

Understanding Addiction: Squirrel Logic

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Wexner Medical Center

Addiction

- Lack of ability to control the behavior
- Causes problems in life functioning, social functioning, health or well-being
- Obsession
- Dis-ease when unavailable

Why don't
they just
quit?

1. The greatest problem we have working with alcoholics and addicts is our own beliefs and expectations

1. The greatest problem we have working with alcoholics and addicts is our own beliefs and expectations
2. The addict is always doing the best he/she can

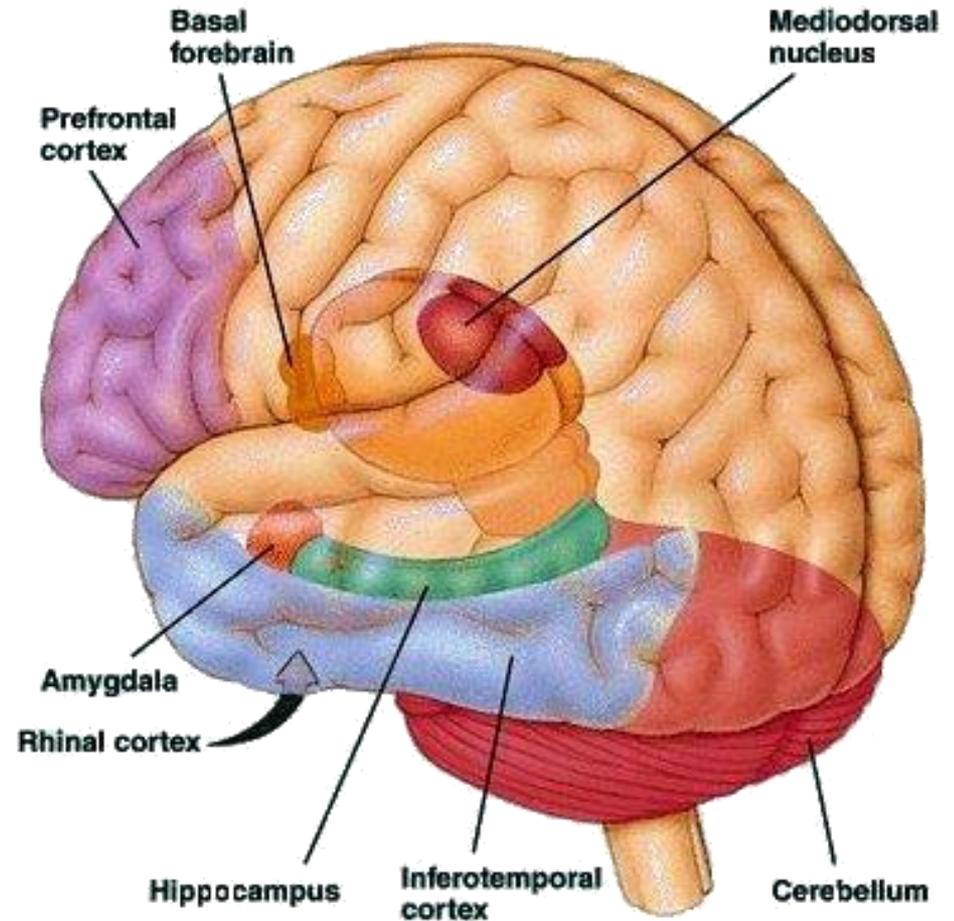
**HUMAN
BEHAVIOR &
REALITY**

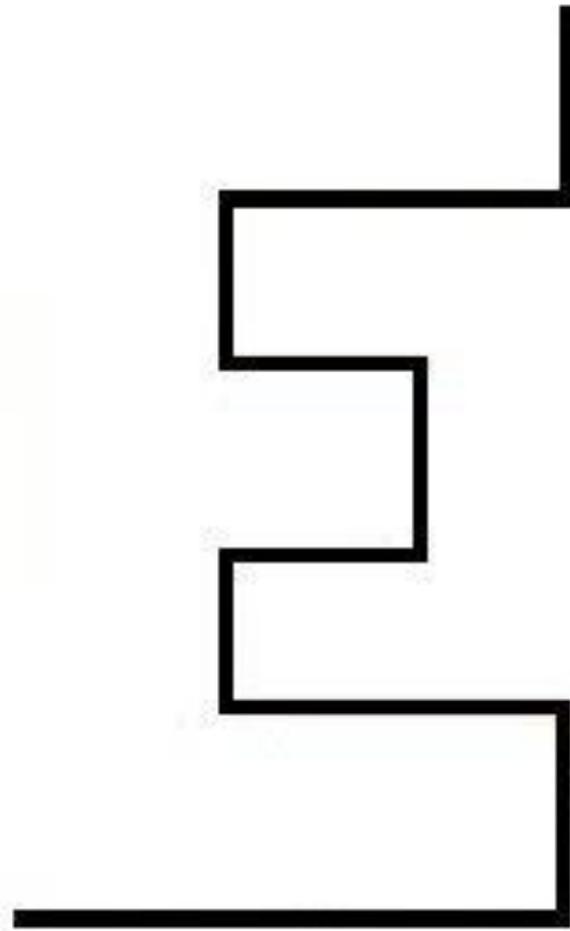
A View of Behavior

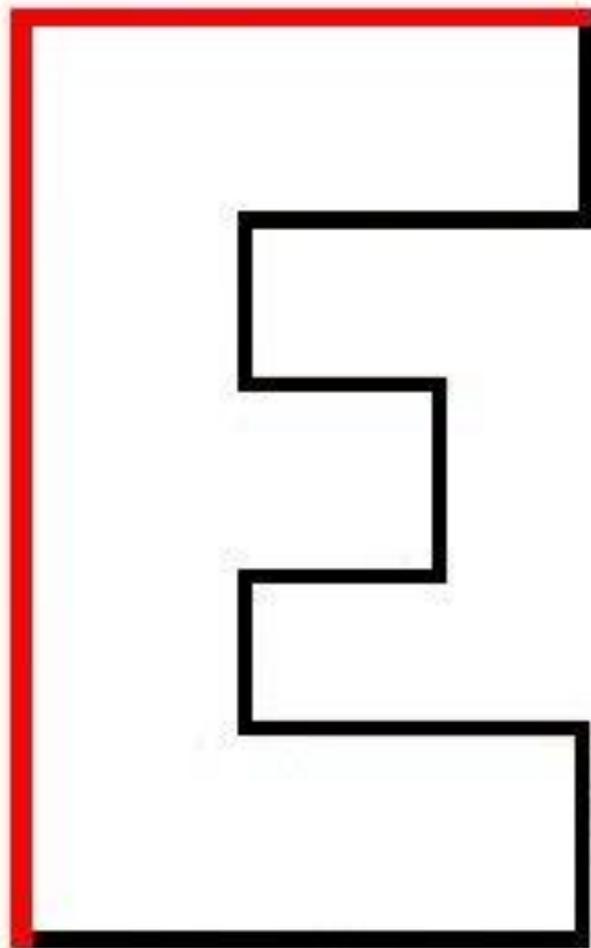
1. All behavior comes from the brain

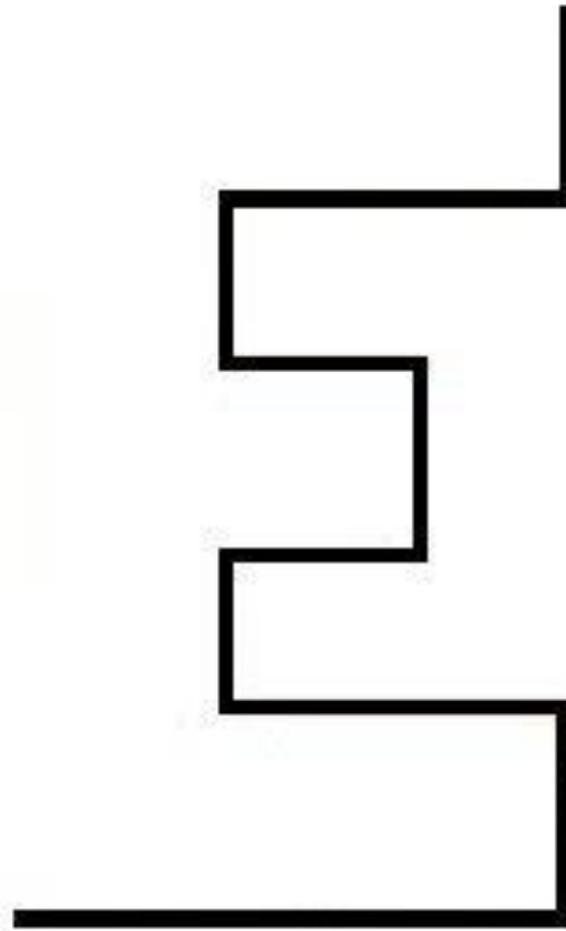
Behavior

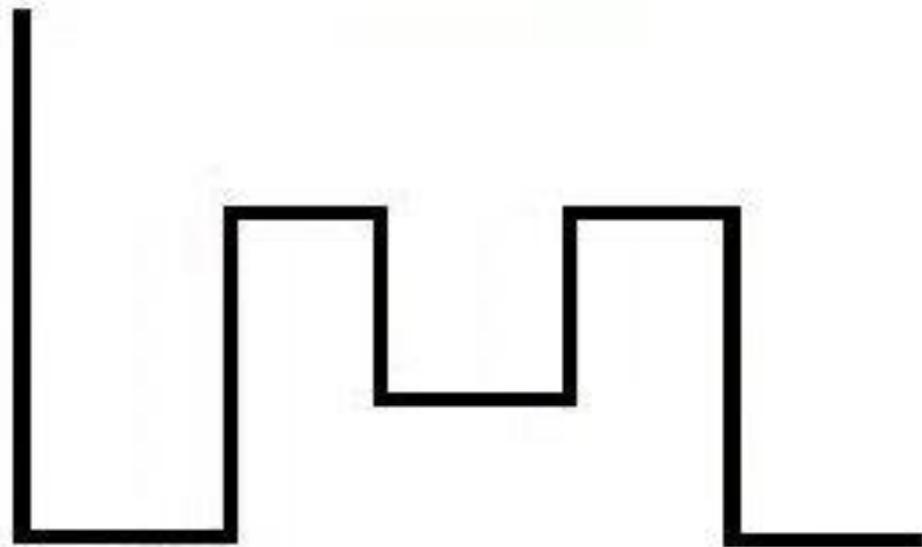
- Thought
- Emotion
- Senses
- Movement
- Memory





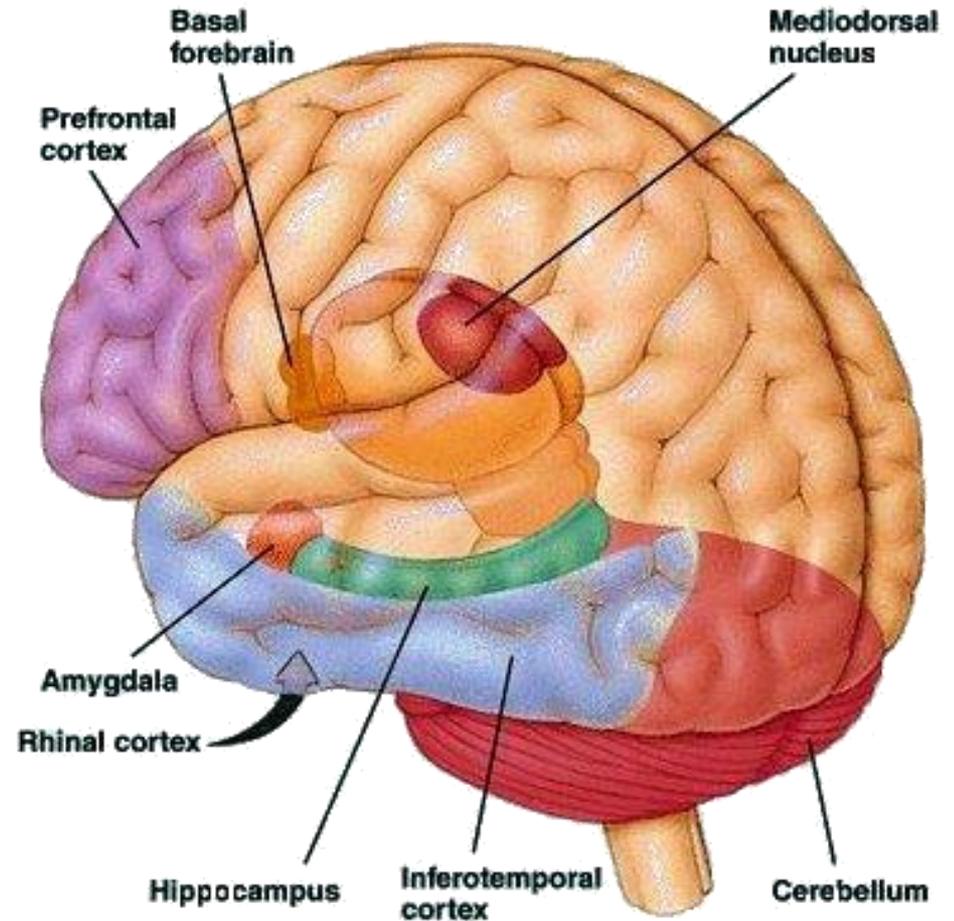






Behavior

- Thought
- Emotion
- Senses
- Movement
- Memory



A View of Behavior

1. All behavior comes from the brain
- 2. The brain is chemical**



A View of Behavior

1. All behavior comes from the brain
2. The brain is chemical
3. **Chemistry follows the LAWS of physics/math**

So...

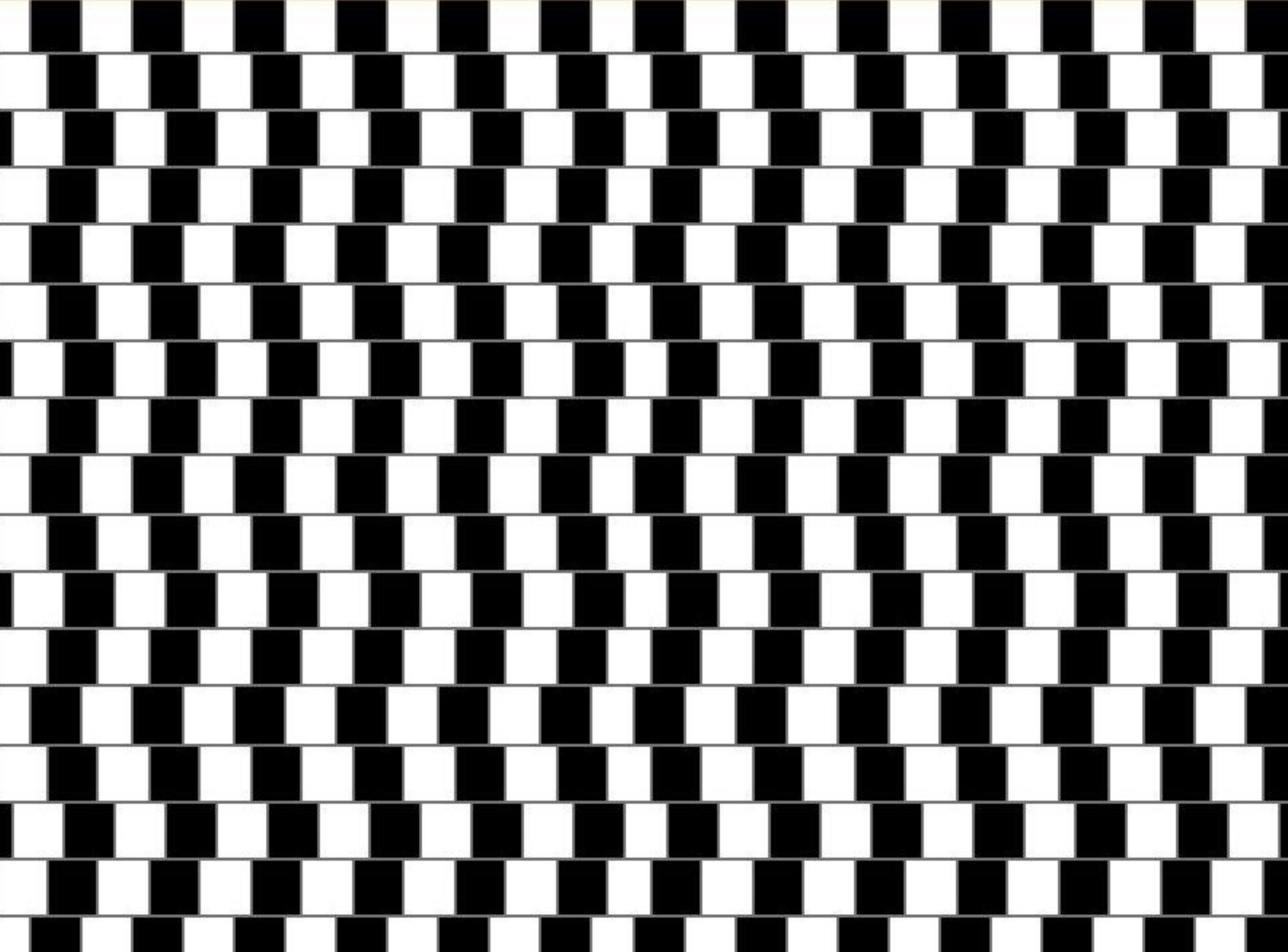
IF... All behavior → brain **AND**

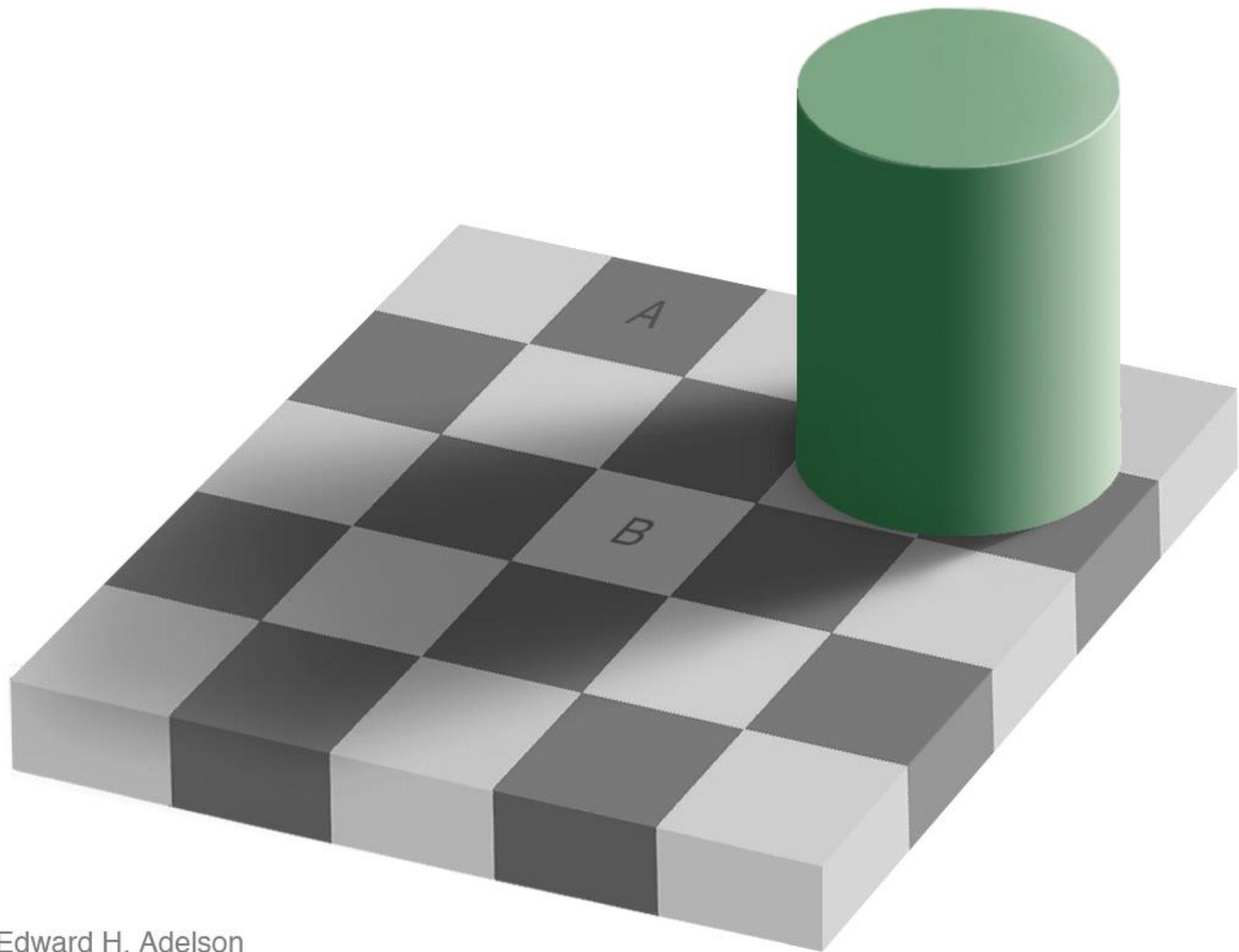
The brain is chemical **AND**

Chemistry follows laws of
Mathematics...

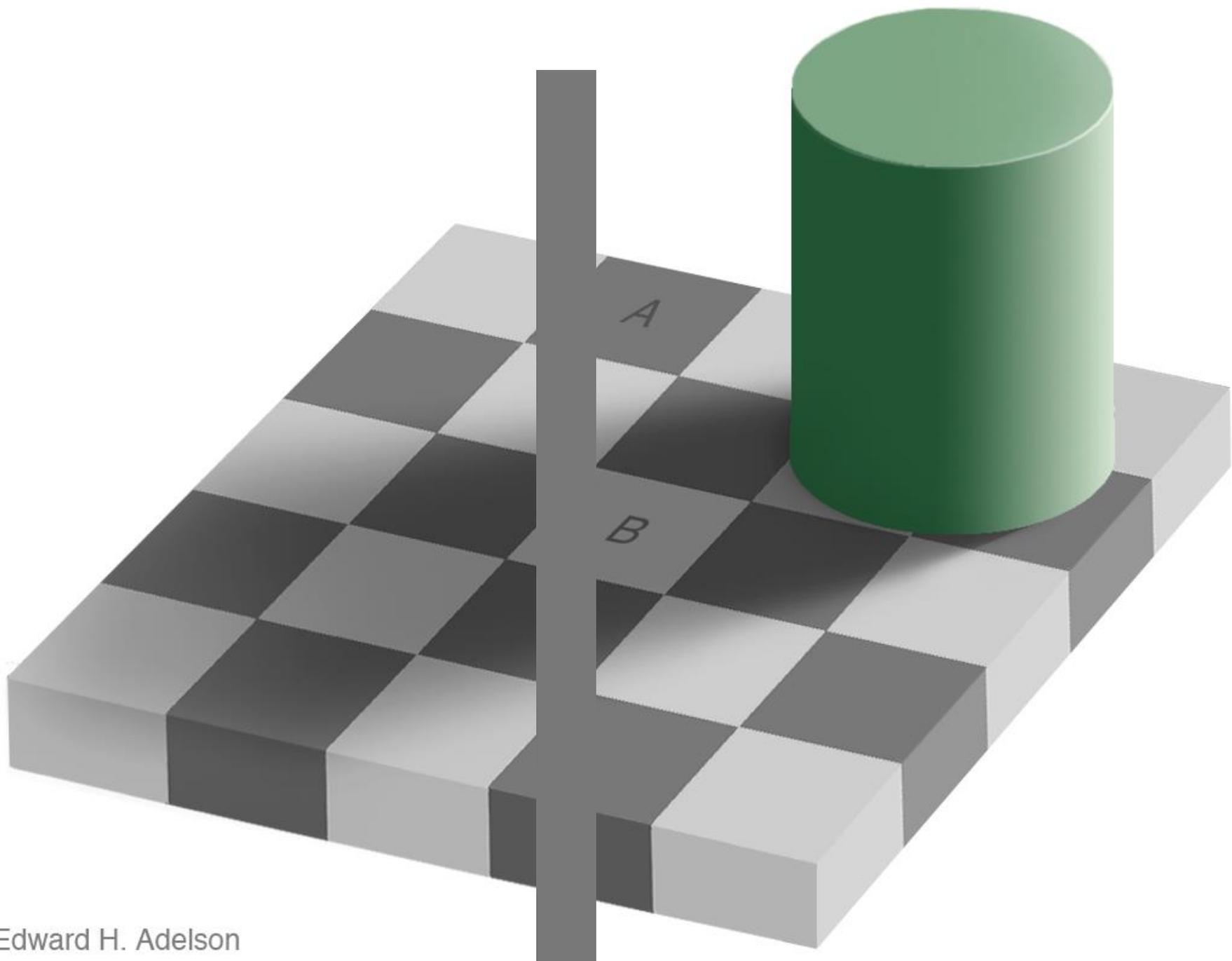
THEN: All behavior follows the
LAWS of mathematics



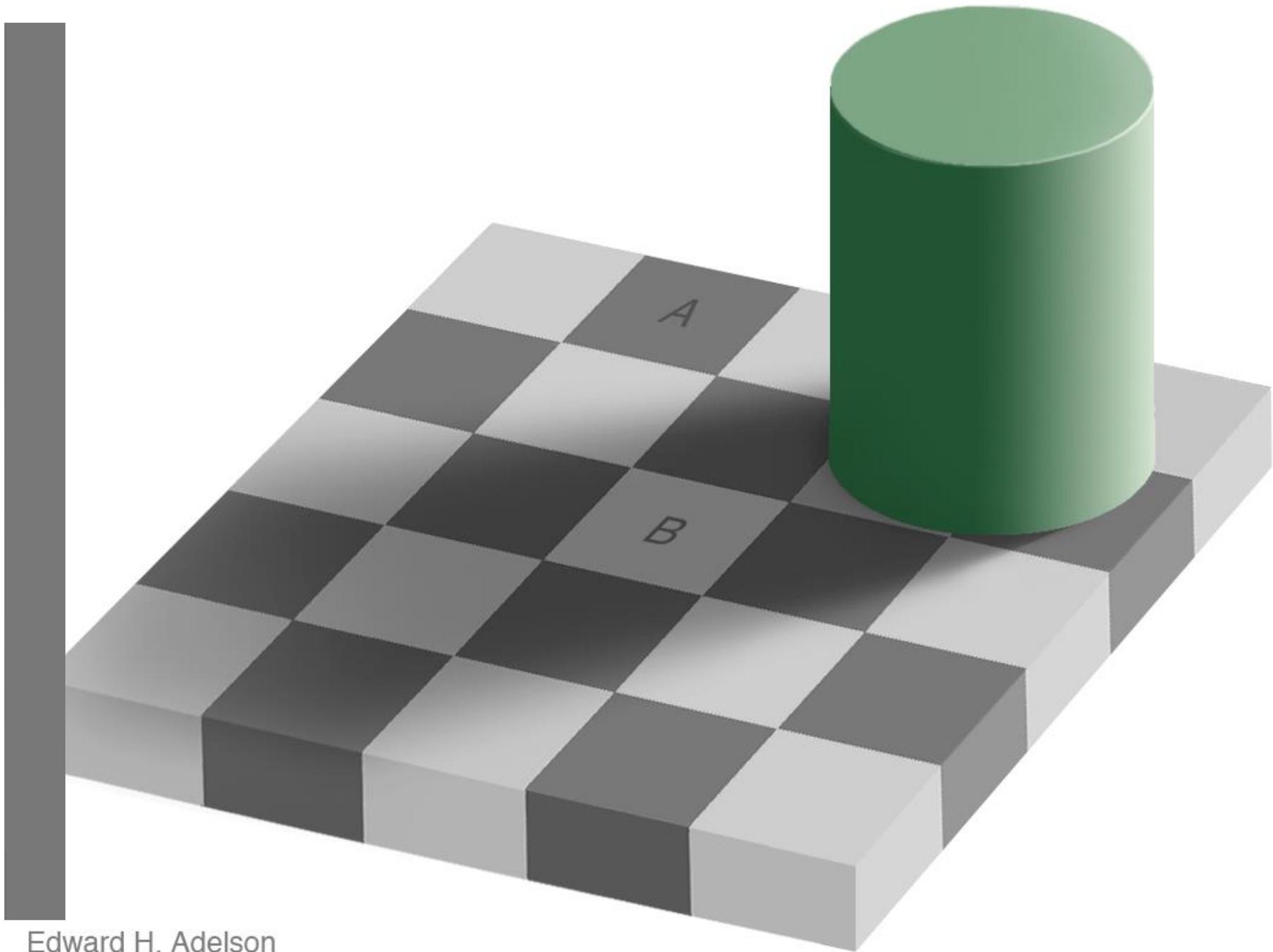




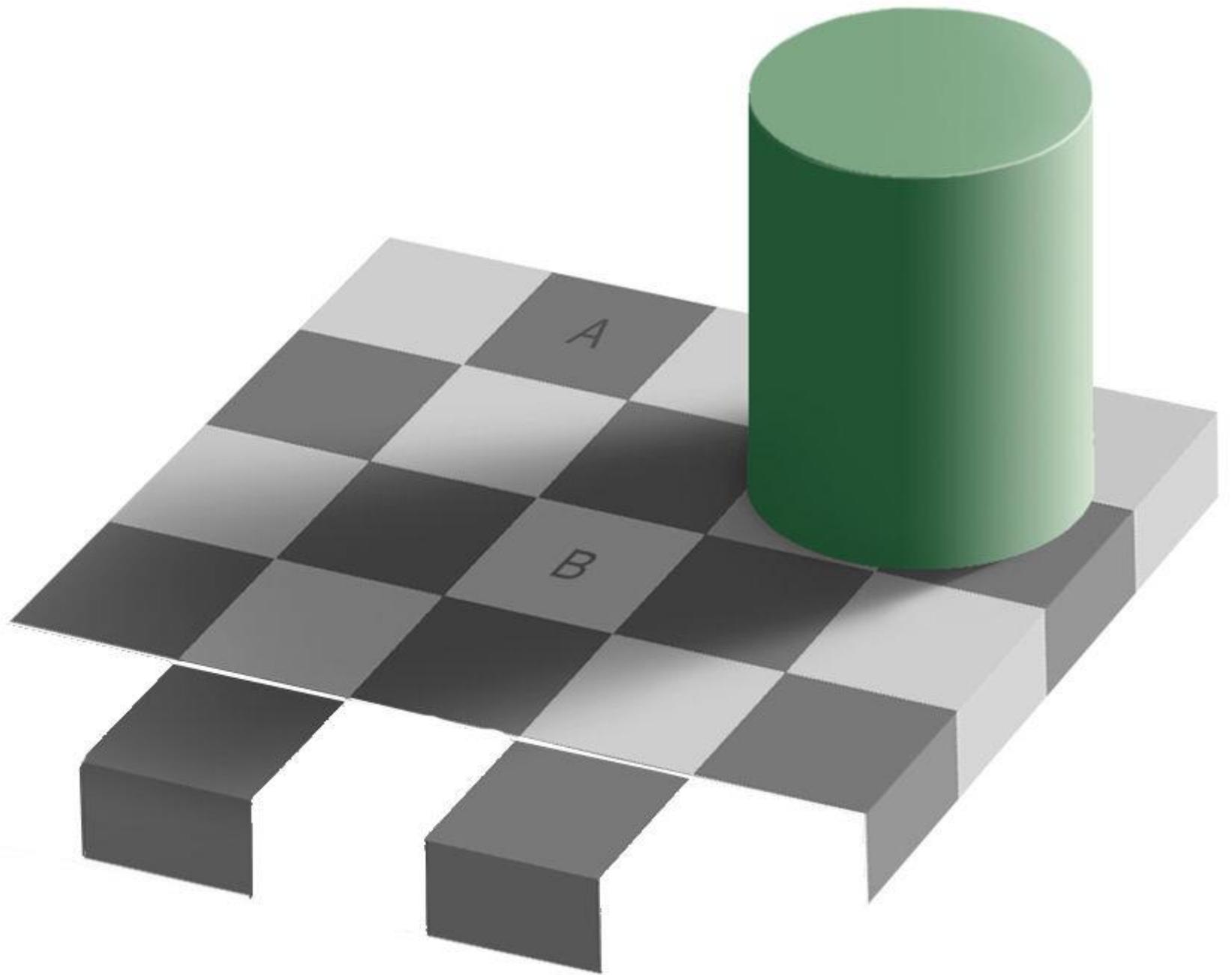
Edward H. Adelson



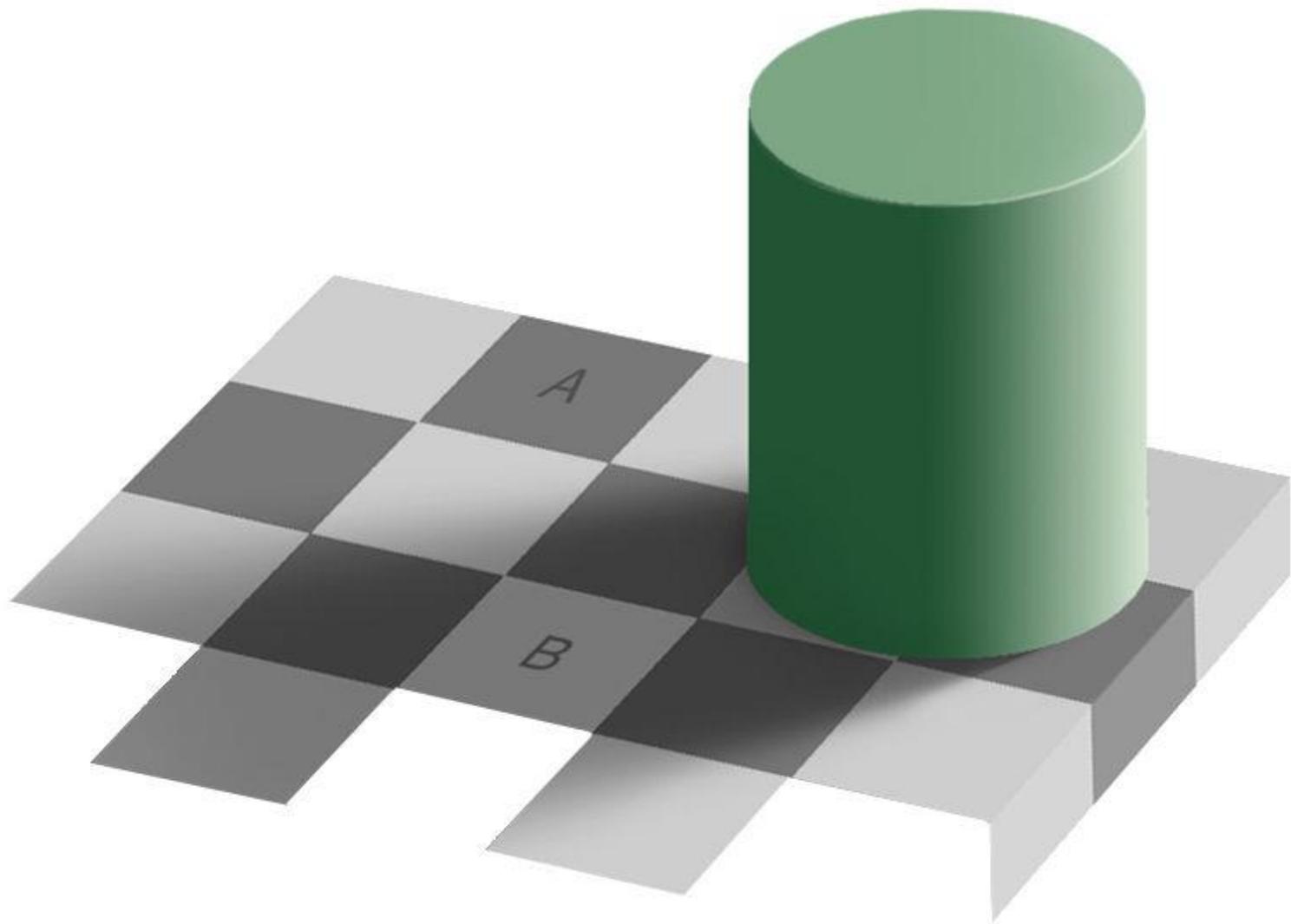
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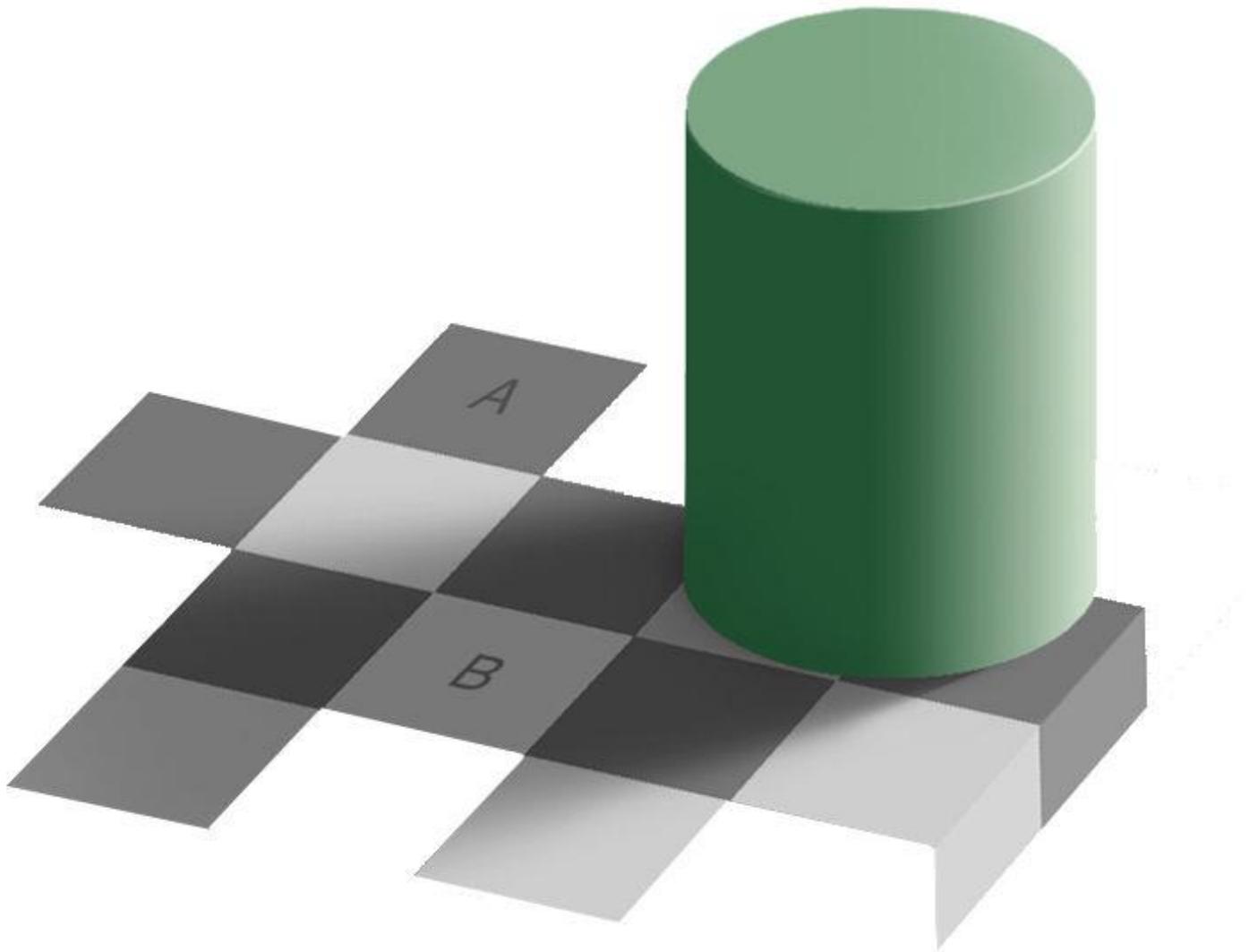
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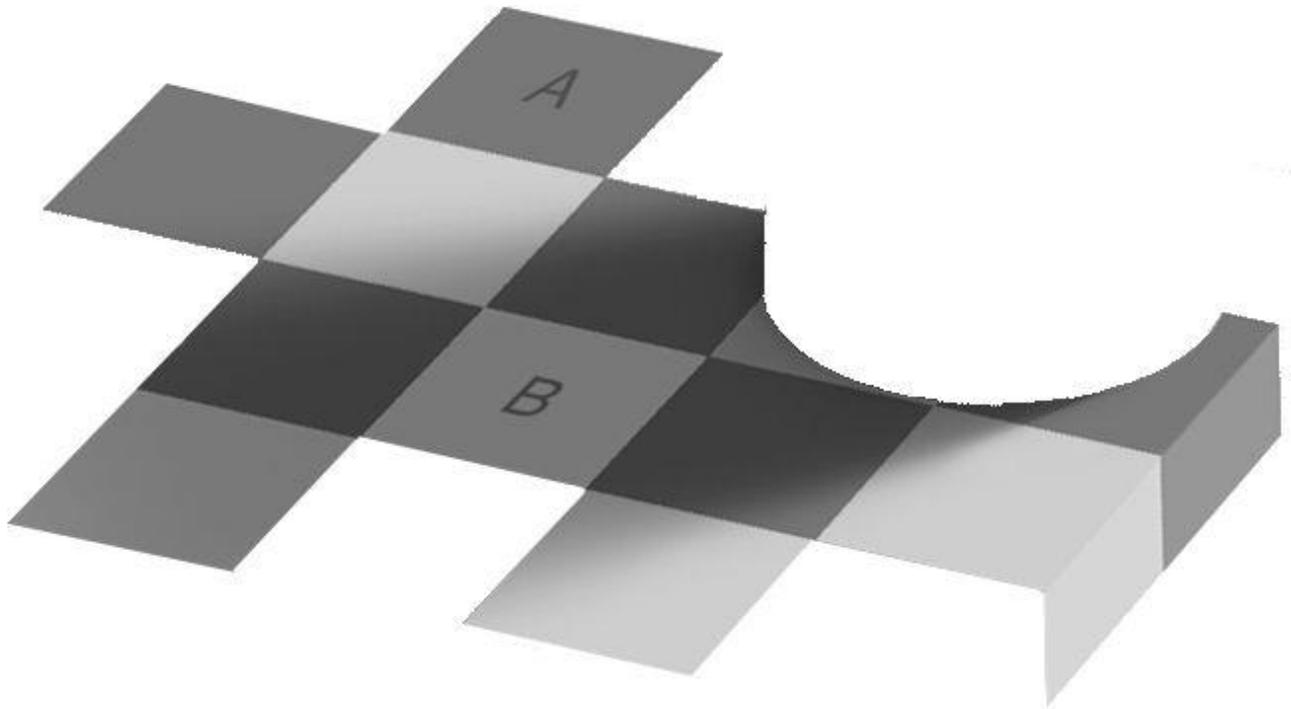
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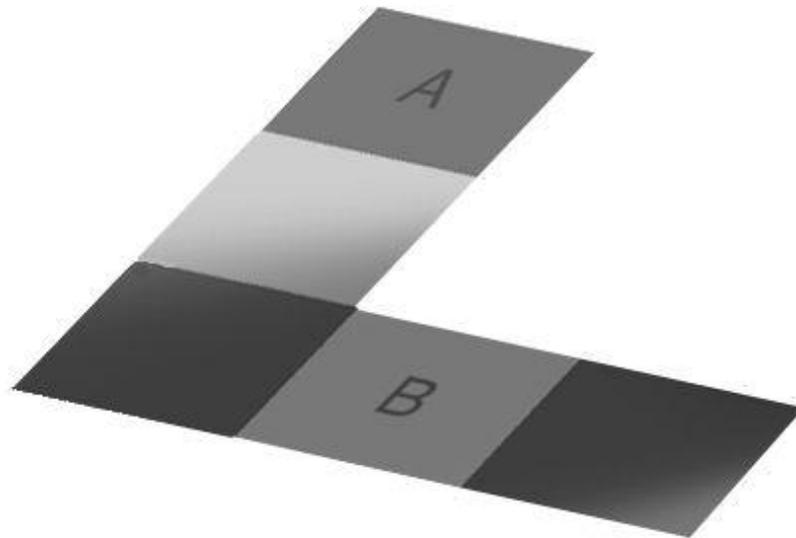
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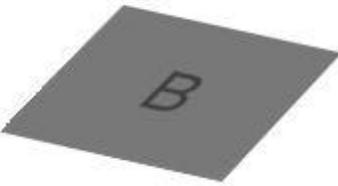
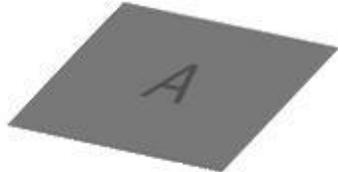


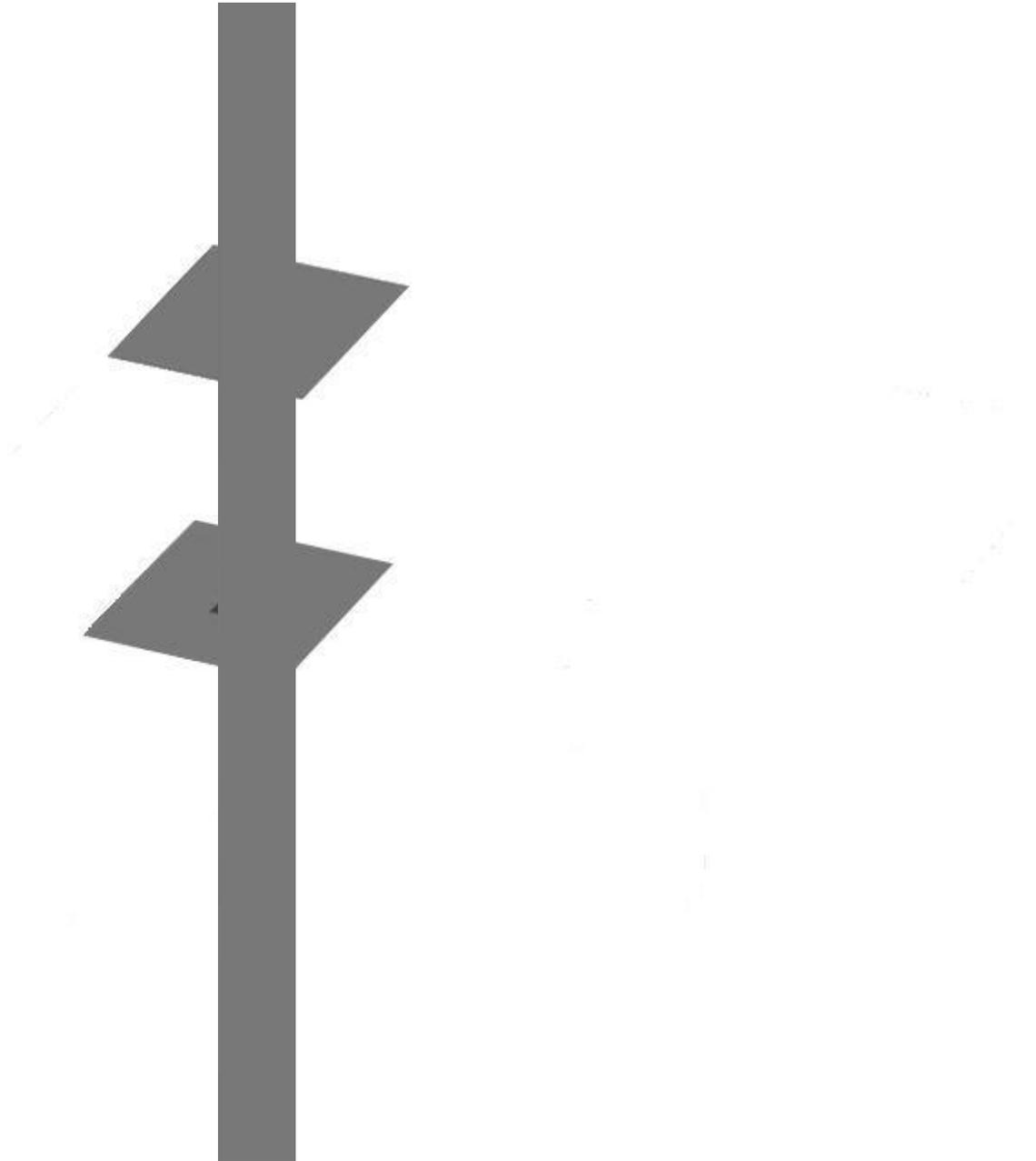
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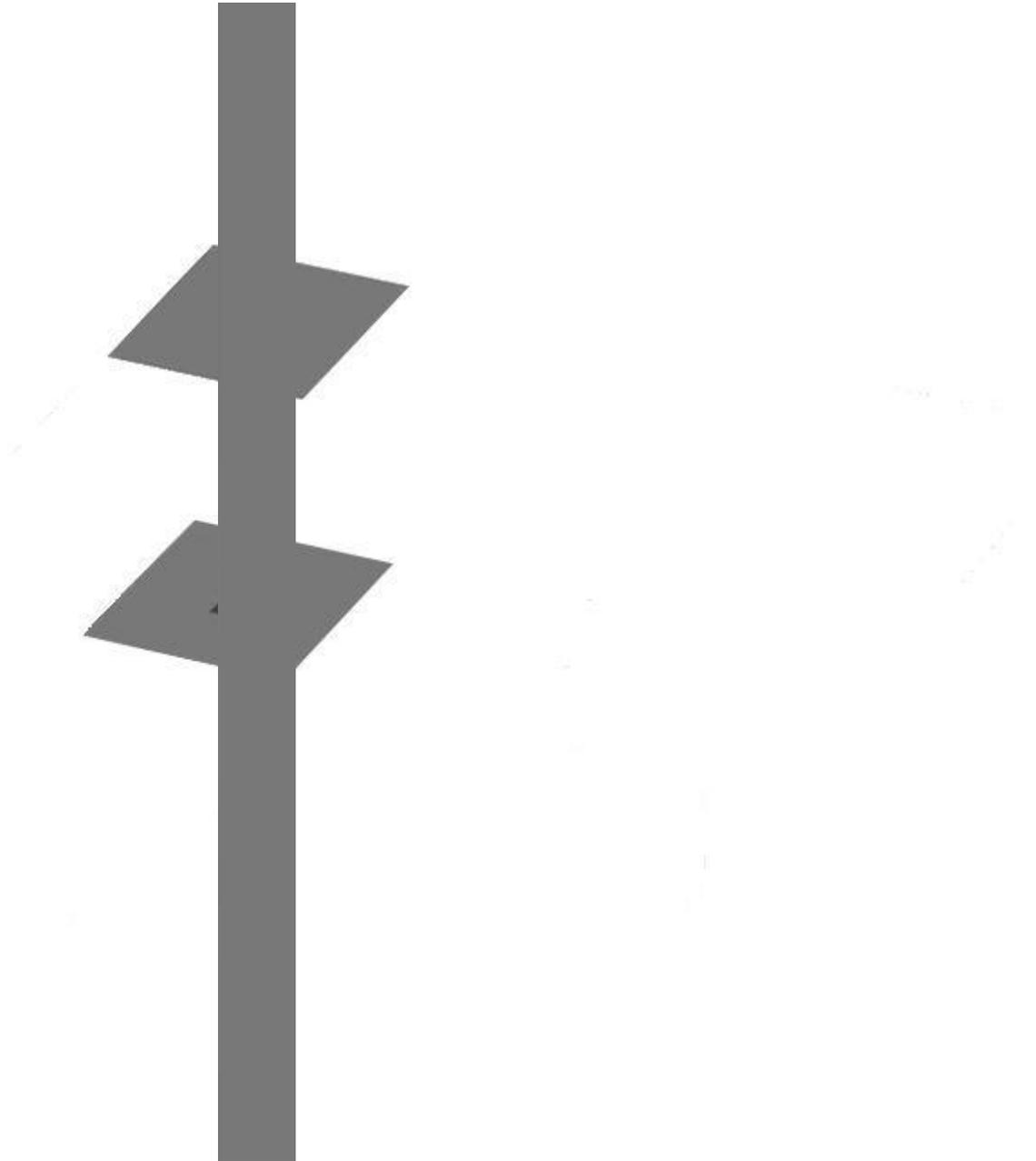


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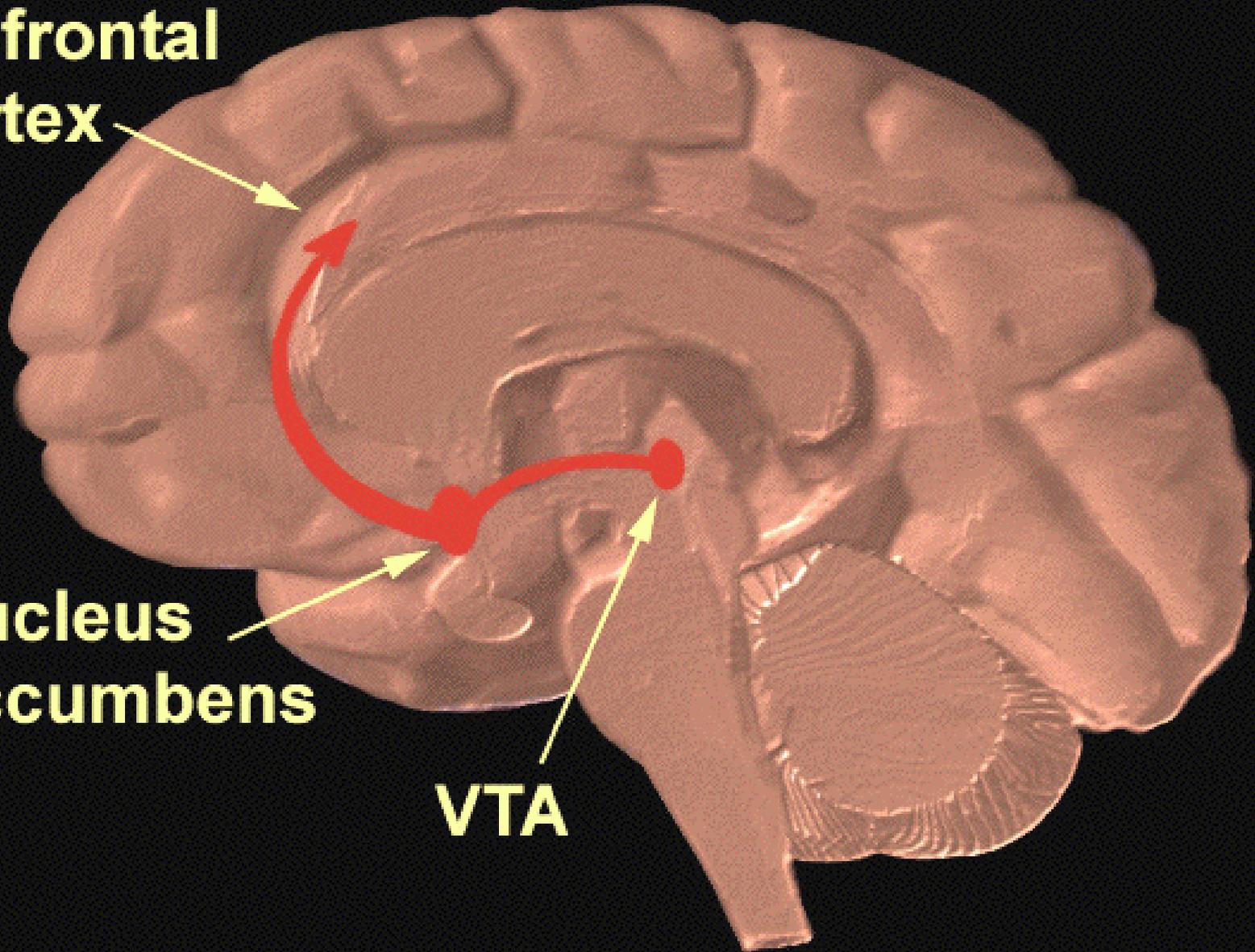
THE REWARD SYSTEM

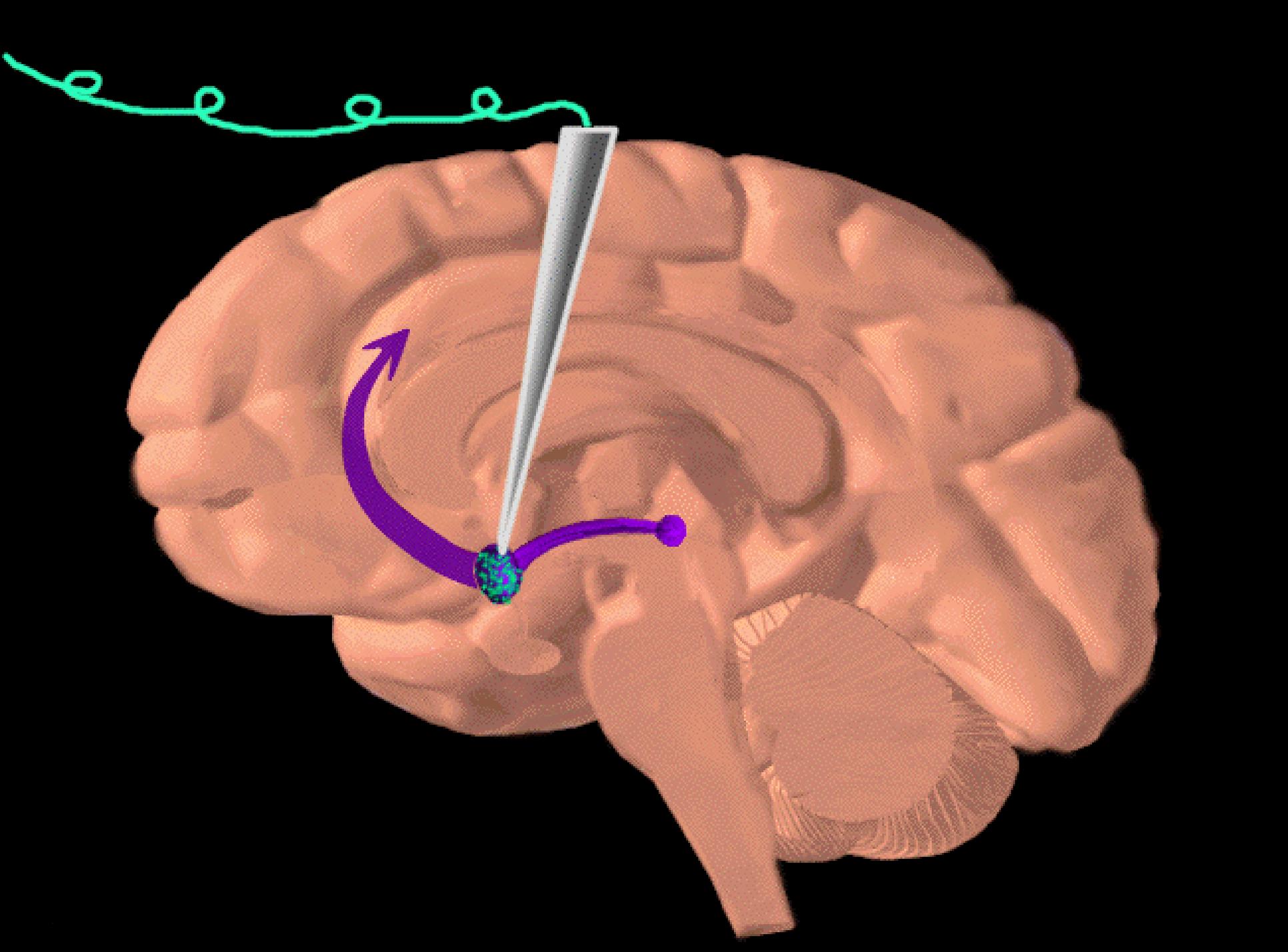
Reward System

prefrontal cortex

nucleus accumbens

VTA











Function of The Reward Pathways

In animals (including humans) the reward pathways are activated by:

Food

Water

Sex

The Pleasure Principle

The brain is built to repeat any behavior that stimulates this part of the brain

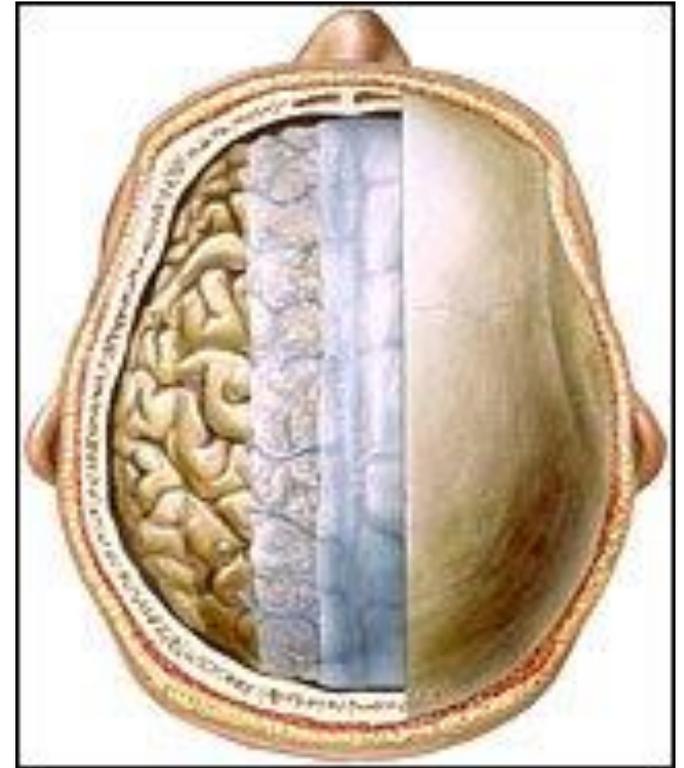
“If it feels good, it must be good for me.”

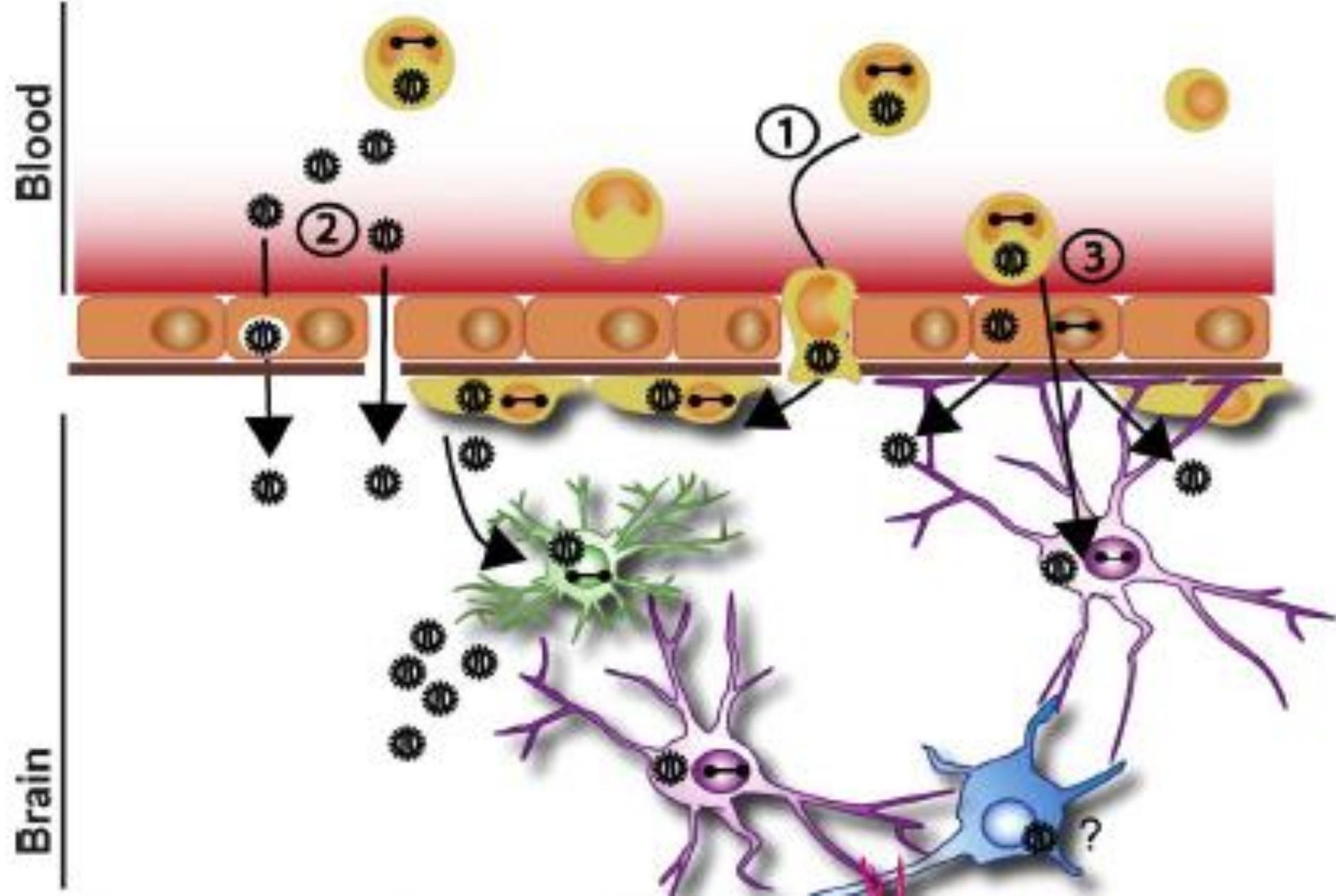
... and it must be repeated

The Effects of Alcohol/Drugs on Behavior

Brain Protection

- Brain protected by bone (skull)
- Fluid layer protects against shocks
- Blood-brain barrier





Let's Take a Drink

- **Thought**

- Logic, Judgment, Prediction, Decision-making

- **Emotion**

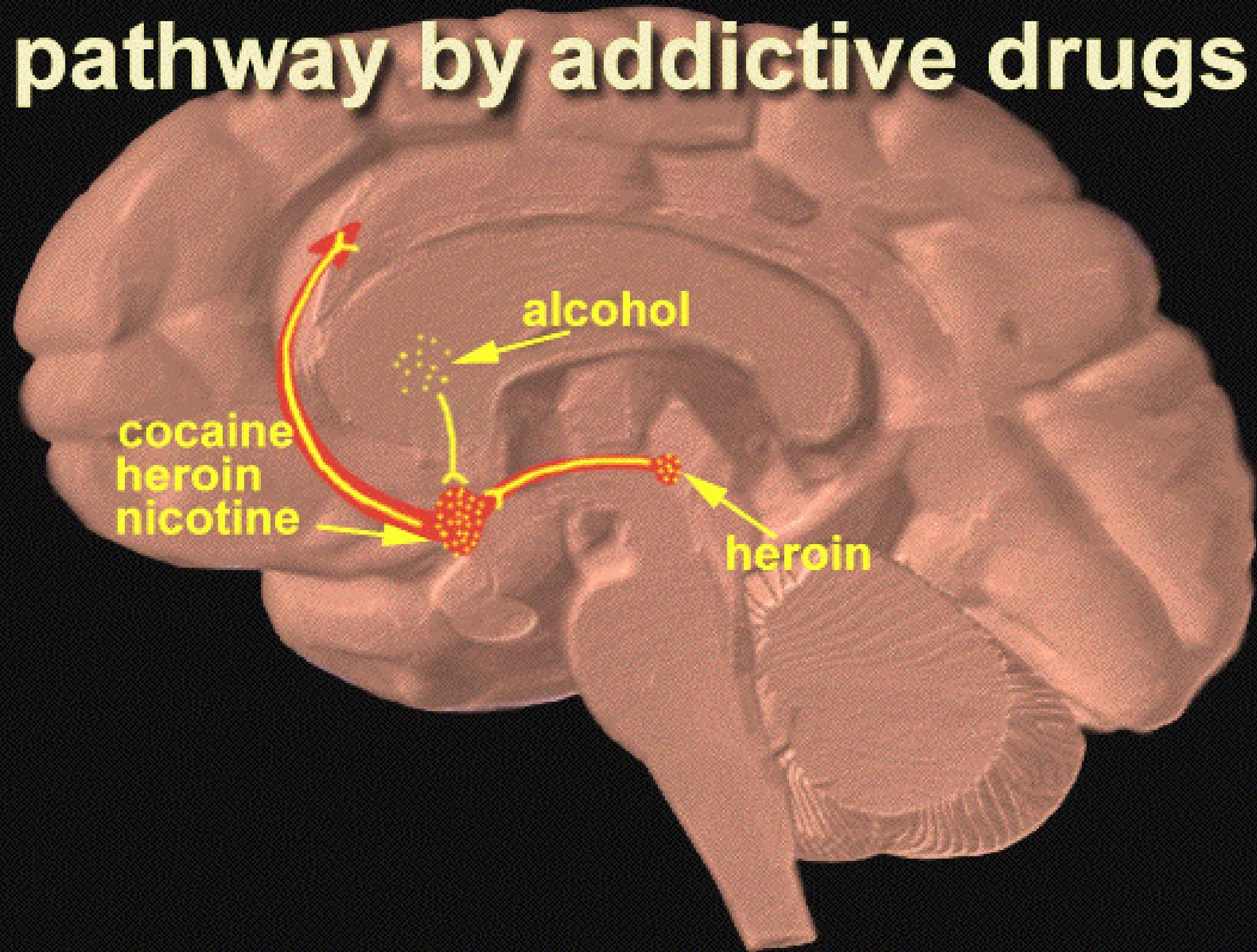
- Anger, Fear, Elation, Sadness

- **Senses**

- **Movement**

- **Memory**

Activation of the reward pathway by addictive drugs



Neurotransmitter Replacement

“The law of no free lunch”

Short Term Effects after Ecstasy is Gone



Normal

During Ecstasy
elevated mood

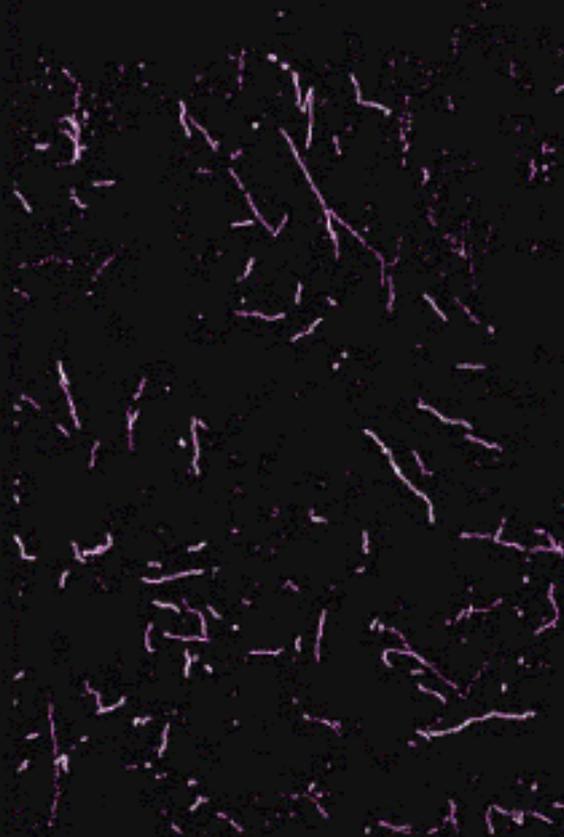
After Ecstasy
depression-like
feelings, irritability

Serotonin Present in Cerebral Cortex Neurons

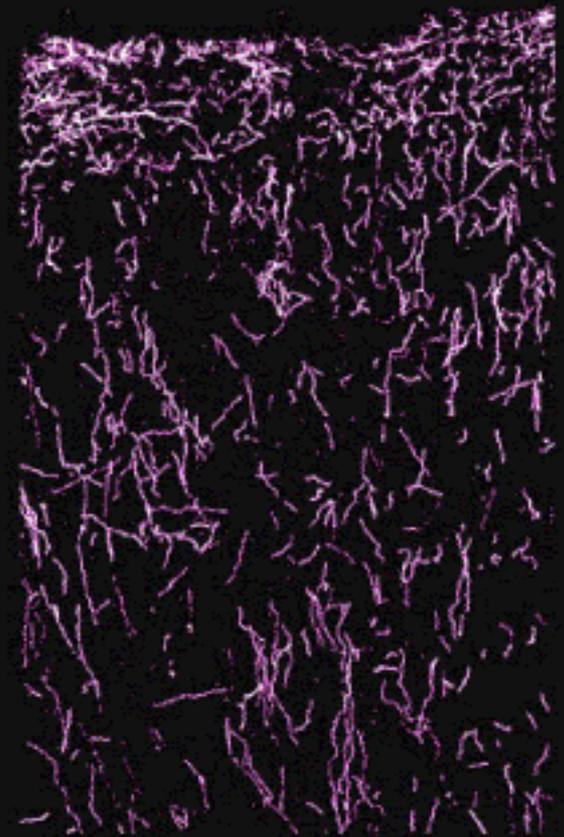
Normal



2 weeks after Ecstasy



7 years after Ecstasy





Normal





Normal



Cocaine Abuser (10 days)



Normal

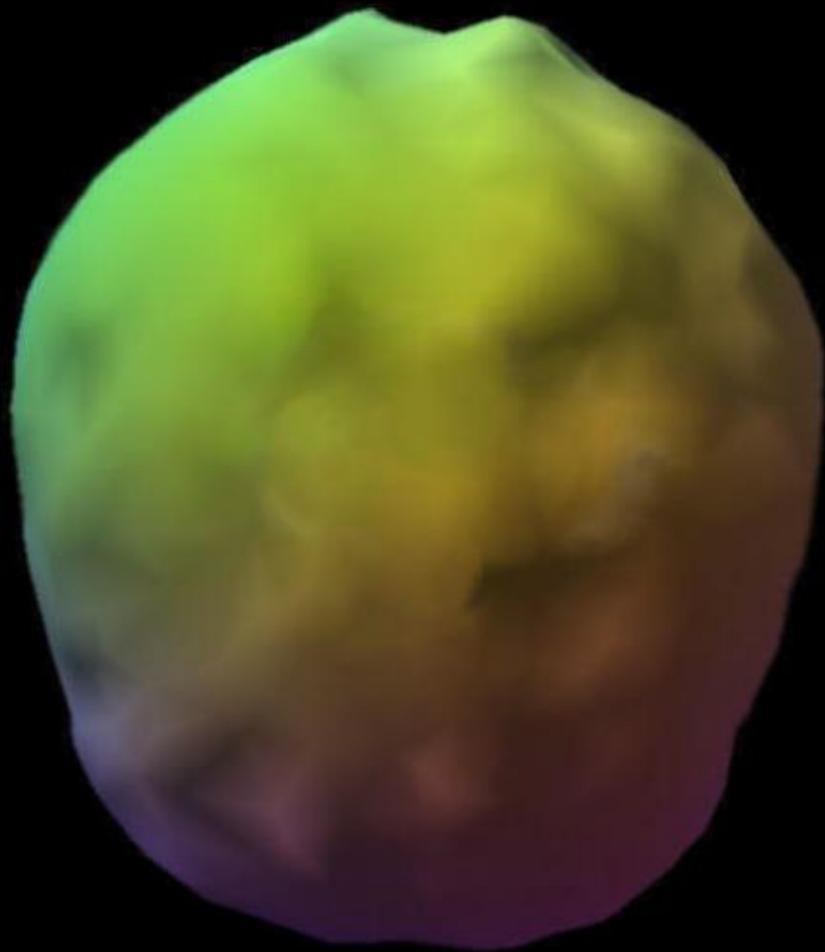


Cocaine Abuser (10 days)

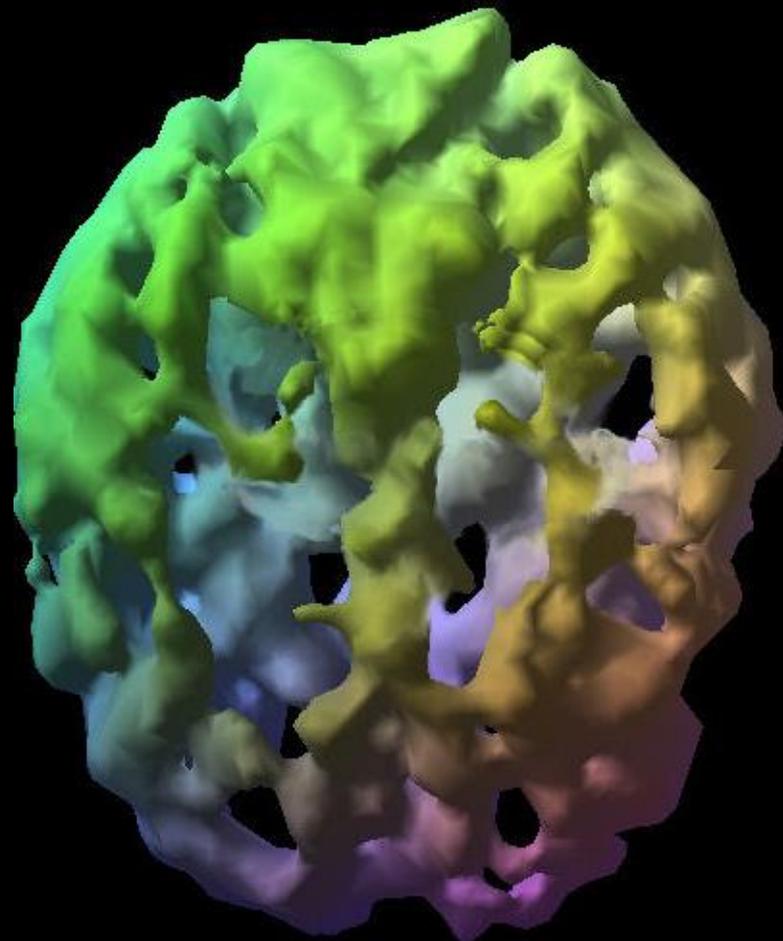


Cocaine Abuser (100 days)

SPECT Scan

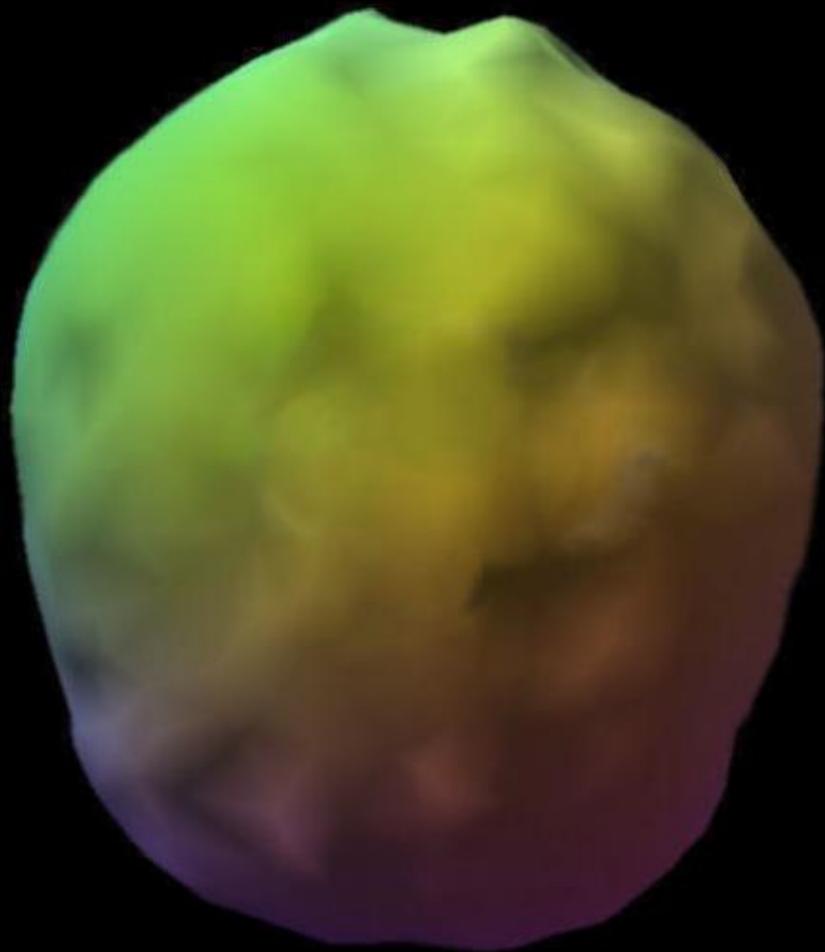


Healthy

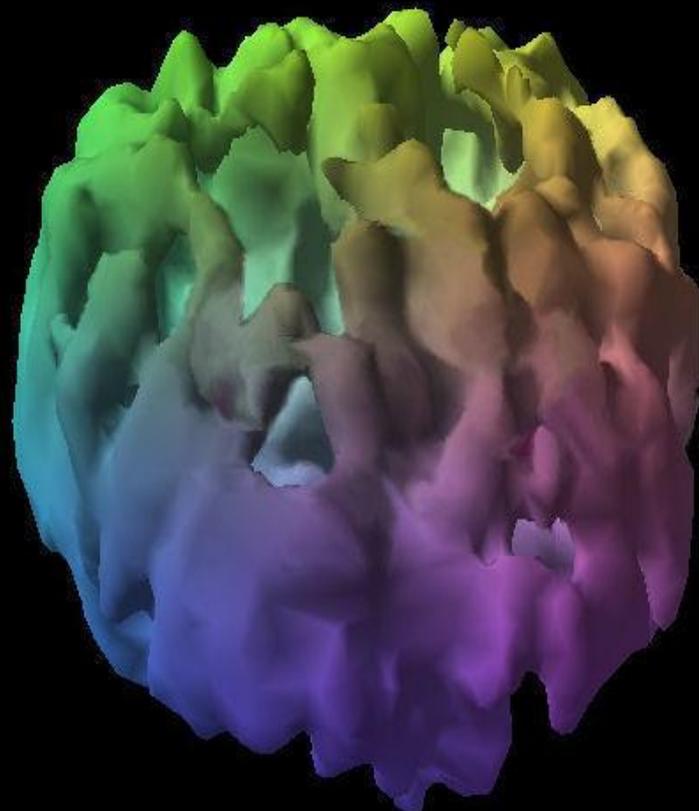


7 year opiate user

SPECT Scan



Healthy



25 year opiate user

Neurotransmitter Imbalances

Imbalances of... Results in:

Serotonin

Depression/Eating DO

Dopamine

Schizophrenia

Norepinephrine

Anxiety/Depression

Glutamate

OCD/PTSD

GABA

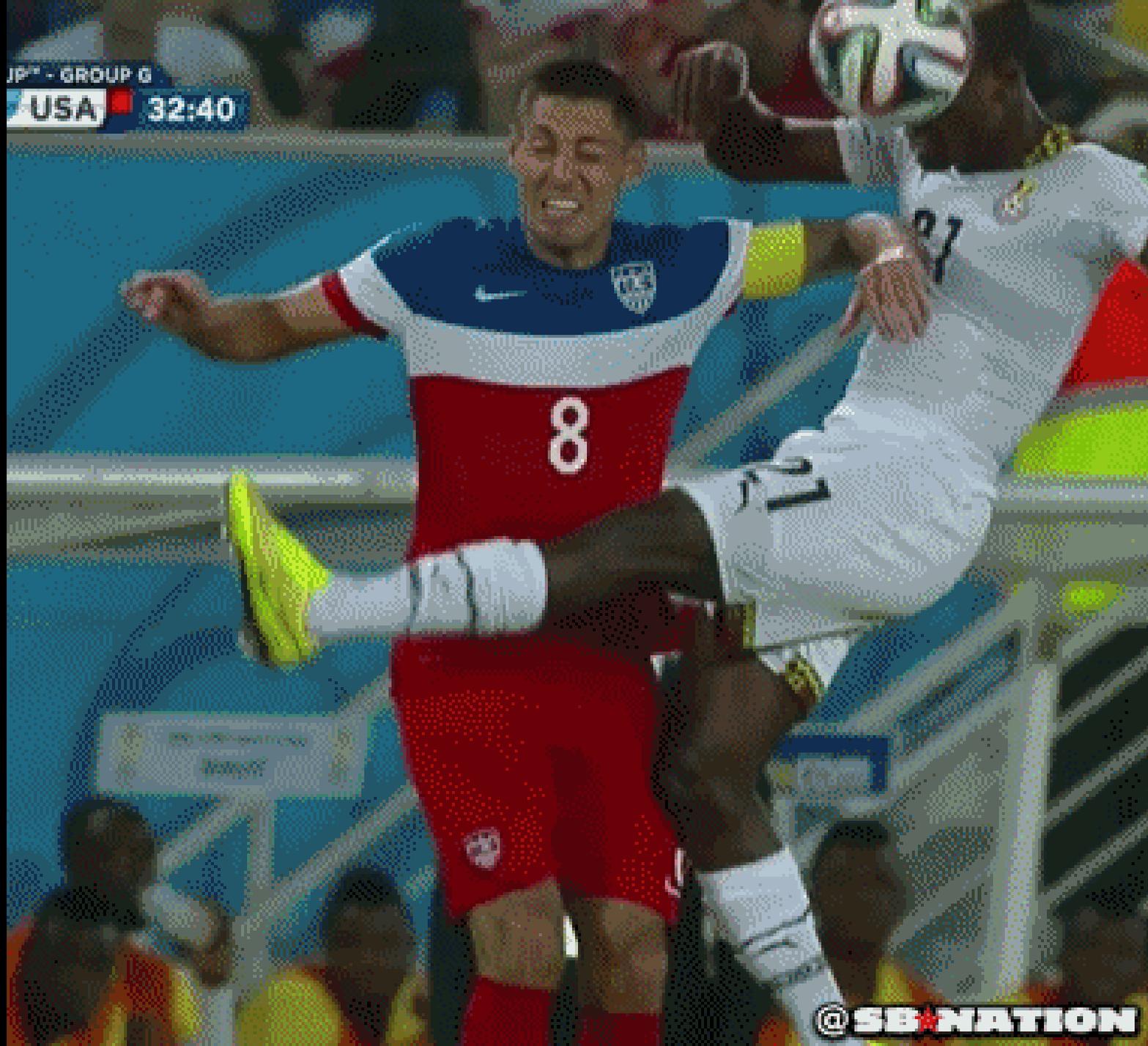
Anxiety/Panic



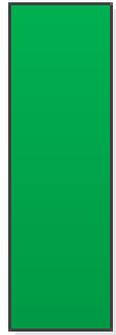
Endorphin

JP - GROUP G

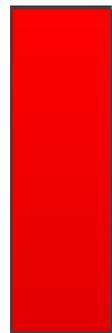
USA 32:40



@SB NATION



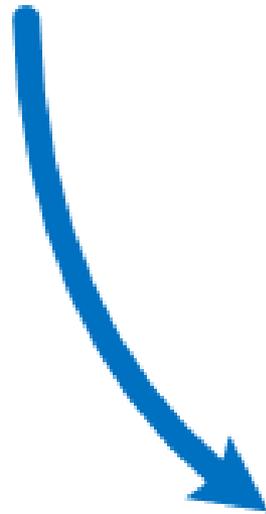
Endorphin



Pain



Endorphin



Pain



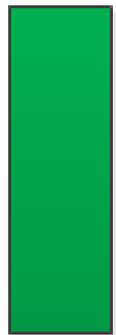
Endorphin

Opiate



Pain





Endorphin

Opiate



Pain



Endorphin

Opiate



Pain



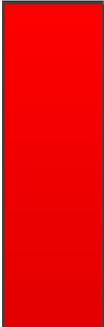
Endorphin

Pain





Endorphin

 Pain

Endorphin



Pain

Endorphin



ADDICTION

Brain Shape (Design)

Factors

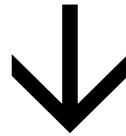
- 1. DNA**
- 2. Oxygen & Nutrients**
- 3. Environment**



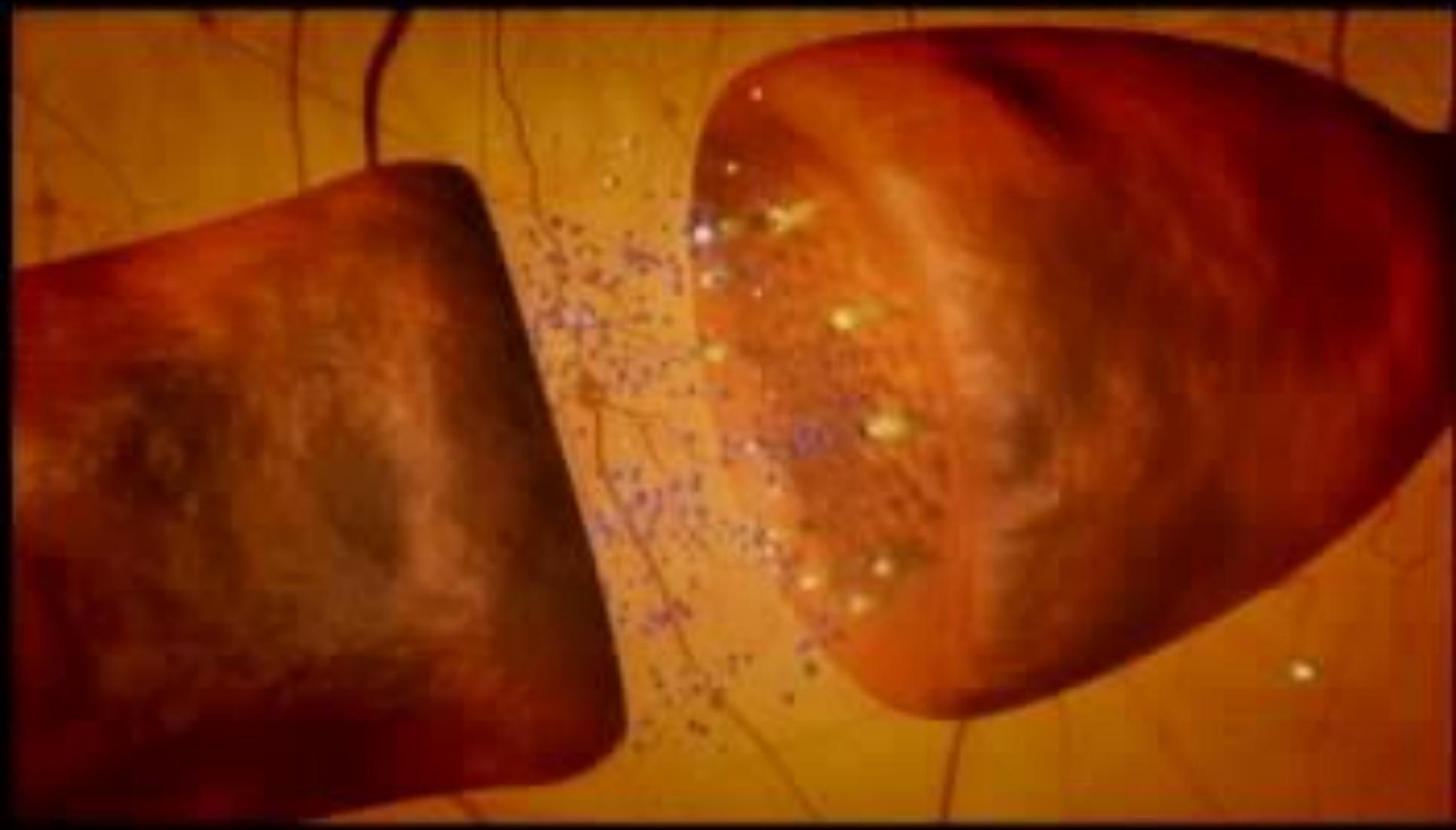


Cellular Adaptation

Environment Change



Brain Change





Adaptation To Drug

- Consistent drug use is a “new environment” and adaptation occurs
- The reward system is strongly affected
- The drug takes on the properties of the activities that naturally create sensations of pleasure

Definition of Addiction

Addiction is the physical adaptation of the reward pathways of the brain to the repeated presence of dopamine-surging chemicals

(False survival drive)

ASAM Definition

- The American Society of Addiction Medicine (ASAM) - August 2011
- Defines Addiction as a “Chronic Brain Disease”

*“Addiction is a primary, chronic disease of brain reward, motivation, memory and related **circuitry.**”*

- Must be treated, managed and monitored over a person's lifetime
- As a **chronic disease**, periods of relapse are a common feature of addiction [however] the return to drug use is **not** inevitable
- In addiction there is a significant impairment of executive functioning that manifests itself in problems with perception, learning, impulse control, compulsivity and judgment

The Evolution of the Cerebrum*



(a) Bass



(b) Frog



(c) Pit viper



(d) Warbler



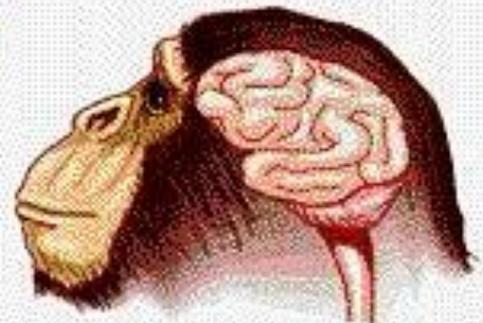
(e) Opossum



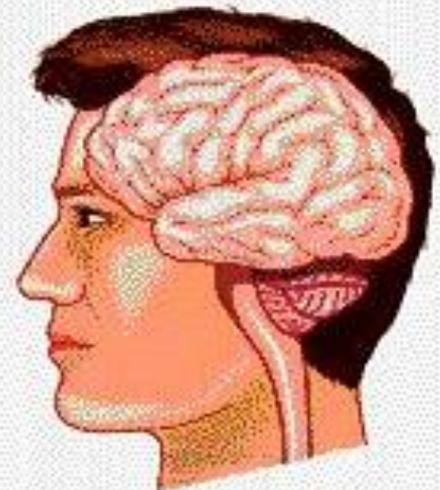
(f) Bobcat



(g) Macaque

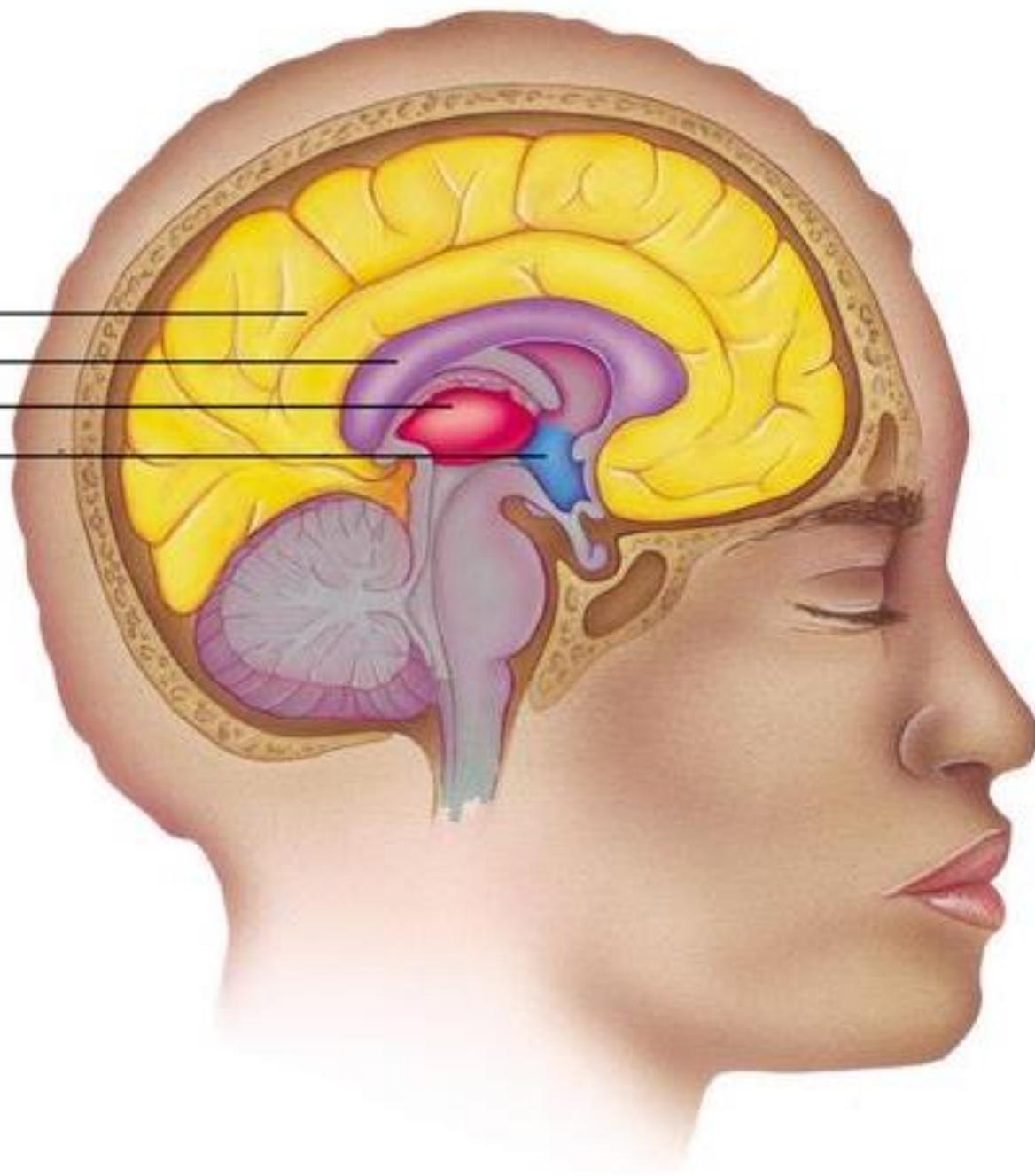


(h) Chimpanzee

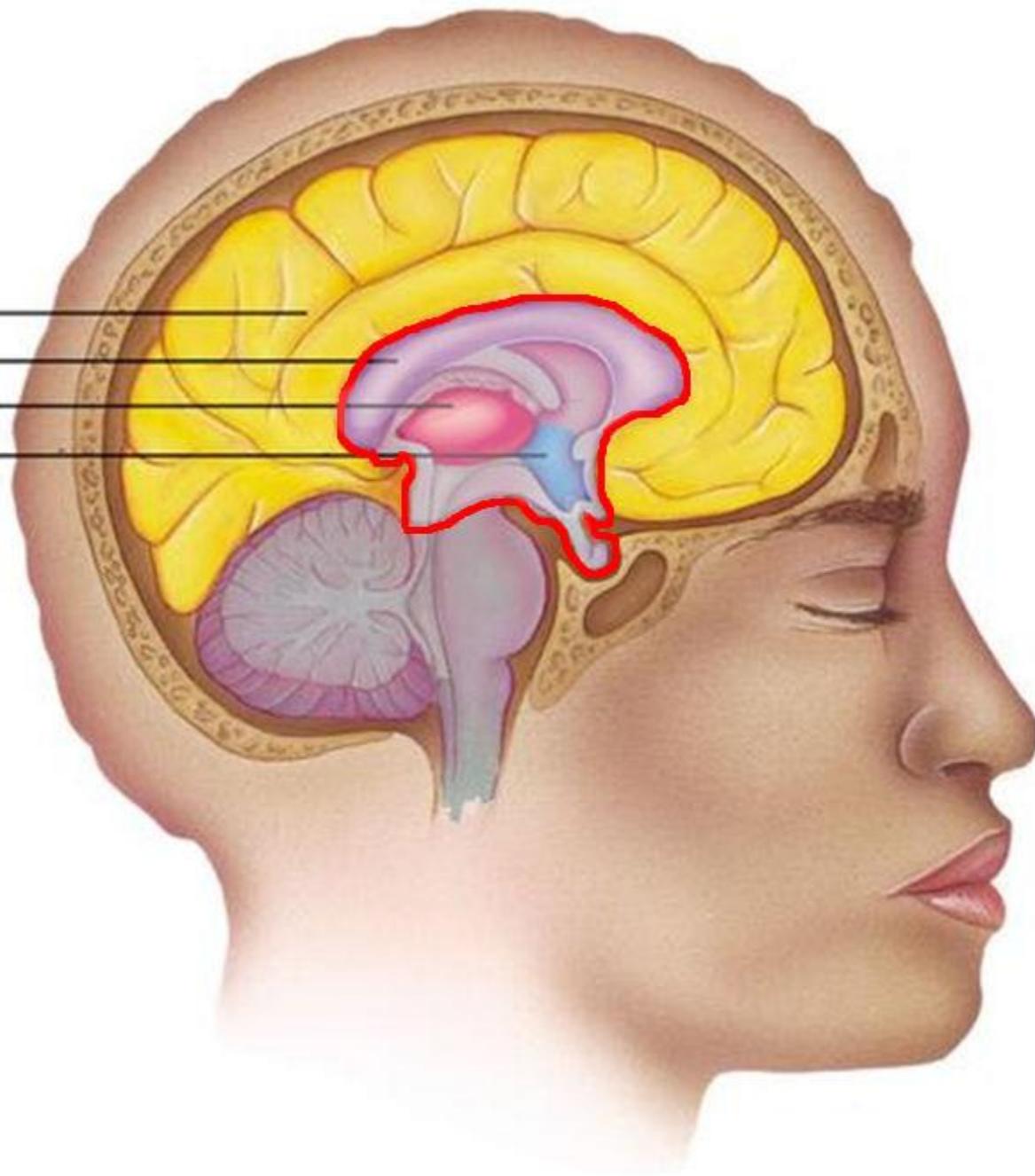


(i) Human

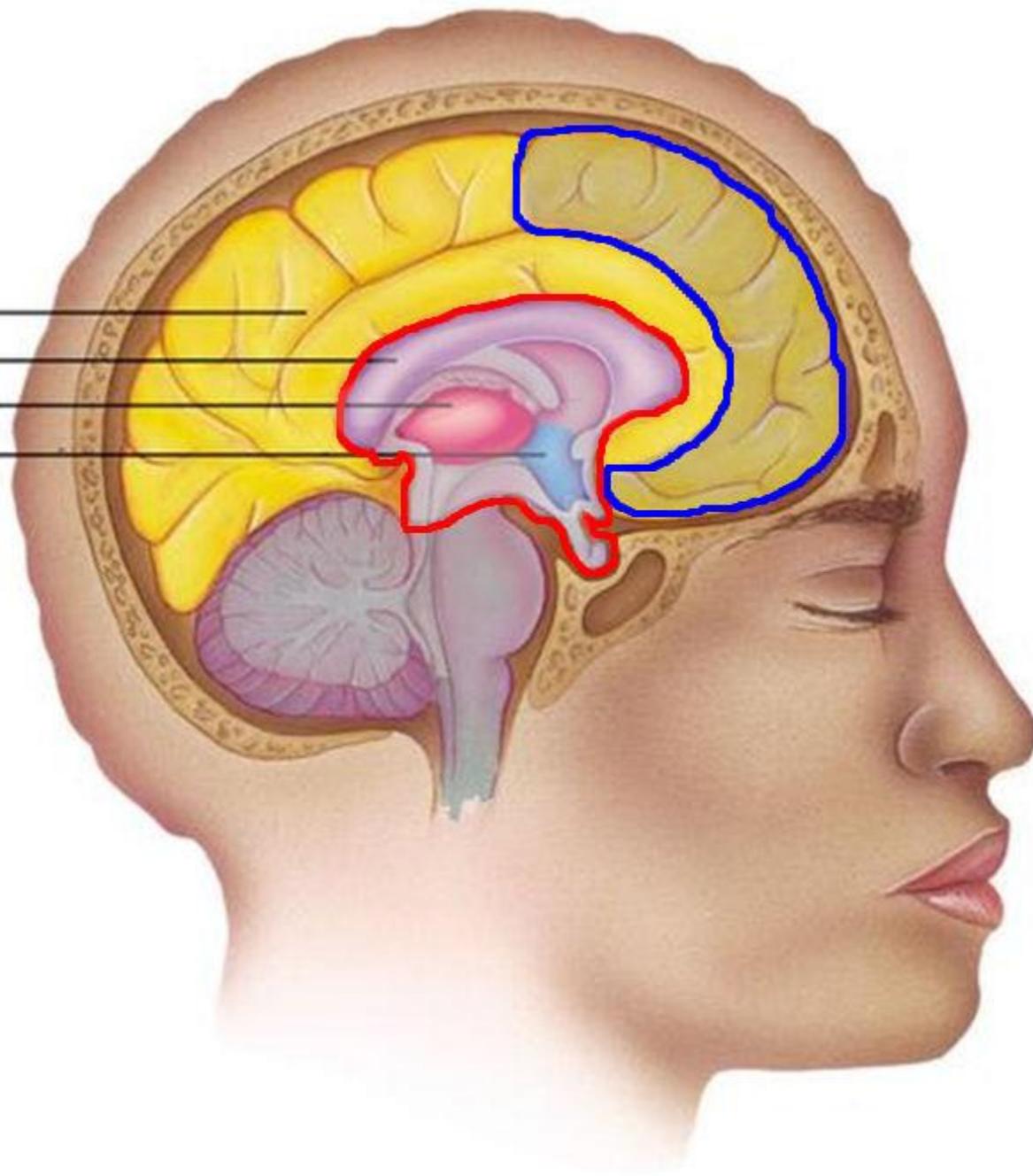
- Cerebral cortex
- Corpus callosum
- Thalamus
- Hypothalamus



- Cerebral cortex
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- Cerebral cortex
- Corpus callosum
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- Hypothalamus



b. kep(c)2011

The Adolescent Brain

- Preteens have “under-developed” prefrontal cortices
- Major growth occurs in the PFC between ages 13 - 26
- Adolescents can become addicted 5x faster than adults
- People who start using as teenagers have immature PFC's

RECOVERY PROCESS

(Now that we know this,
what do we do?)



Goals of Treatment

- Cessation and abstinence from all dopamine-surging chemicals
- Empowerment to steer behavior by the prefrontal cortex
- Stabilize & quiet the midbrain
- Become comfortable with not using

Treatment Tasks

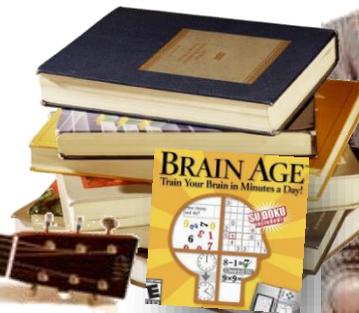
Physical Stability

- Sleep
- Balance blood sugar levels
- Exercise
- Relaxation/meditation



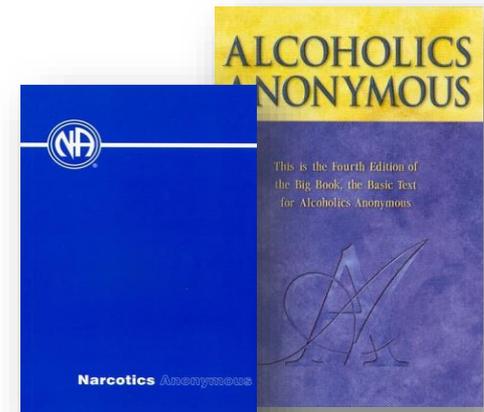
Mental/Neural Strengthening

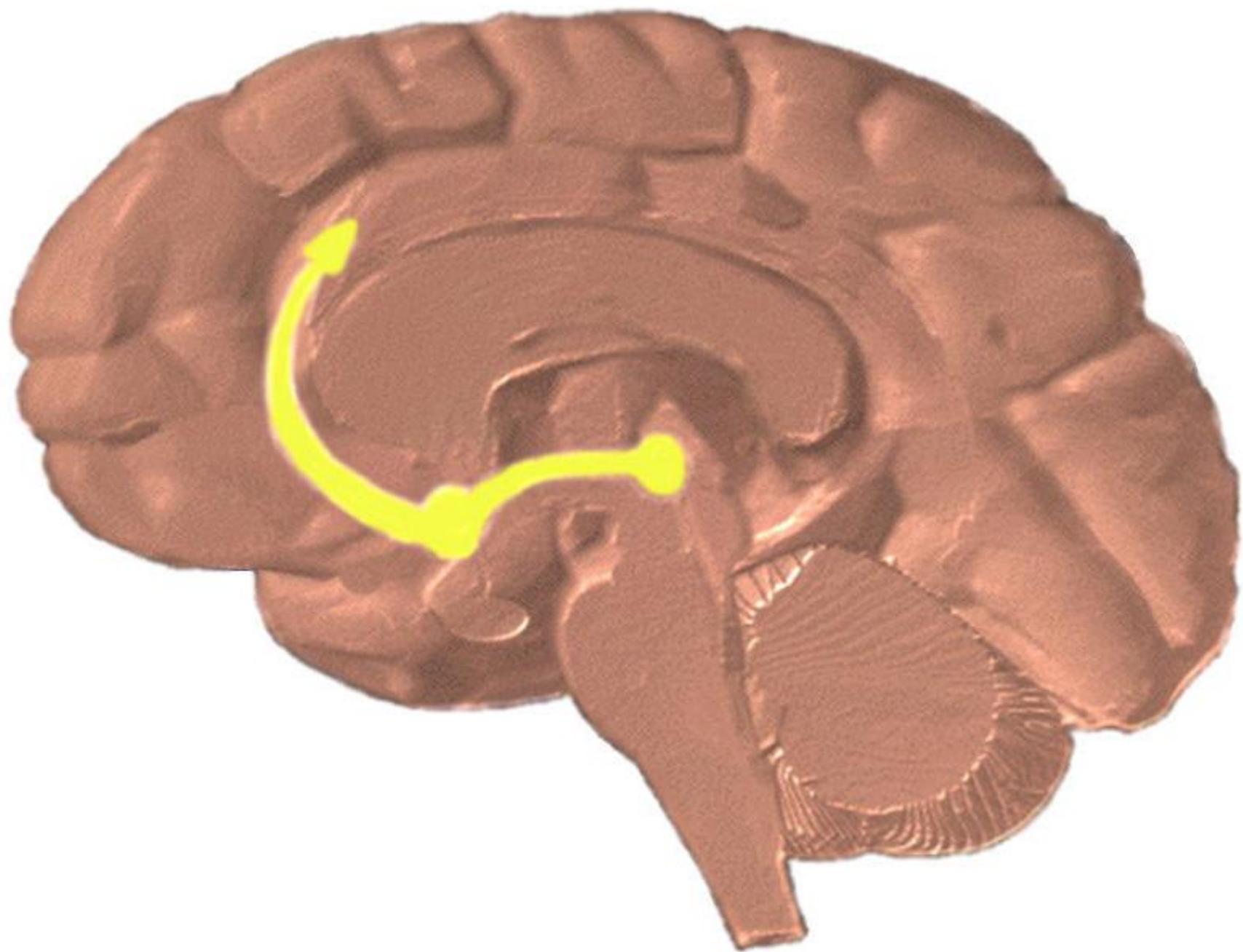
- Develop New Neural Pathways
- Learn Recovery Skills
- Counseling
- Quit Smoking

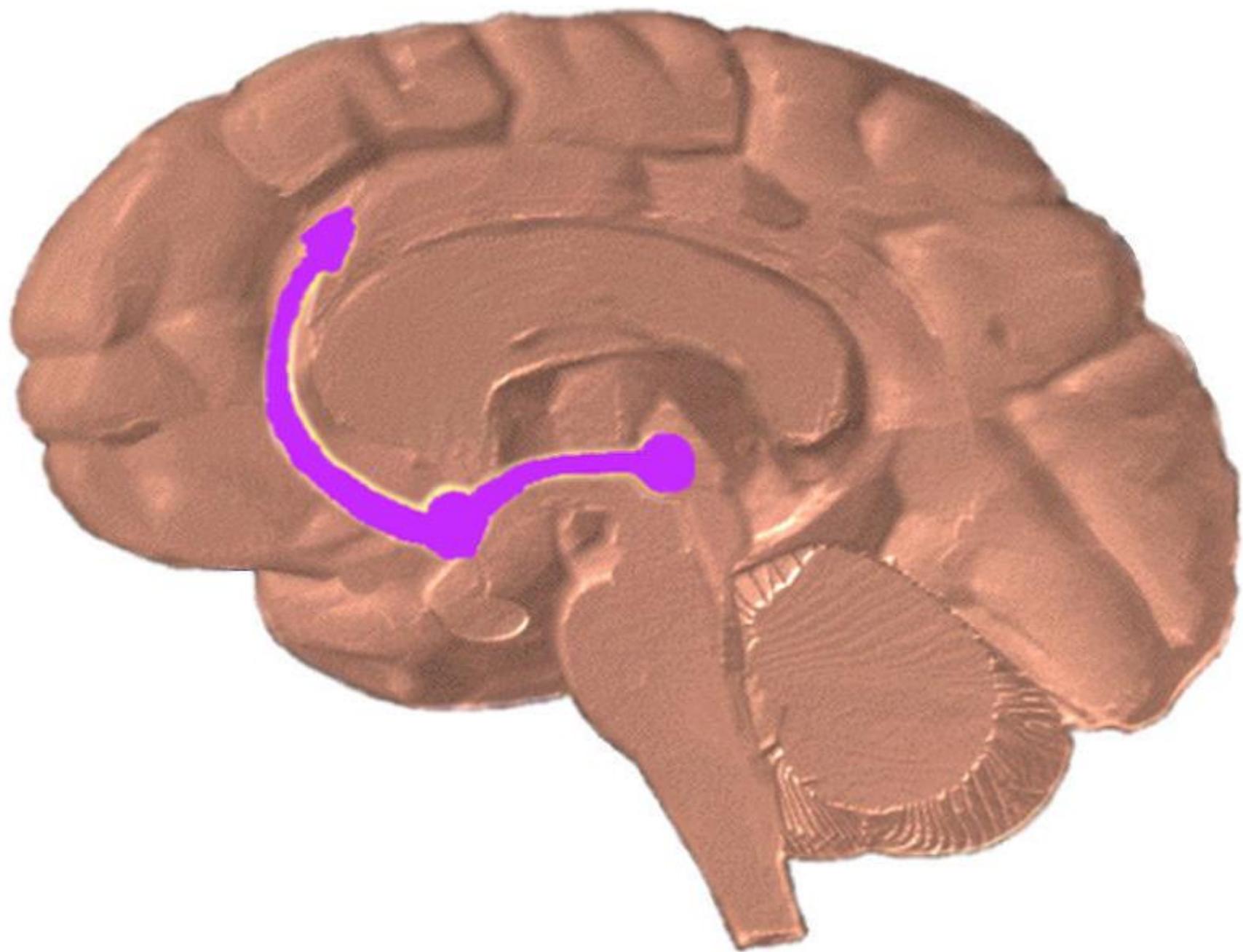


Environmental Management

- Establish a healthy life space
 - People
 - Places
 - Things
- Immersion into sober activities with sober people
- 12-step activity







Treatment Options

- IV Acute Hospital Detoxification
- III-C Sub-acute Detoxification [24-hour medical monitoring]
- III-B 24 hour Observation Bed
- II-B Residential, Medical [24-hour medical/nursing monitoring]
- II-A Residential, Non-medical

Treatment Options

III-A Outpatient/Ambulatory
Detoxification

I-B Intensive Outpatient/Partial
Hospitalization [≥ 8 hr/week over at
least 3 days]

1-A Standard Outpatient

Opiate Agonist Program

Medication Assisted Treatment (MAT)

Medication-Assisted vs Opiate Agonist

MAT

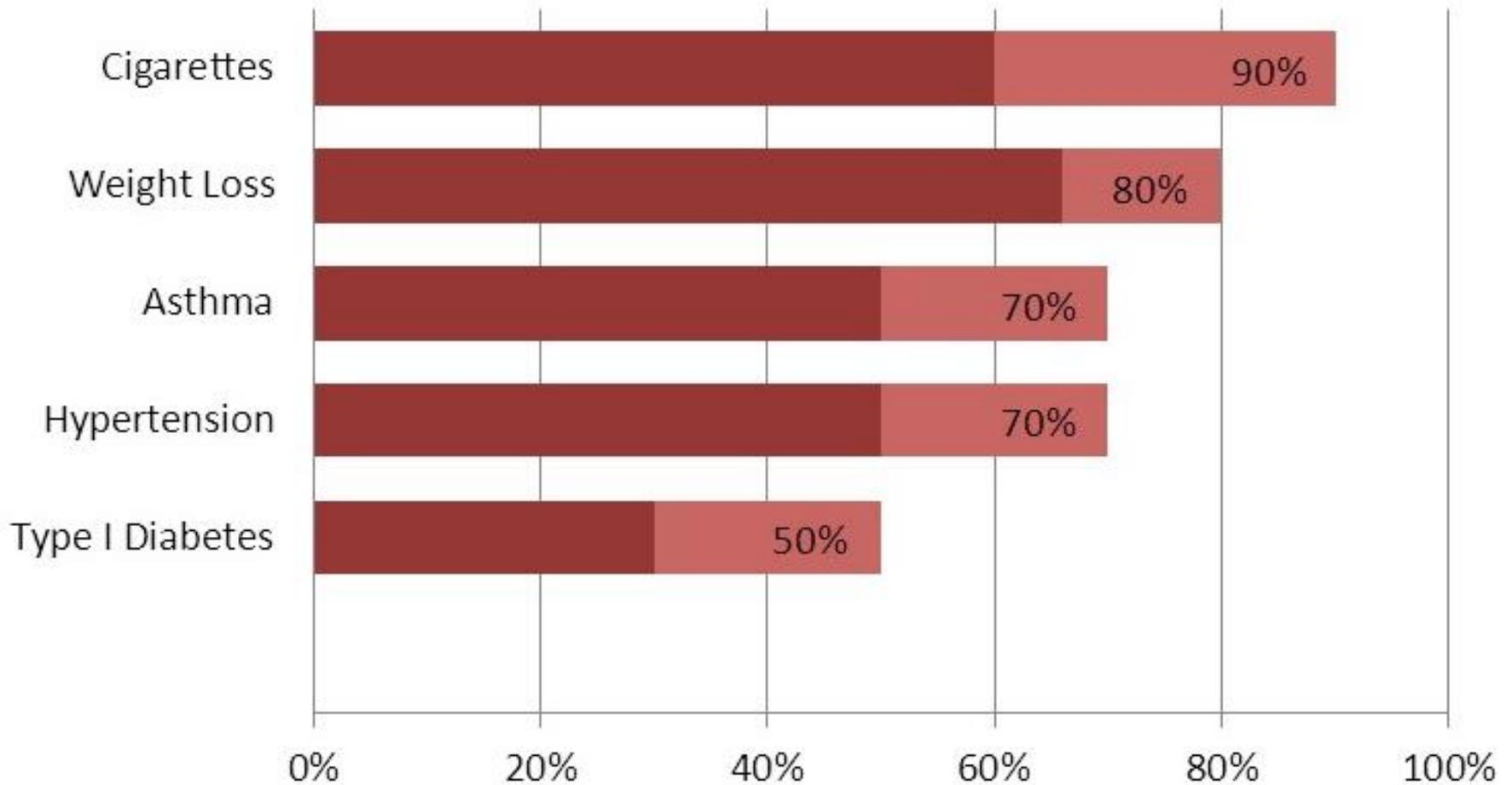
- Taper or maintenance
 - Buprenorphine (Subutex, Suboxone)
 - Naltrexone (Depade, Revia)
 - Vivitrol

Opiate Agonist Program

- Methadone

Relapse Rates in First 12 Months

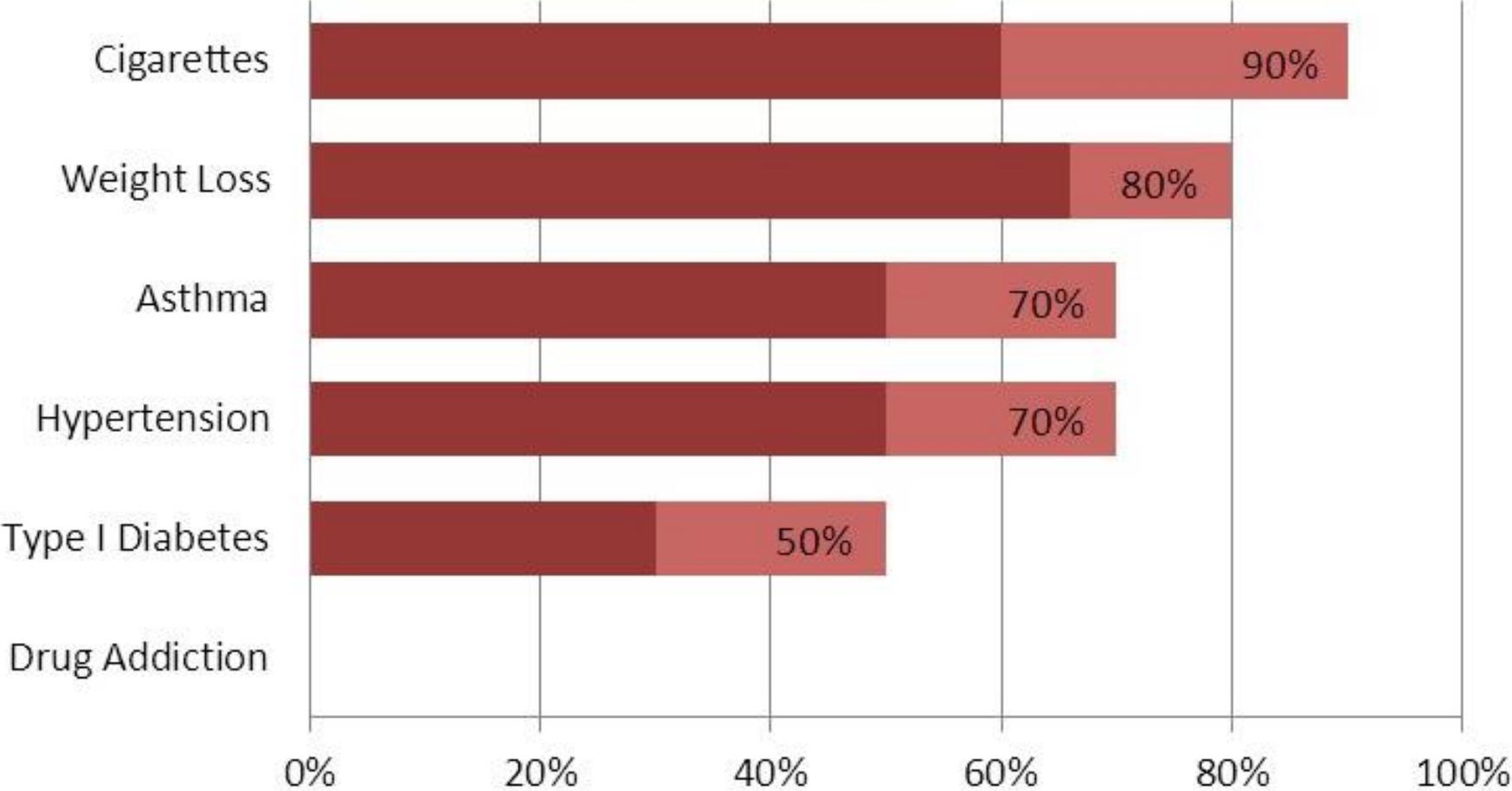
■ Low est. ■ High est.



NIDA, 2012

Relapse Rates in First 12 Months

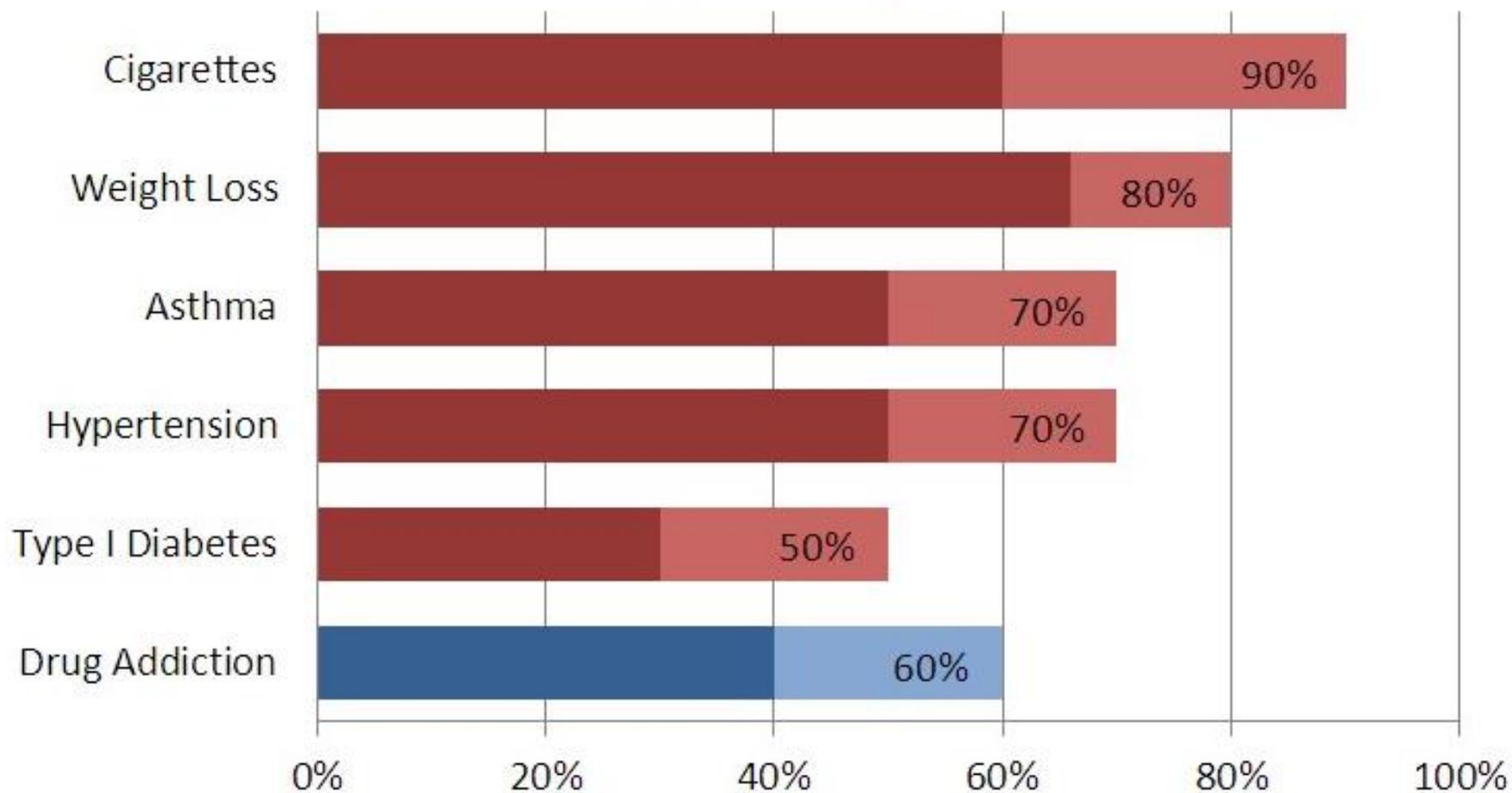
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