

Escaping the Tyranny of Small Decisions: A Proposal

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Overview

- Briefly reflect on mechanisms of behavioral change concept
- Describe a new conceptual model for understanding challenging behaviors
- Illustrate potential opportunities to exploit new mechanisms of behavioral change derived from this model

Mechanisms of Behavioral Change

Noch, and Kazdin & Noch propose a fundamentally sound approach

- Existing treatments provide the mechanism

Potential constraints may include:

- Tx effects are small or modest

- Tx does not match current theory of disease or disorder

An Alternative Approach for Mechanism of Behavior Change

- Treatments or interventions should be supported by the theory of the disorder (Toplack et al., 2007)
- Changing conceptualization of the disease or disorder should force the evaluation of the adequacy of our treatments, and, in turn, our working theory of the disease/disorder should impact our treatment approaches. (Toplack et al., 2007)

“Thence is imposed the task of everywhere seeking out in the natural phenomena those elements that are the same, and that amid all multiplicity are ever present.”

Ernst Mach (1893)



The Tyranny of Small Decisions

Refers to situations where an individual can be victimized by the narrowness of the temporal context in which he or she exercises choice.

The Tyranny of Small Decisions (TSD)

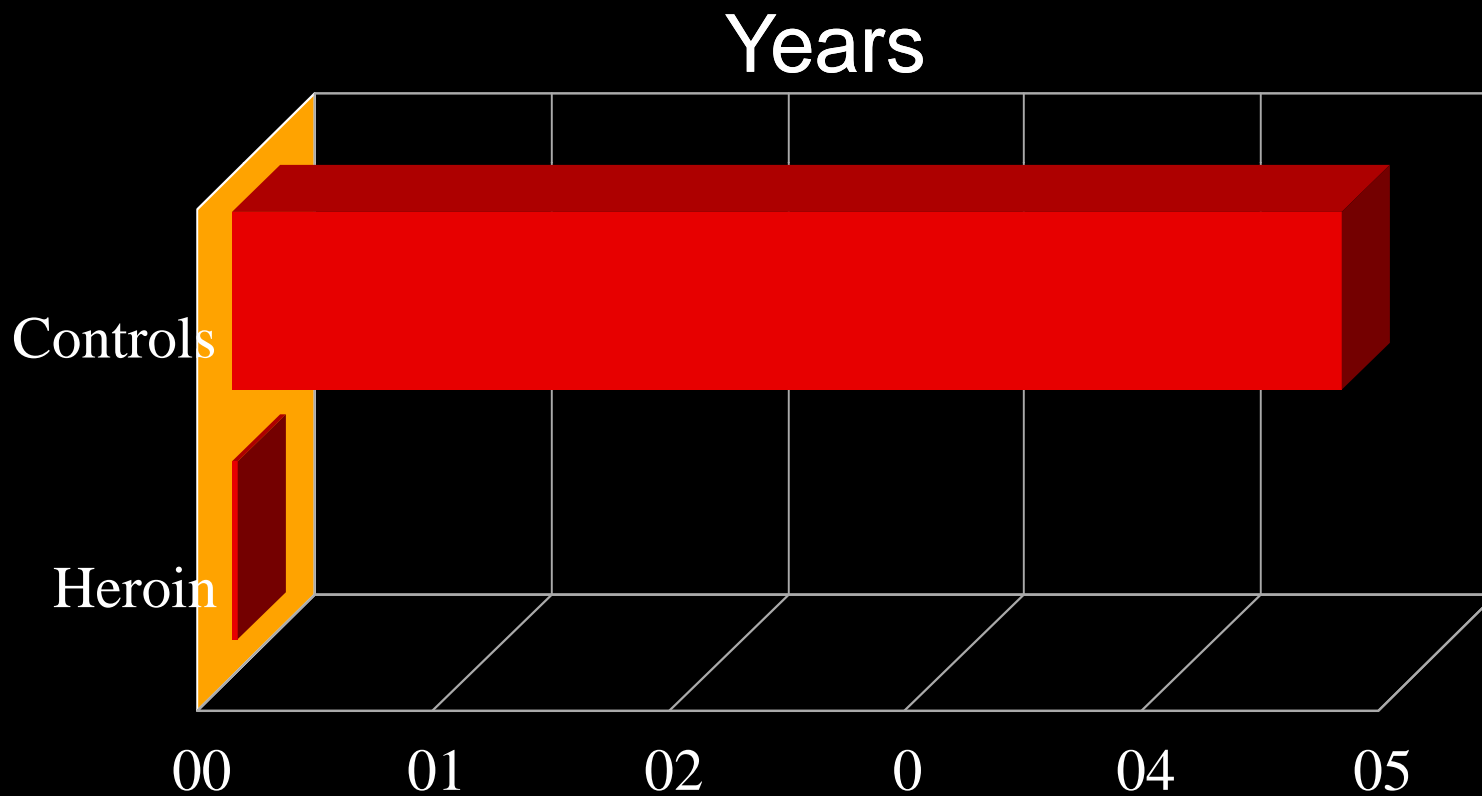
Characteristics

- ✓ Choices favor the immediate valued choice
- ✓ Ignore long-term consequences

Examples

- Addiction
- Risky Behaviors (e.g., HIV)
- Debt and the Failure to Save Money
- Global Climate Change
- Many Forms of Crime
- Obesity

Temporal Horizon



Delay Discounting

- Refers to the reduction in value of a reinforcer as a function of the delay to reinforcer delivery
- Psychophysical Titration Procedure
 - Developed by Mazur (1987) with pigeons
 - Used by Rachlin, Raineri, and Cross (1991) with humans

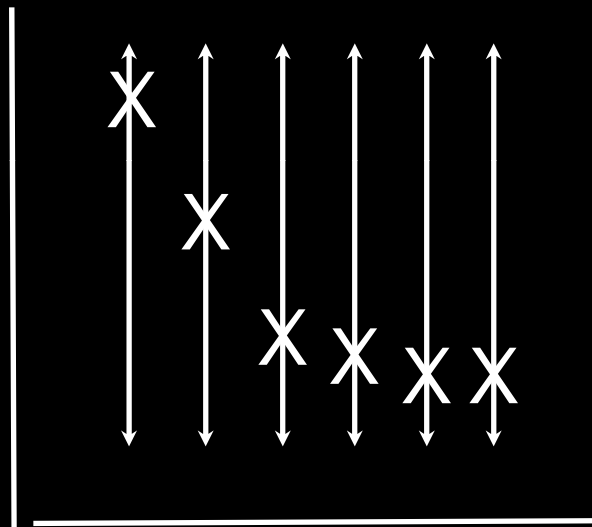
**Adjusting
Procedure
with
Hypothetical
Money**

Immediate Adjusting	Delayed Constant
\$1,000	\$1,000
\$990	\$1,000
\$960	\$1,000



Adjusting Procedure

Point of
Subjective
Equality



Delay

Hyperbolic Decay Model (Mazur, 1987)

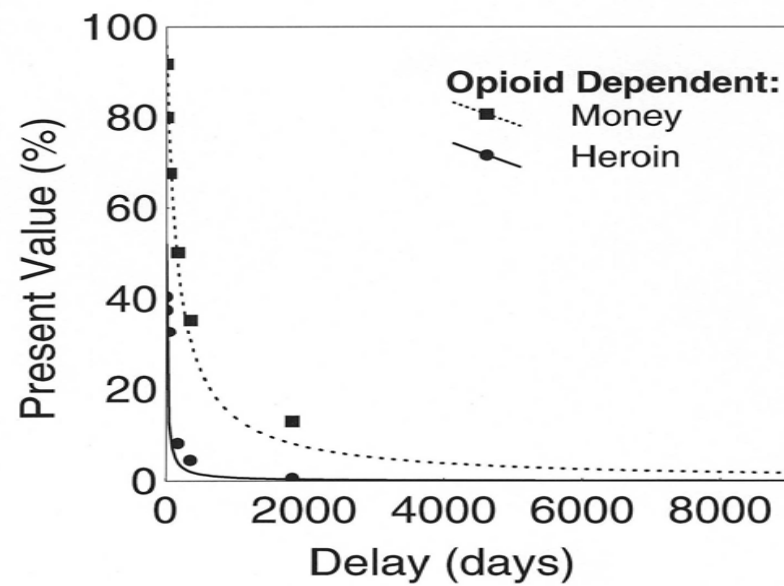
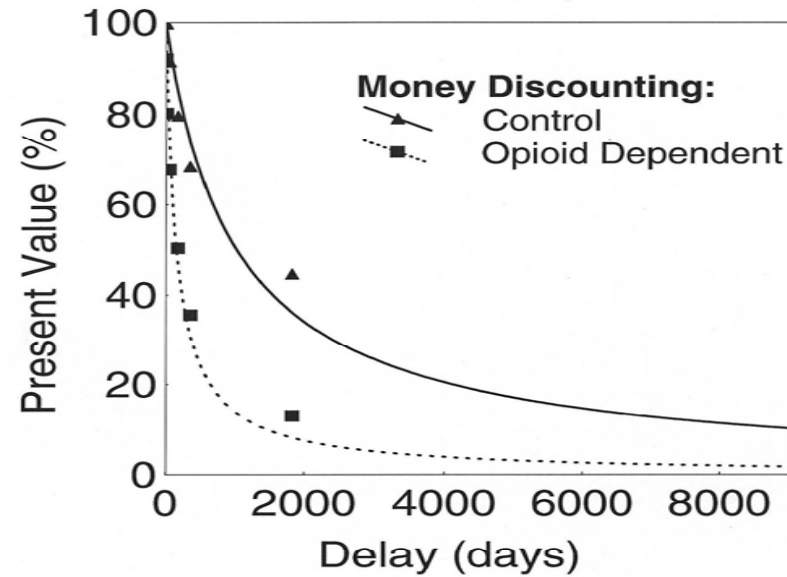
$$V = A / (1 + kD)$$

V = Value of reinforcer

A = Amount of reinforcer

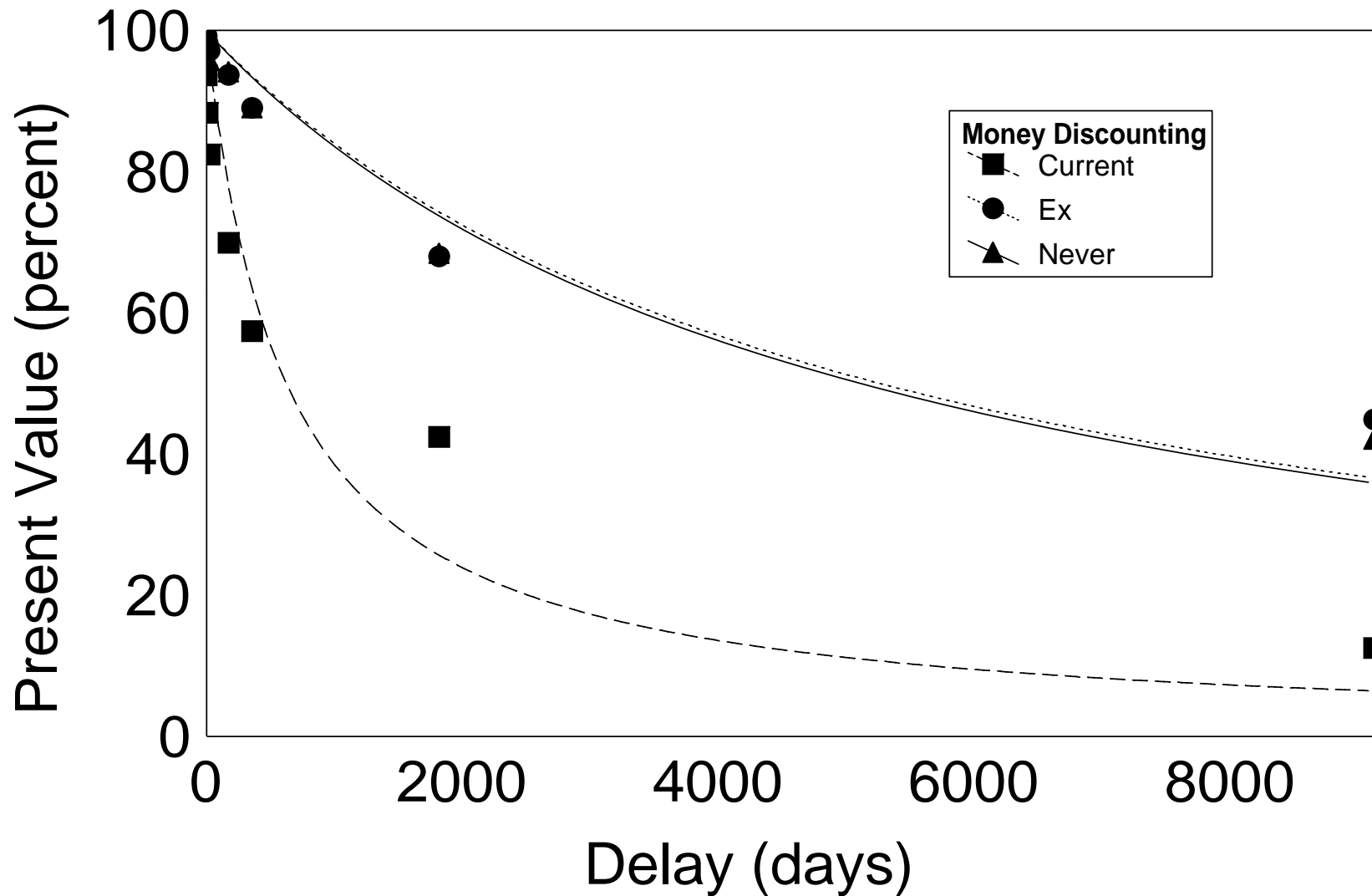
D = Delay of reinforcer

k = Discounting rate



Madden, Petry, Badger, & Bickel (1997)

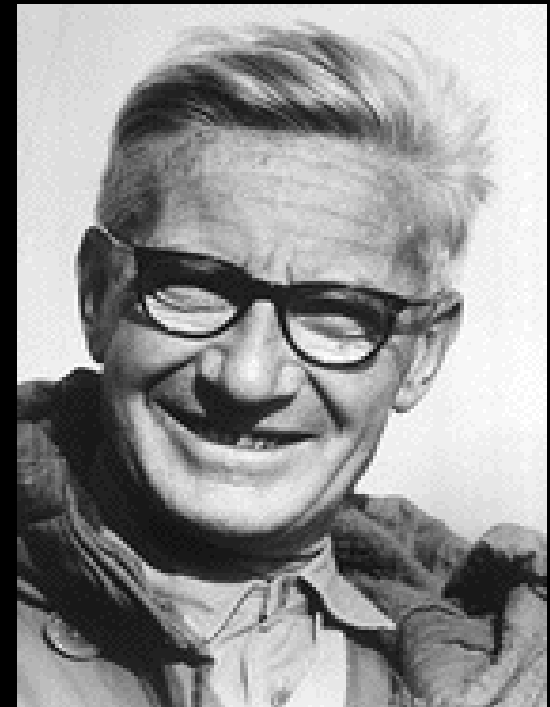
Smoking vs. Non-Smoking



Bickel et al. (1999)

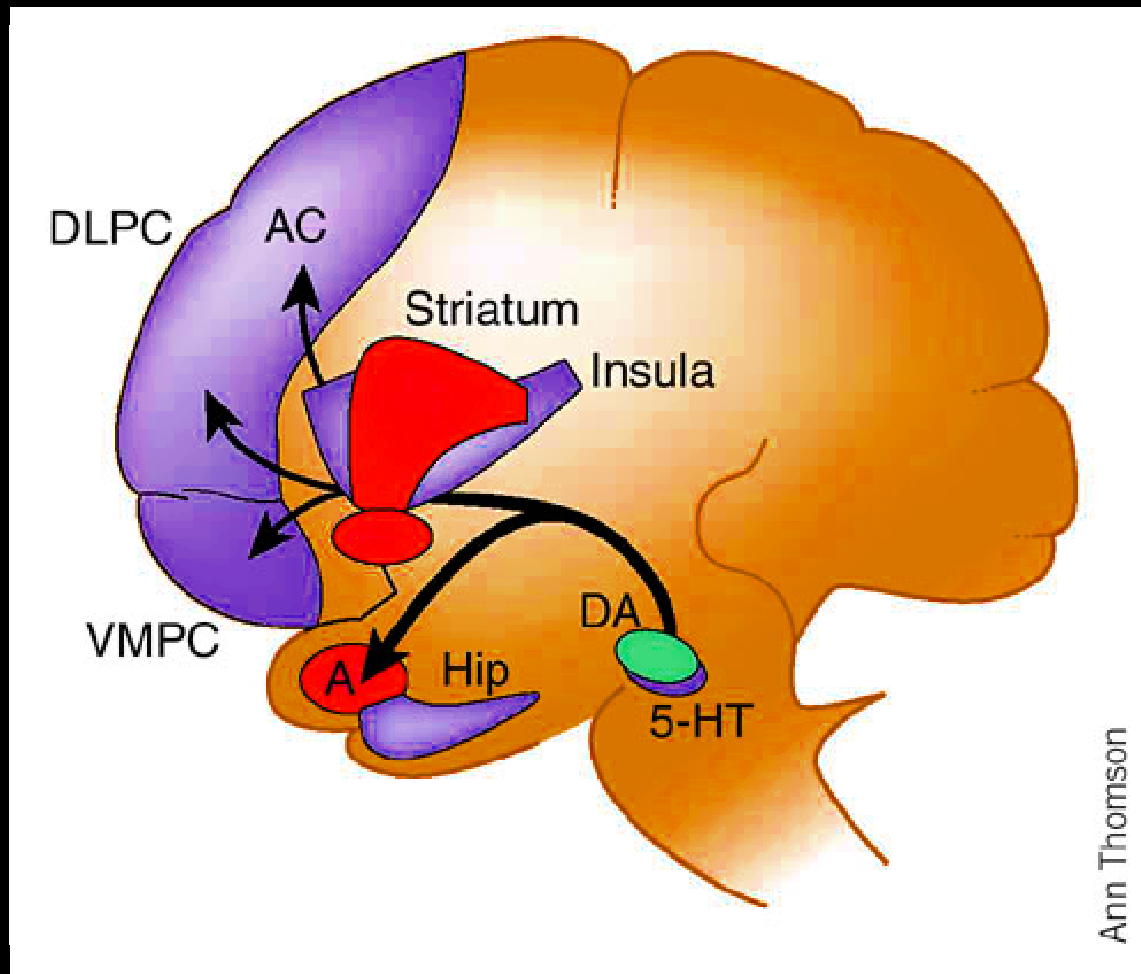
TSD in 4 Dimensions: Tinbergen's (1951) 4 explanations

1. **Mechanism**-relates specific behavior to brain regions or structures
2. **Ontogenetic**-developmental changes
3. **Functional**- how has the behavior adapted to the current environment (culture)
4. **Evolutionary**-how this behavior evolved



Competing Neurobehavioral Decision Systems Hypothesis:

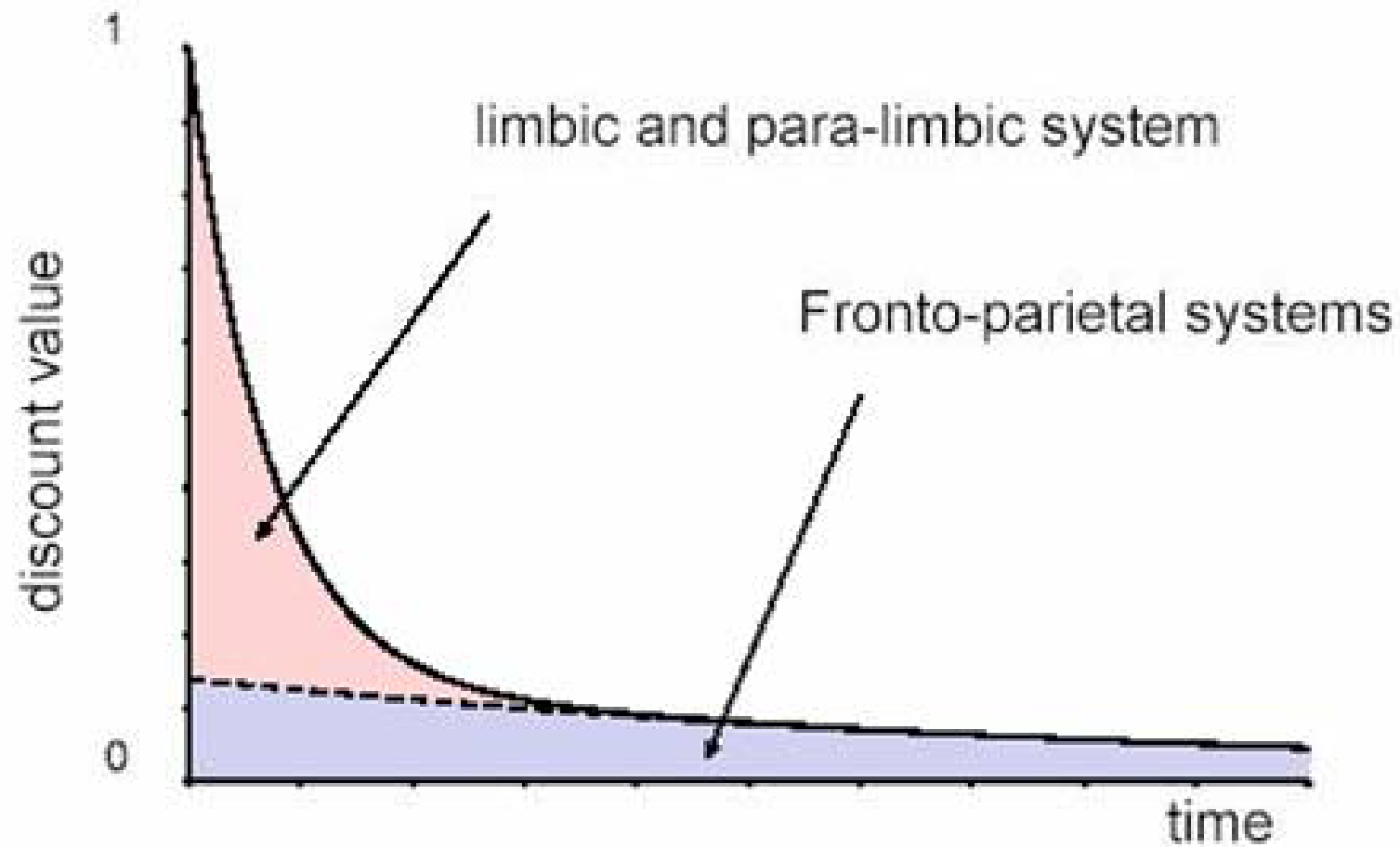
- Mechanism of TSD
 - Increased activity of the Impulsive System (motivational)
 - Limbic Region
 - Ventral Striatum
 - Decreased activity of Executive System (rationality and valuation)
 - Prefrontal Cortex
 - Dorsolateral Prefrontal Cortex



Bechara 2005

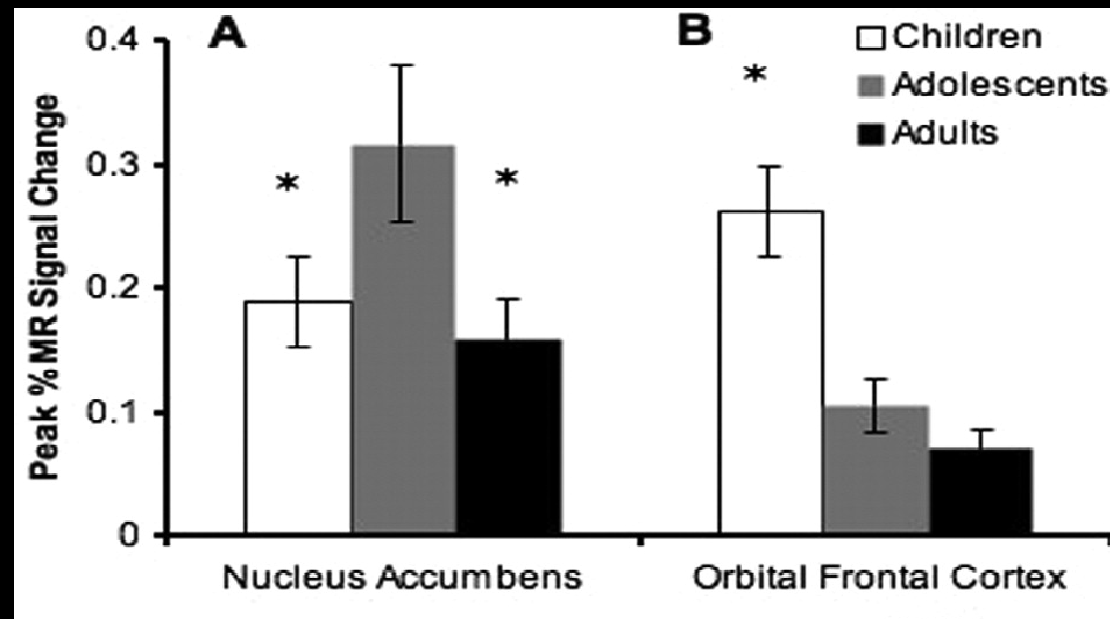
McClure et al., Science, 2004

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.



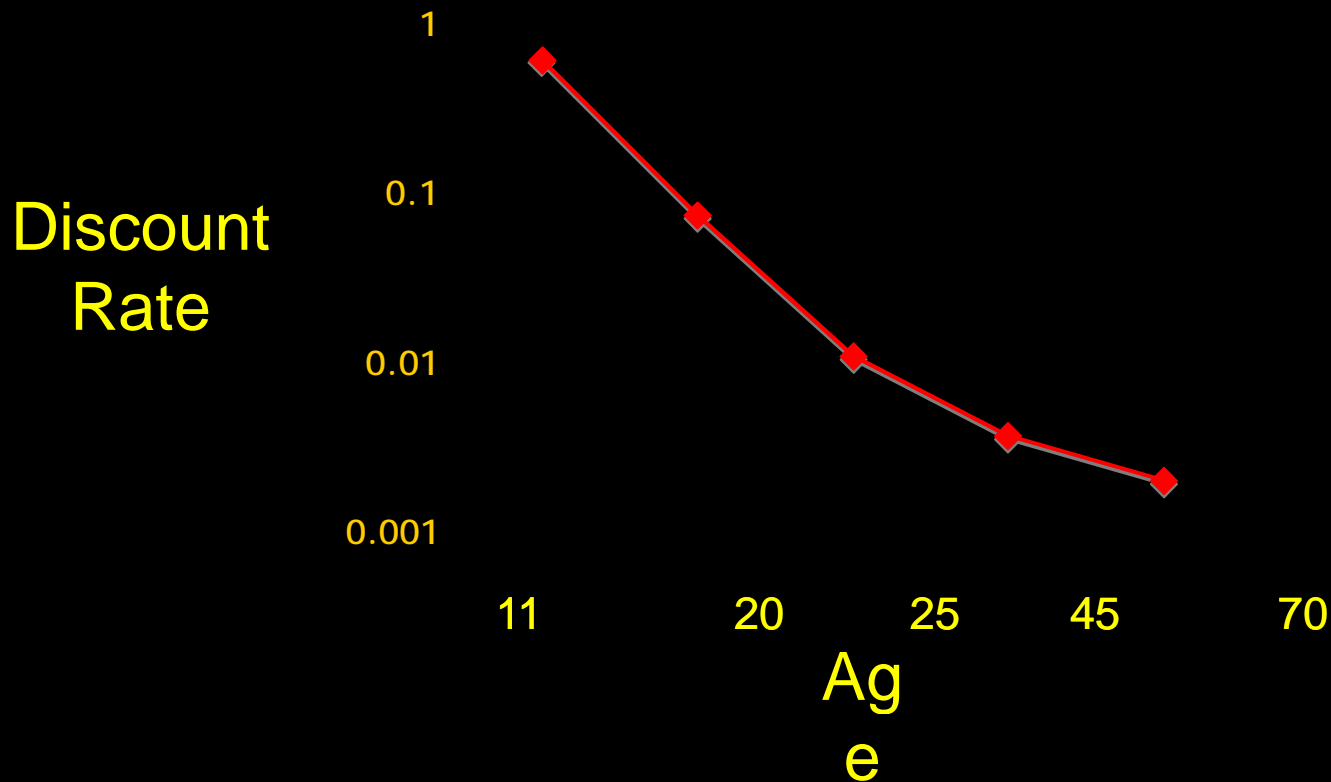
Hagens 2007

Development



Galvan et al., J Neurosci 2006

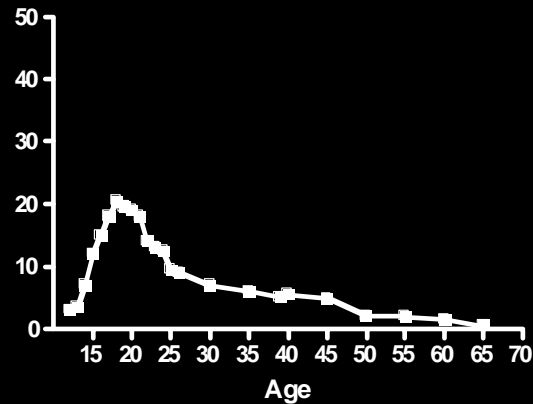
Developmental Pattern of Temporal Horizon



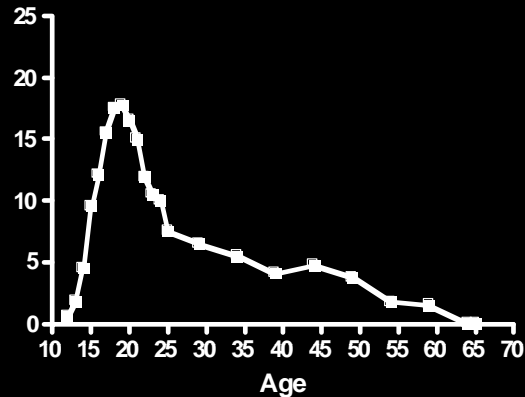
Household Survey

% of Responders

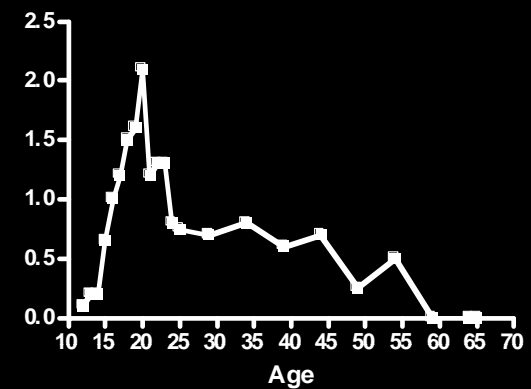
Illicit Drug Use (month)



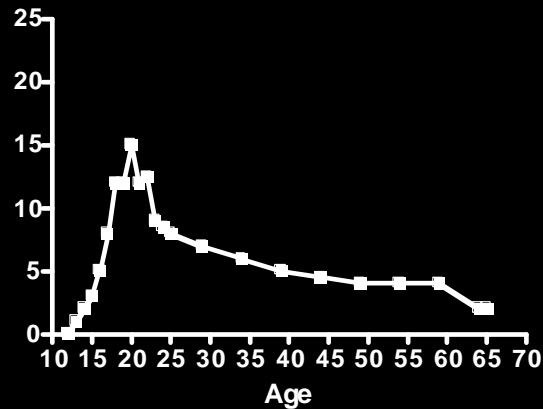
Marijuana Use (month)



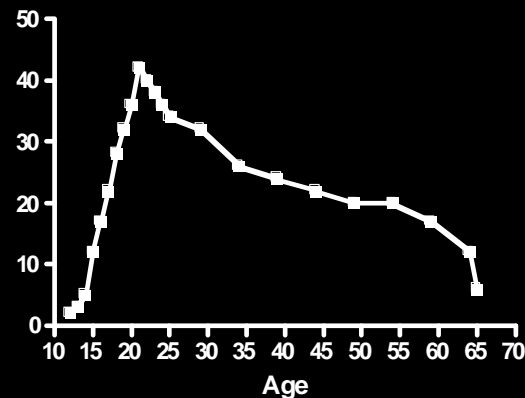
Cocaine Use (month)



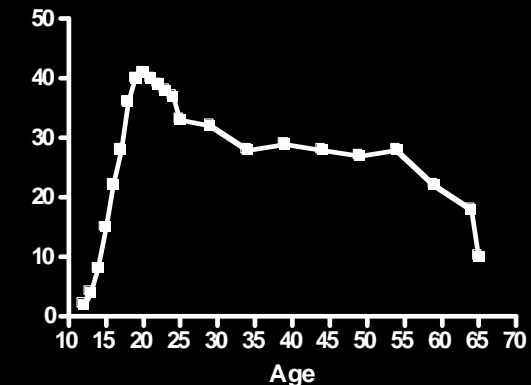
Heavy Alcohol Use (month)



Binge Alcohol Use (month)



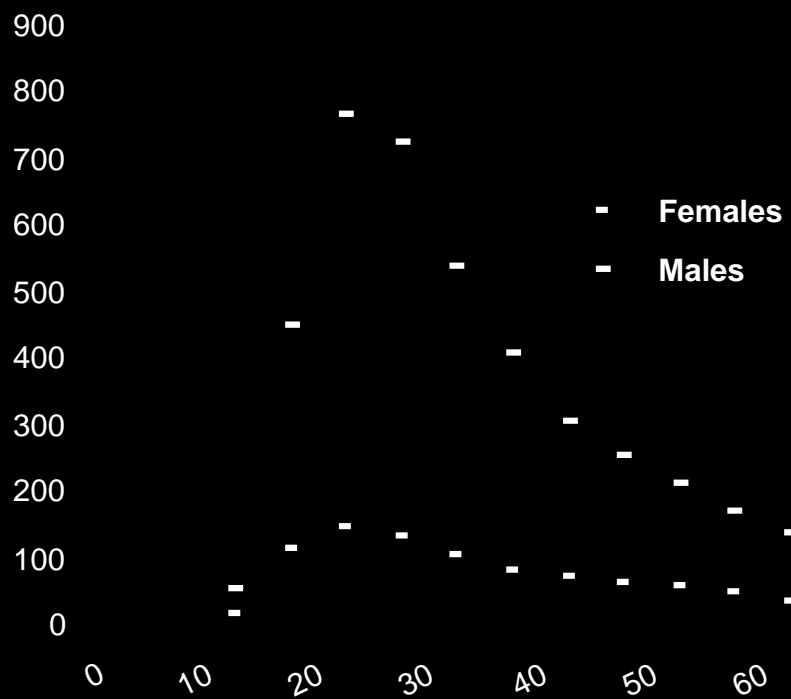
Cigarette Use (month)



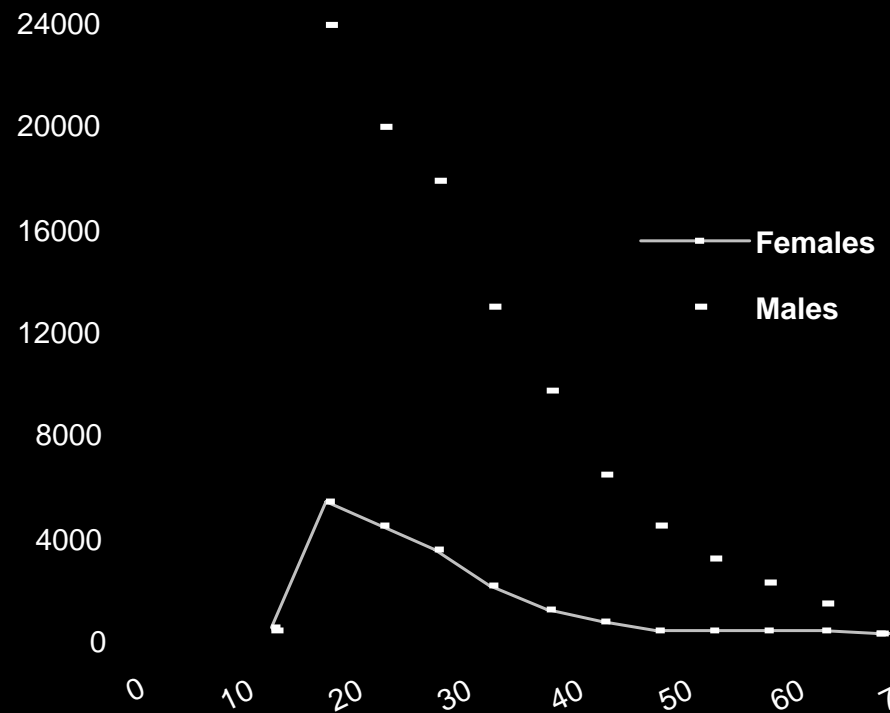
Kowal, Gatchalian, Badger, & Bickel, In prep.

Crime

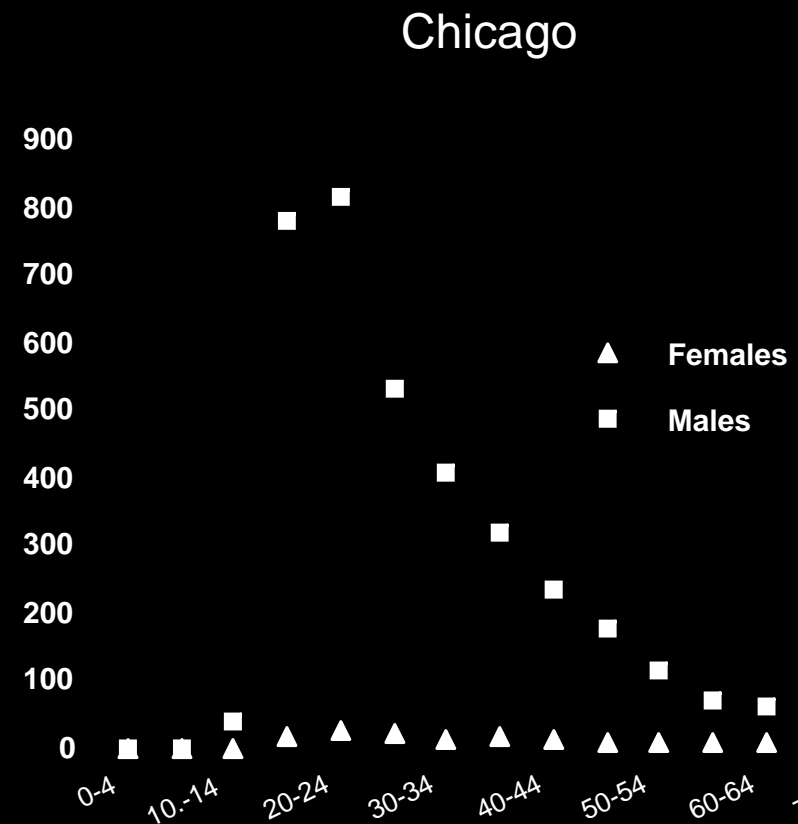
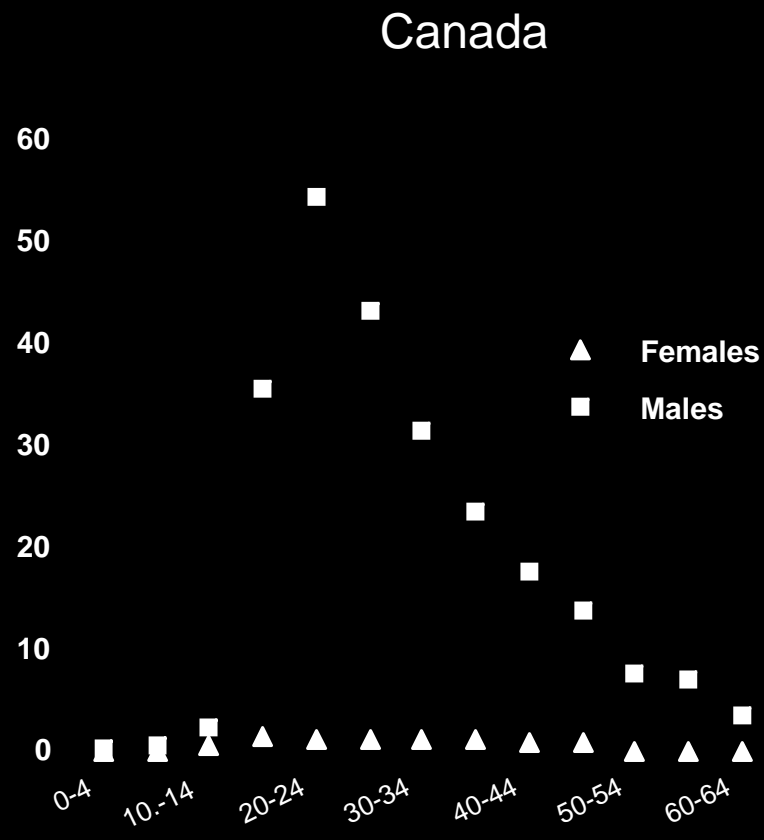
England and Wales 1842-1844



United States 1990



Homocides

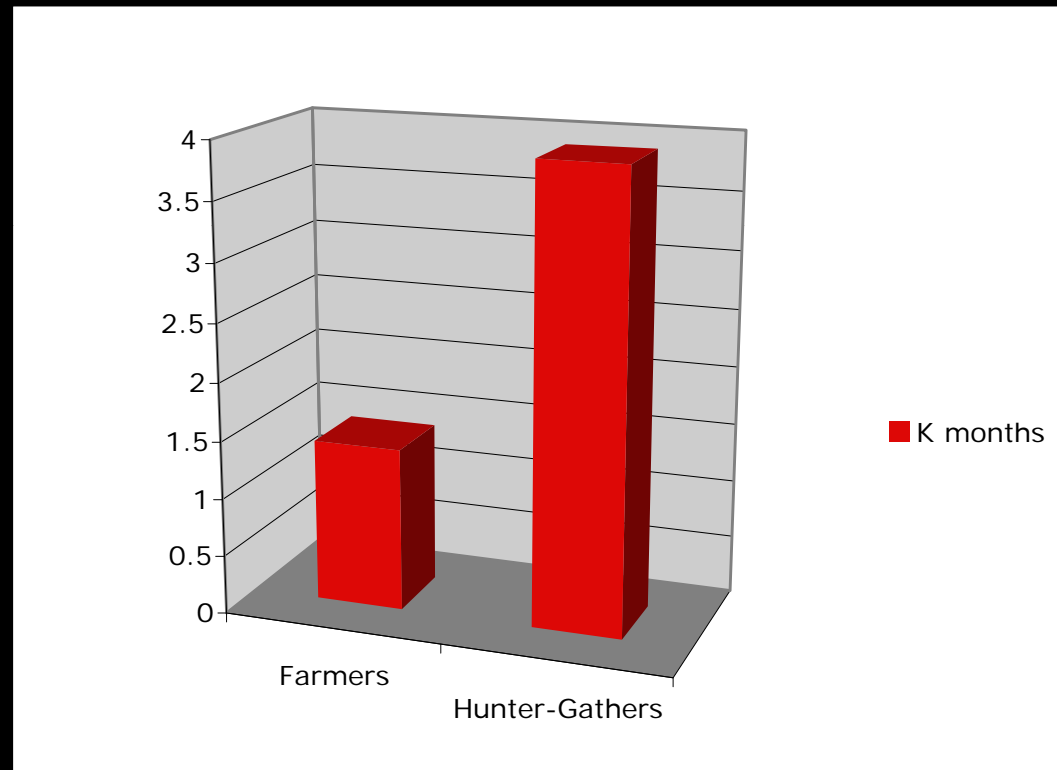


Wilson & Daly, 1994

Functional Adaptation of TSD

- Can Changes in Cultural Practices Influence Temporal Horizon?
 - Homo Sapiens emerged about 500,000 yrs ago.
 - Hunter-Gathering was the sole economic enterprise for all but the last 2.6% of our time on this planet.
 - 13,000 yrs ago agriculture developed

Income & Discounting



Tucker, 2006

Income and Discounting

- Econometric studies of U.S. data conclude that discounting is negatively correlated with labor income and education attainment (Lawrence, 1991)

A Component of the Fundamental Cause of Health Disparities

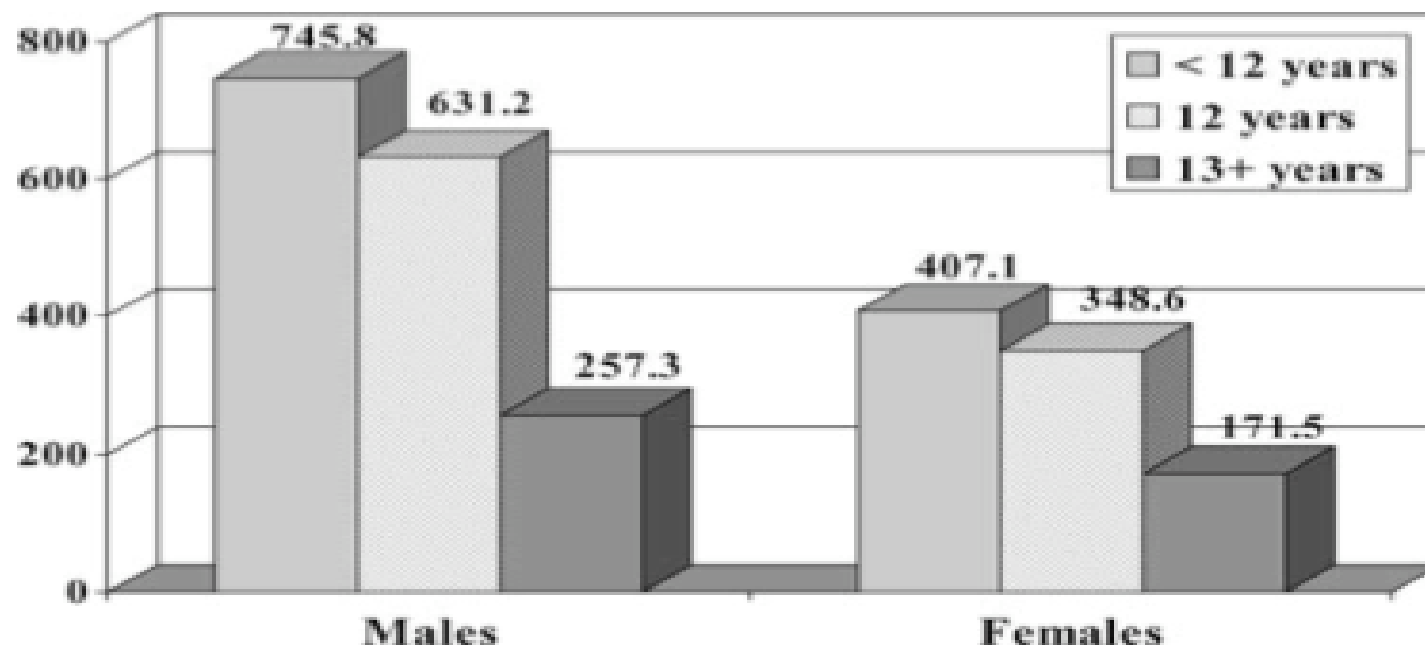
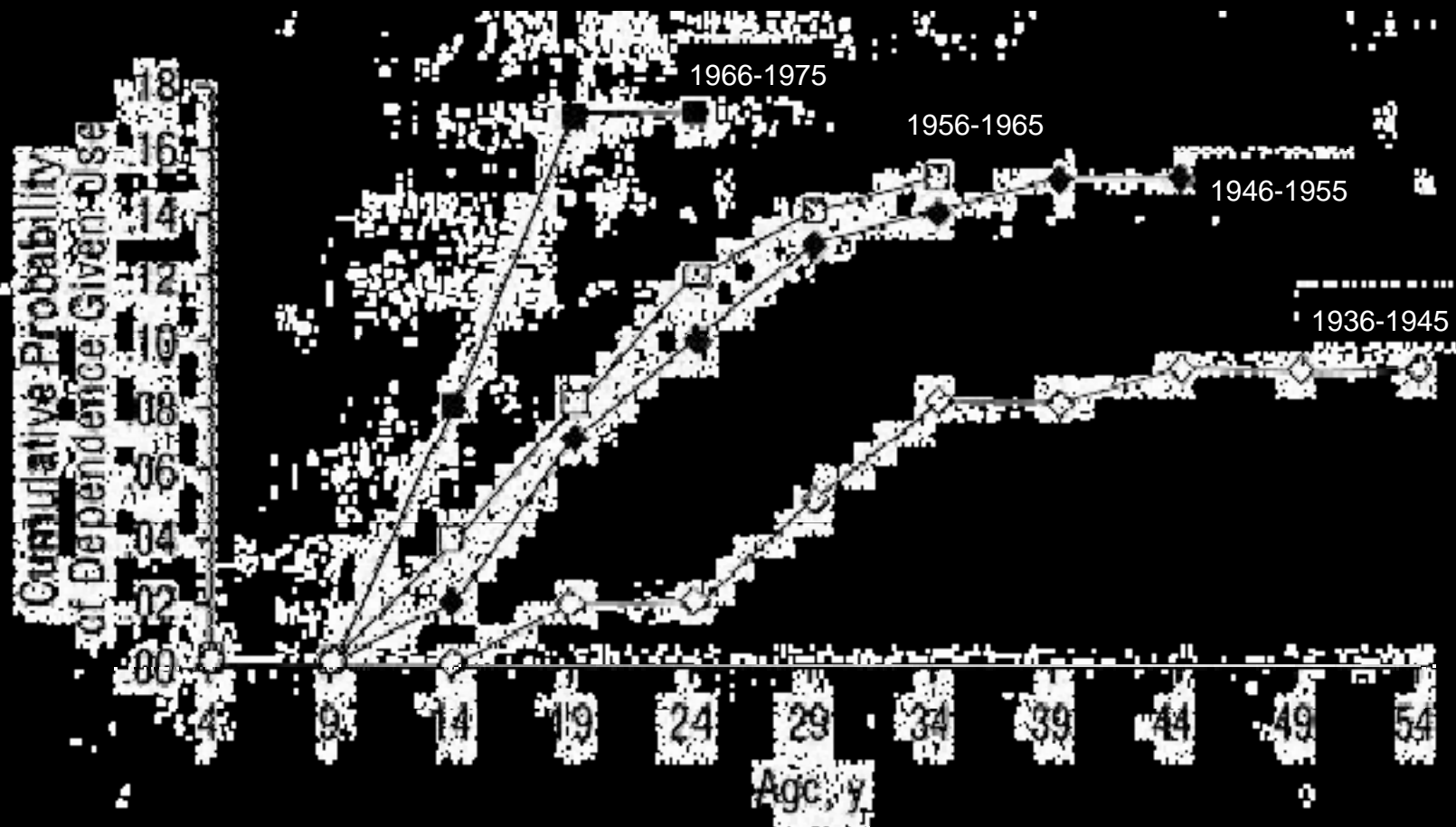


Figure 1. All-cause age-adjusted death rates per 100,000 people aged 25–64 years by education, 2001. [Health United States 2003. U.S. Department of Health and Human Services, National Center for Health Statistics. Health United States 2003.]

Social Factors Promoting the Short Temporal

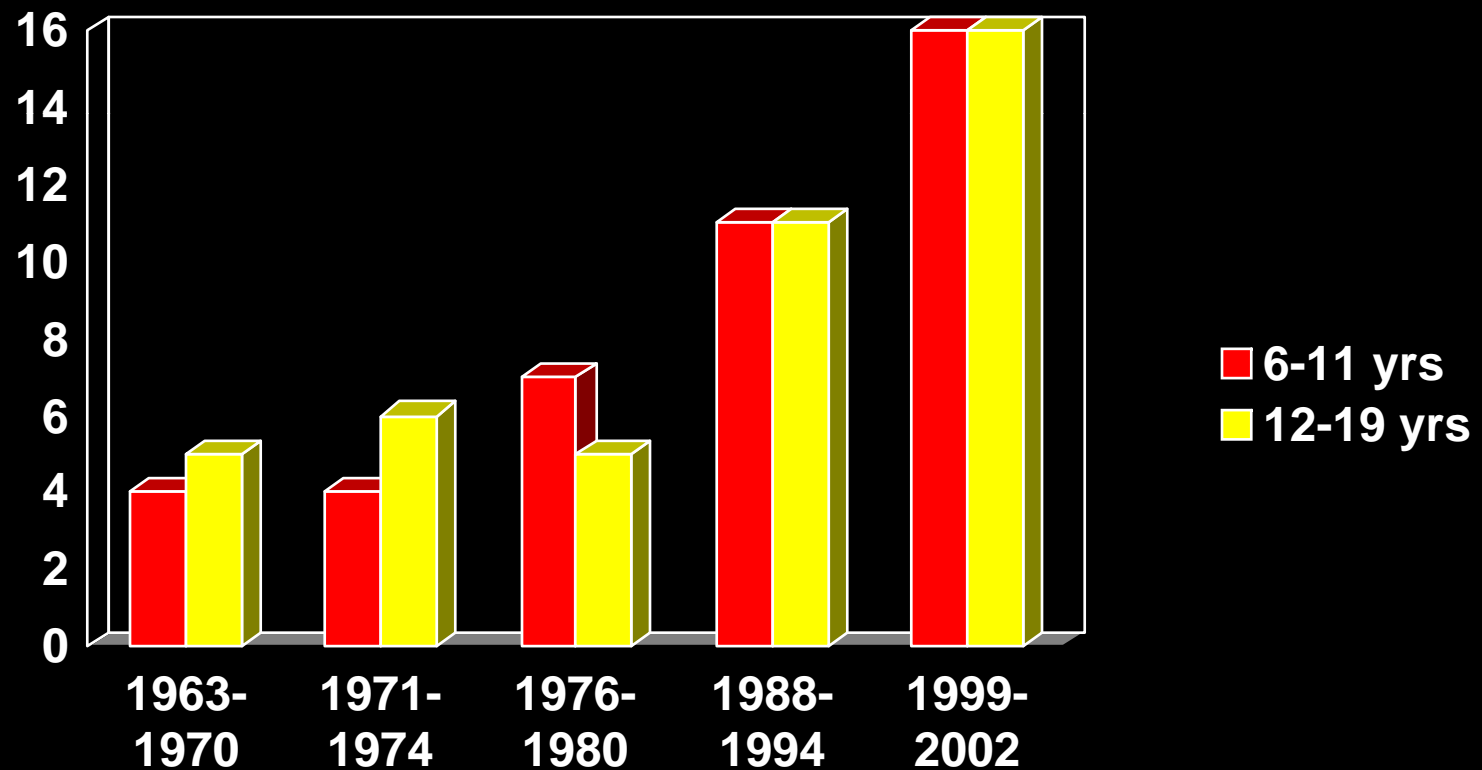
- Culture of Immediate Gratification
- Erosion of Civic-Community Bonds
- Erosion of the Family
- Economic Deterioration and Disorder

Cohort Analysis of Addiction



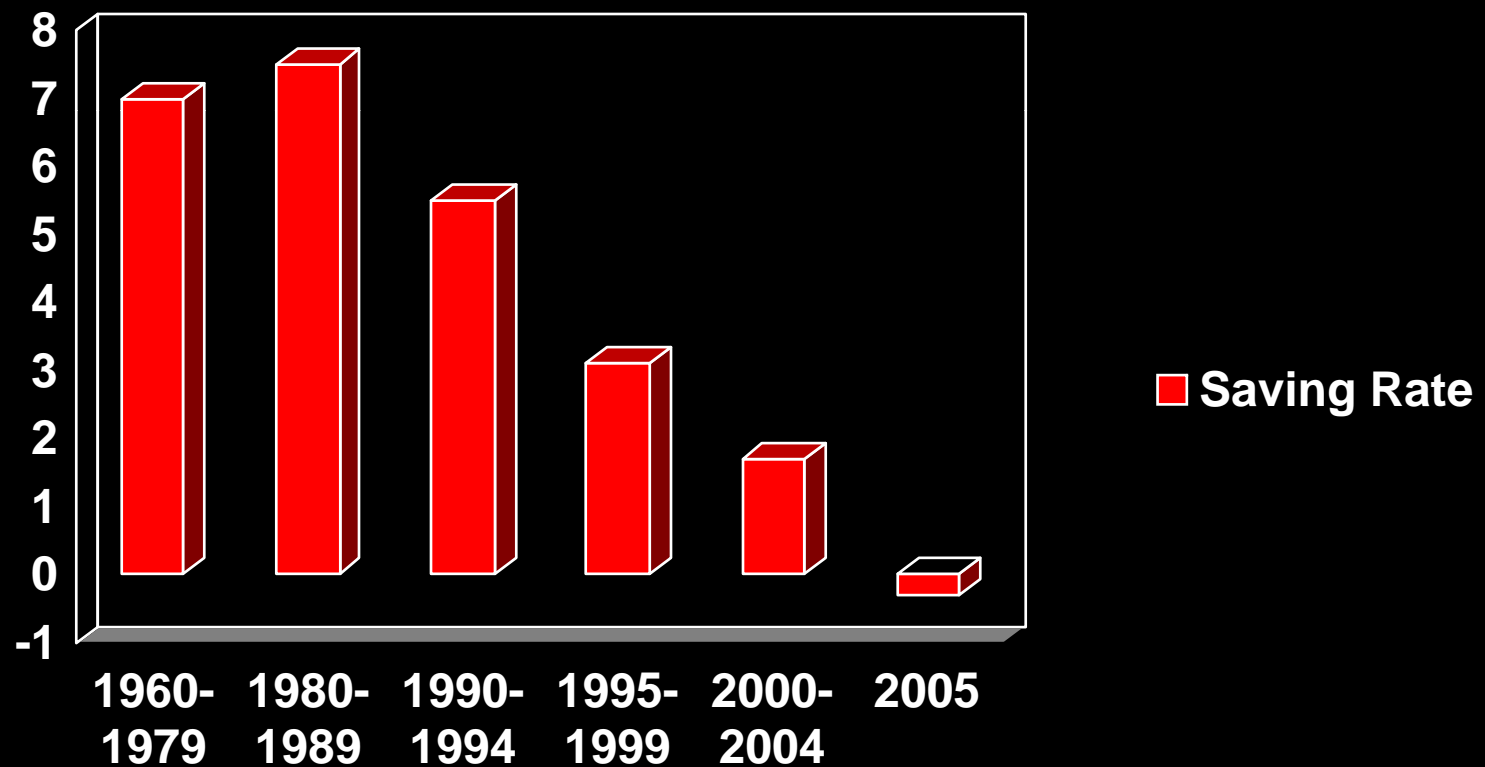
Warner et al., 1995

Percentage Overweight



Ogden et al., JAMA 2000; Hedley et al., JAMA 2004

U.S. Household Savings



Bureau of Economic Analysis

Escaping the Tyranny of Small Decisions

Hyperactive Impulsive System

Likely

- ✓ Contingency Management
- ✓ Replacement Medications

Unlikely

Cognitive Behavior Therapy
Other Medications

Escaping the Tyranny of Small Decisions

Hypoactive Executive System

Likely

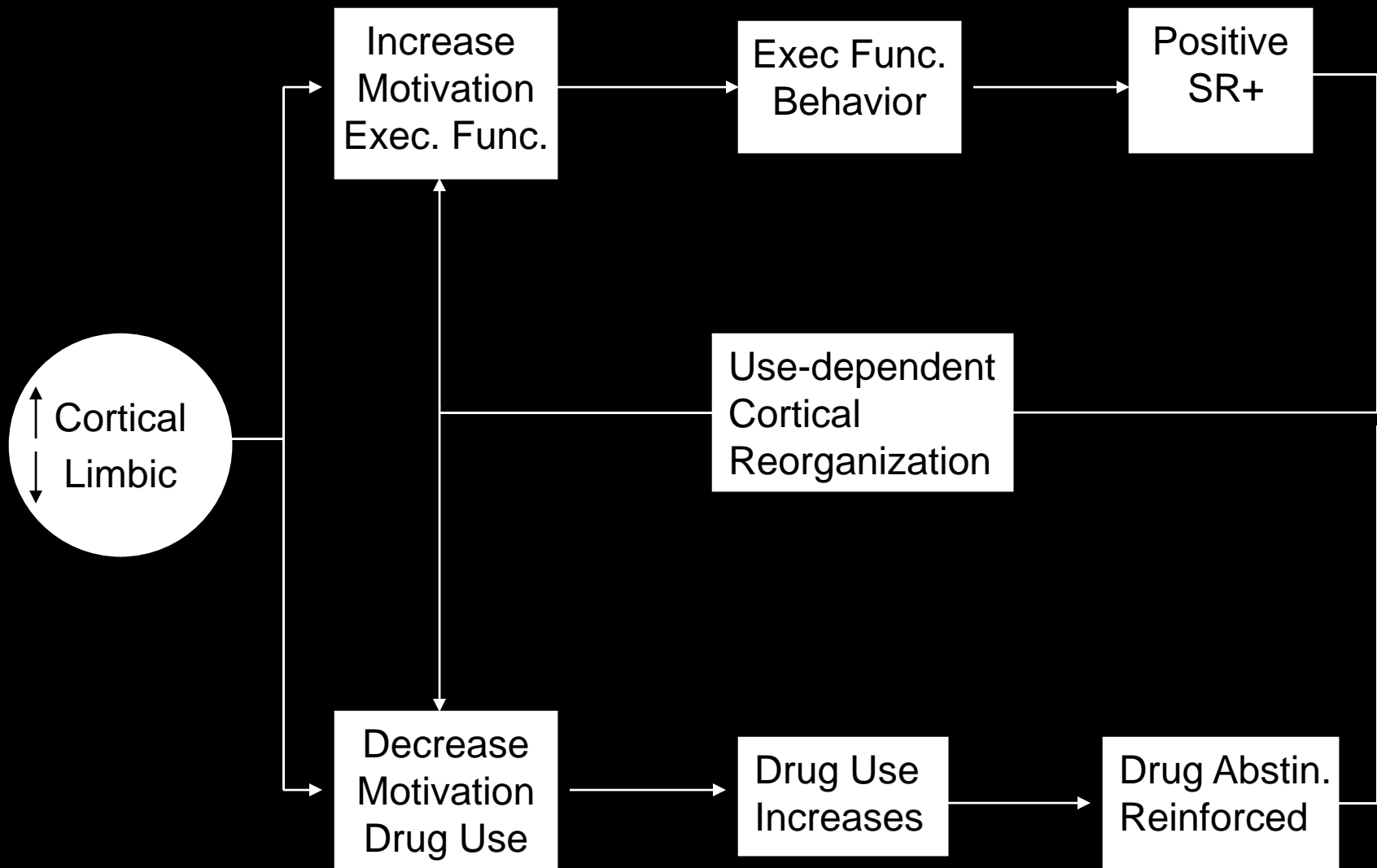
Other Medications?

Unlikely

Contingency Management

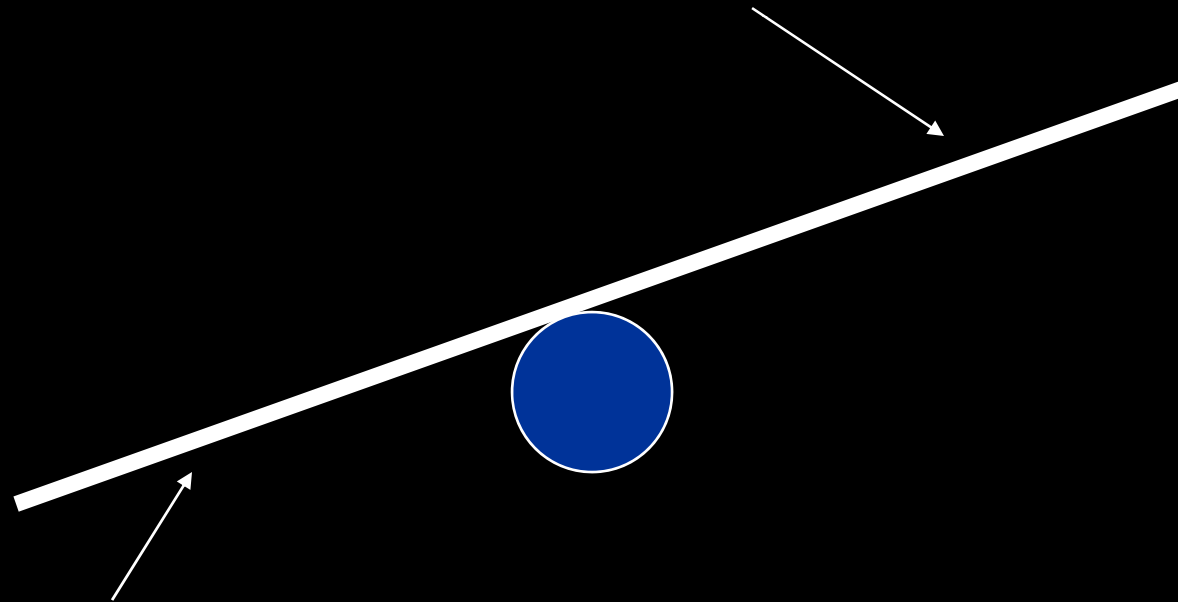
Cognitive Behavior Therapy

Replacement Medications



Escaping the Tyranny of Small Decisions

Impulsive System Constraint



Executive Function
Improvement

Conclusions

- Broaden our view of mechanisms to those relevant to multiple disorders
- Align our understanding of Disease/Disorder with Treatment and prevention
- TSD may provide one such mechanism
- Suggests new mechanisms of behavioral change to explore

“Time is both a medium and a perspective. It is a medium through which we live as the future becomes present. As the future becomes present, we become aware of duration and succession. Also, by transcending the present and looking at it from the past or future, we gain perspective on the present. These time processes are fundamental to our construction of reality. If they are disturbed, our view of reality may become distorted”.

-F.T. Melges

(Time and the Inner Future, 1982)

