - What matching memories are retrieved
- Create background states that alter evaluation of subsequent information
  - String of losses makes each one harder
  - String of gains makes each one more pleasurable
  - The stronger the background state the more resistance to “discordant” input or memories

# How do emotions alter thinking?

- Strongly negative background states shift information receptivity and decisions toward short-term goals/information and risk management/avoidance
- Strongly positive background states make people more receptive to thinking about the future and to risk taking

# Teens and smoking

- Increased prevalence of smoking with age
- Paralleled by increasing knowledge of risk
- Teens “cope” by:
  - Normalizing behavior
  - Increase estimates of rate among peers
  - Avoid thinking about negative consequences

# Fishbein's Boomerang

- 30 antidrug public service announcements for TV
  - Rated by adolescents for:
    - Dramatic effect
    - Information gain
    - Likelihood to be persuasive
- 6/30 rated as increasing interest in drugs
  - Global admonishments (just say no)
  - Messages about familiar threats
- 8/30 no different than control video

# Factors associated with perceived effect

- Realism with negative outcome for protagonist
- New knowledge about negative consequences
- Negative emotional response other than fear (ie, disgust, anger)
- Specificity to serious drug or outcome
  
- Least impact (or seen as pro-use)
  - Dramatic representation showing avoidance (“Say no”)
  - Comic presentation with negative consequences
  - Message relating to marijuana
  - Message about risk of drugs not specific to any drug

# 6. Work-arounds



# Opt-in vs. opt-out

- Cass Sunstein and Richard Thaler (Chicago)
- Usual situation with “opt-in” retirement plans
  - Despite huge incentives participation rates often 50-60% or less among younger employees
- Opt-out version has about 90-95% rate
- Apply to organ donation, credit card payment?
  - “libertarian paternalism”
  - “choice architecture”

# Transtheoretical model (Prochaska)

- evolved out of substance treatment field; have a party but nobody comes
- meant to incorporate common elements of many theories
- more explicitly than others poses temporal framework to evolution of intention and changes in behavior

# Major assumptions of transtheoretical model

- change happens in stages
  - people can remain at any given stage
  - no inherent motivation to change, in fact change is feared
- each stage has mechanisms that determine movement
  - each has "decisional balance" of pros and cons
  - progress happens when cons decrease relative to pros or vice versa
- interventions have to match the stage
- don't teach an action before someone has decided to act

# Stages of change

<b>Stage</b>	<b>Definition</b>	<b>Potential Change Strategies</b>
<b>Precontemplation</b>	Has no intention of taking action within the next six months	Increase awareness of need for change; personalize information about risks and benefits
<b>Contemplation</b>	Intends to take action in the next six months	Motivate; encourage making specific plans
<b>Preparation</b>	Intends to take action within the next thirty days and has taken some behavioral steps in this direction	Assist with developing and implementing concrete action plans; help set gradual goals
<b>Action</b>	Has changed behavior for less than six months	Assist with feedback, problem solving, social support, and reinforcement
<b>Maintenance</b>	Has changed behavior for more than six months	Assist with coping, reminders, finding alternatives, avoiding slips/relapses (as applicable)