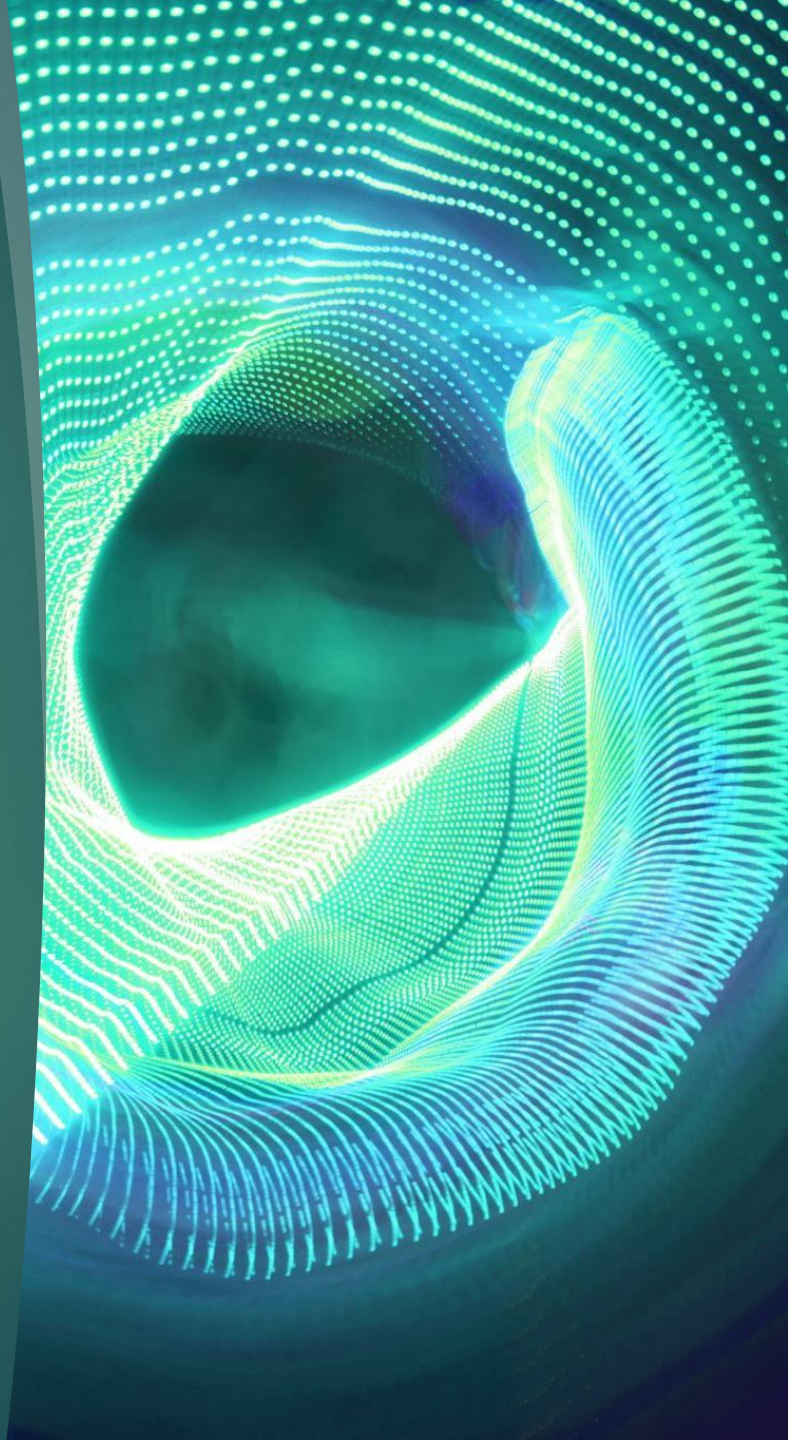
# The Power of Plasticity

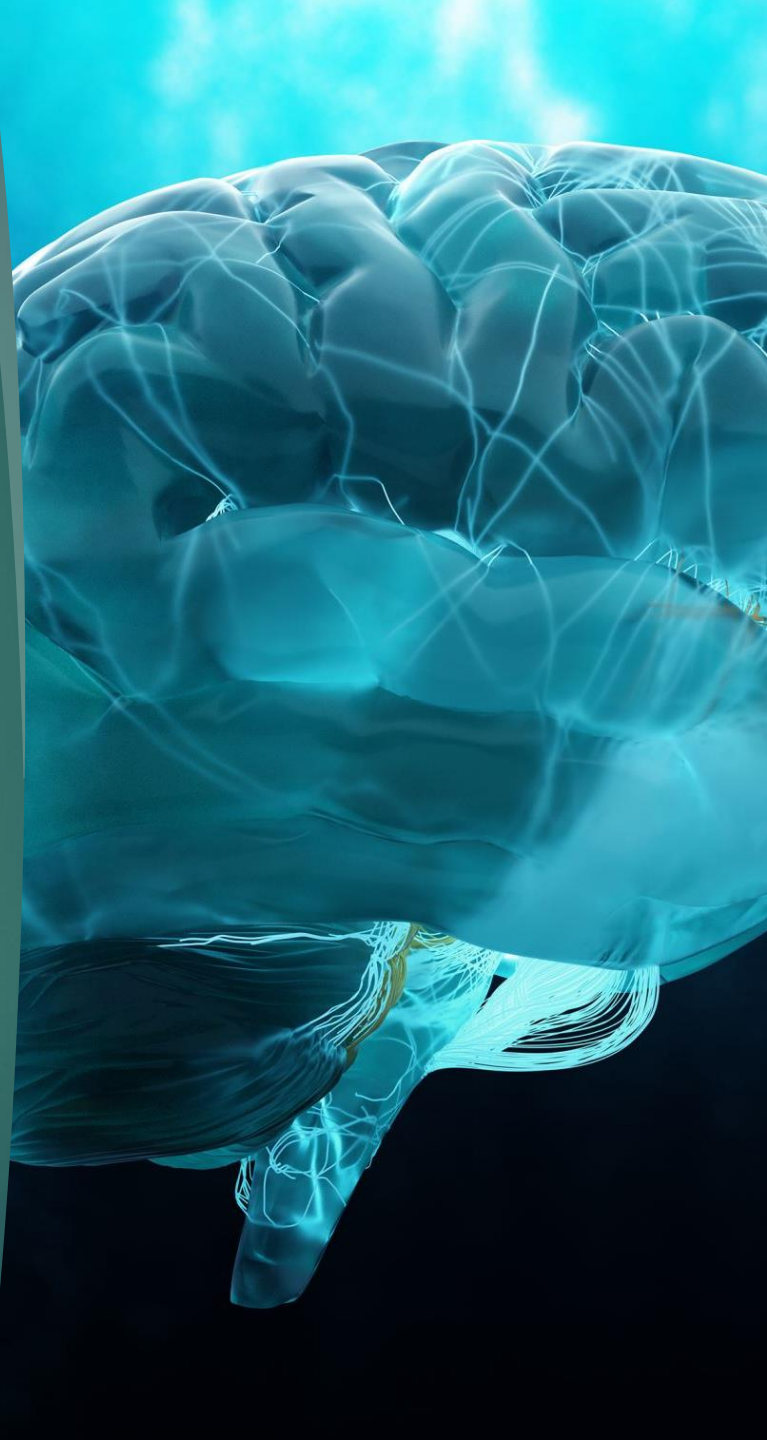
## Paving New Neural Pathways for Recovery

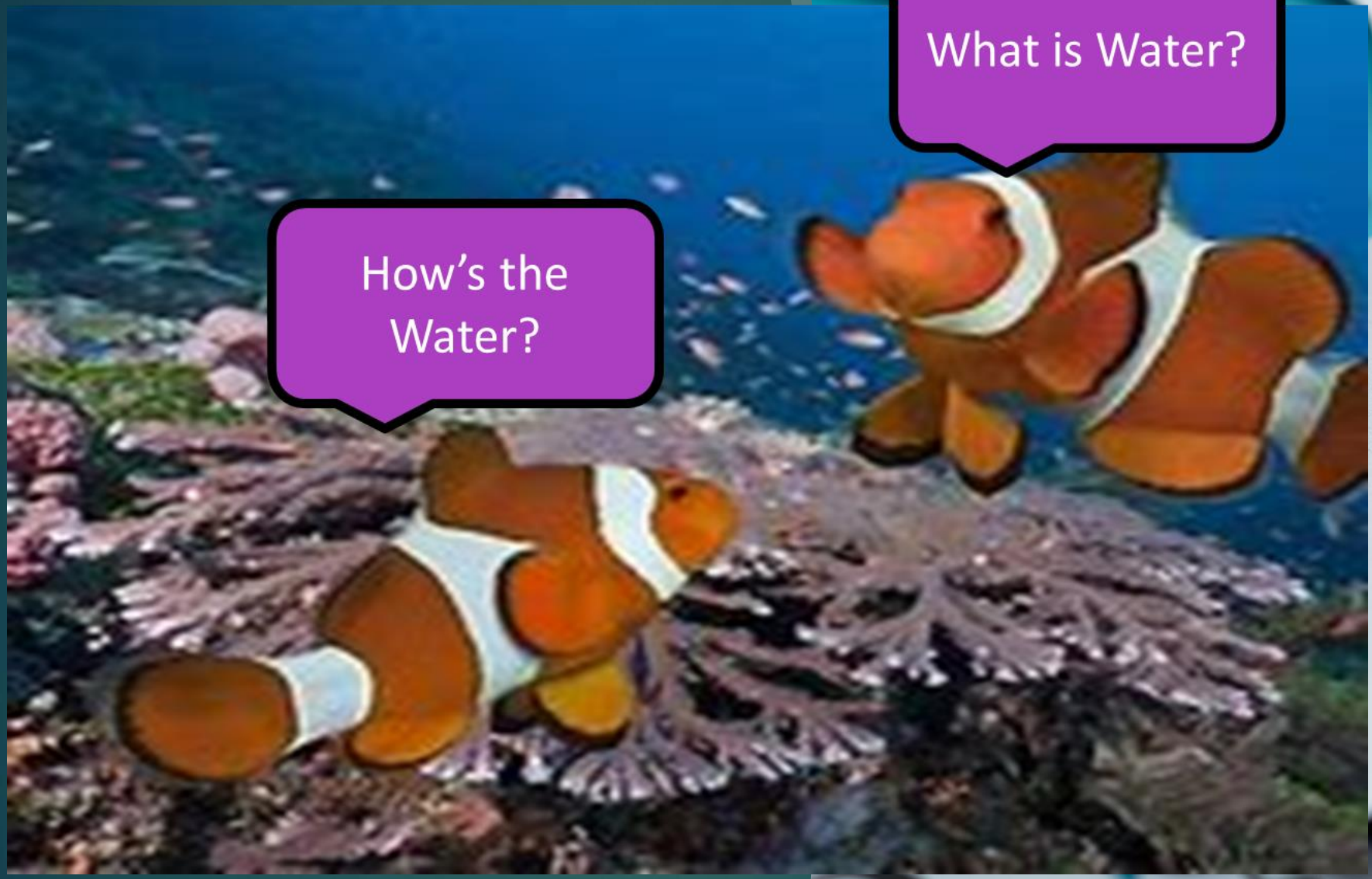
Ken Martz, Psy.D. ICGC-II, BACC



# Overview

- Brain Function
  - Motivation
  - Reward
  - Memory
- External Factors
  - Trauma
  - Beliefs
- Chemistry
- Treatment

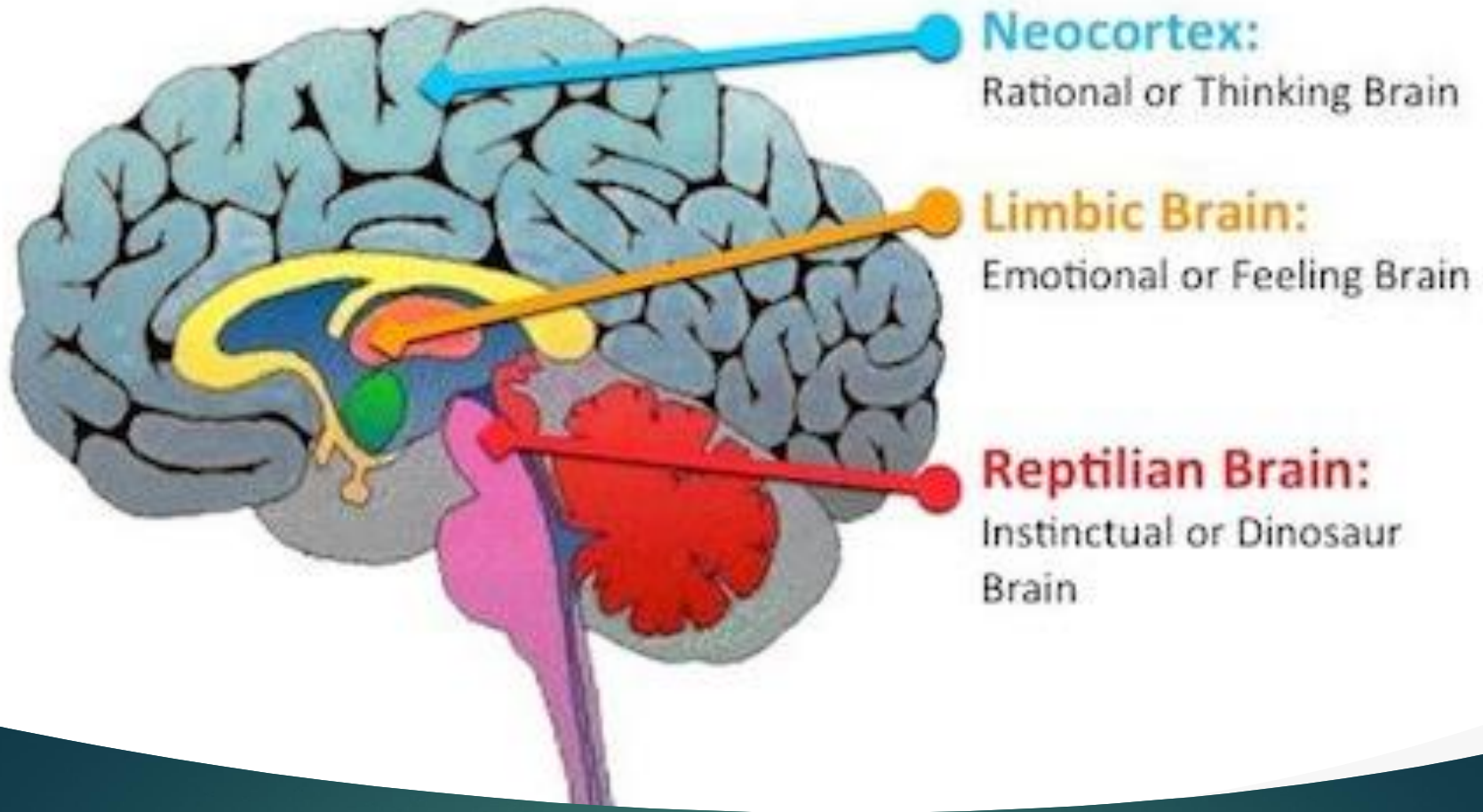



What is Water?
How's the Water?

# ASAM Definition

**ASAM Definition of Addiction:**

- Addiction is a **primary, chronic disease of brain reward, motivation, memory and related circuitry.** Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors.
- Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one's behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.


Neocortex:
Rational or Thinking Brain
Limbic Brain:
Emotional or Feeling Brain
Reptilian Brain:
Instinctual or Dinosaur Brain

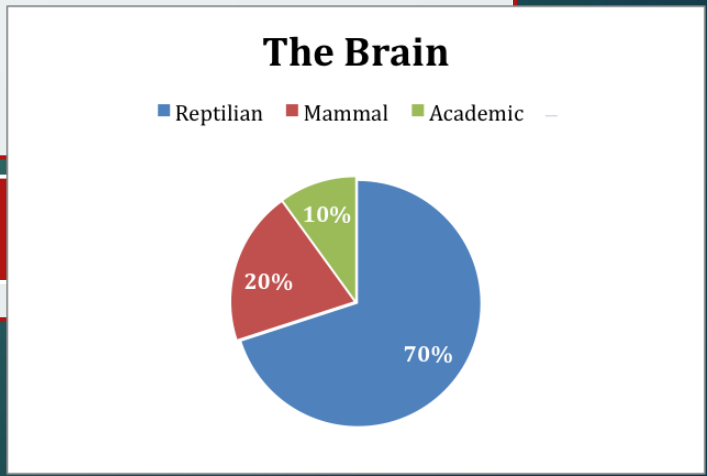
# Motivation

# Motivation

## Triune Brain- Neuroscientist Paul MacLean

- Reptilian Brain:
  - Instinctual responses: Fight, Flight, Feeding
    - Thought: I must have this or I'll die.
  - Basal ganglia
- Limbic Brain/Mammalian Brain:
  - Motivation:
    - Thought: I want/"need" it.
  - Amygdala, cingulate cortex
- Neocortex/Paleomammalian Brain
  - Cognition, planning
    - Thought: I'd rather have this than that.
  - Neocortex

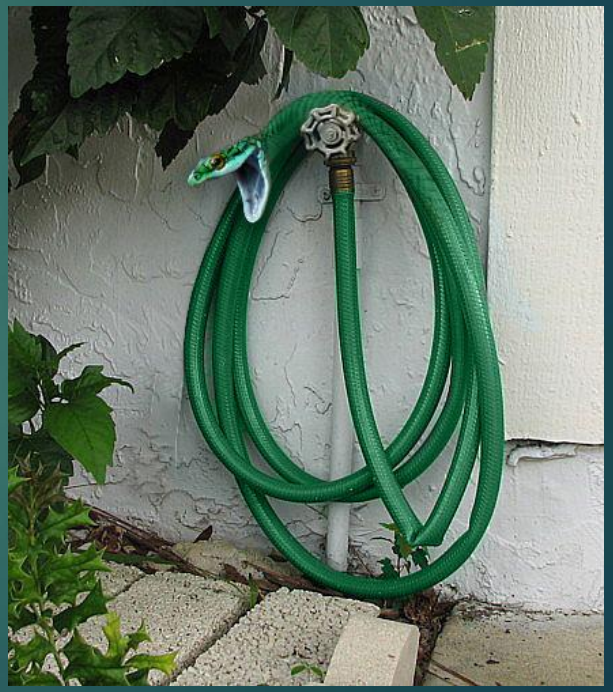
## Task: Leverage higher thinking



# Motivation

**Reptilian Brain:**
Rapid Action/Reaction

**Rational Brain:**
Slower Thinking/Planning



# Motivation

**Reptilian Brain:**
Rapid Action/Reaction

**Drugs: I need it!**

**Rational Brain:**
Slower Thinking/Planning

**Drugs: I need it?**

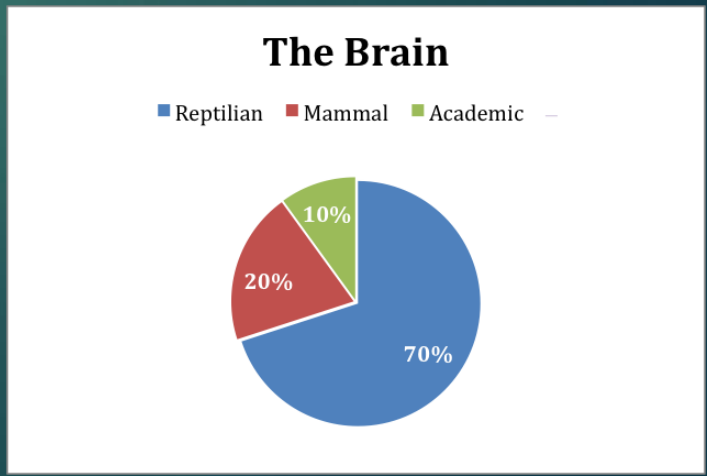
**Vs:**

- My kids
- My spouse
- My job
- My freedom…

# Motivation

- Task: Leverage higher thinking

- Driving example:
  - Autopilot
  - Actively Navigating



# Motivation/Reward

- Intrinsic/Extrinsic Motivation/Reward
  - Intrinsic motivation comes from within the task itself (e.g. pleasure/relief provided by the substance)
    - Advantages: Intrinsic motivation can be long-lasting and self-sustaining
    - Disadvantages: Efforts at fostering intrinsic motivation can be slow to affect behavior and can require special and lengthy preparation.
  - Extrinsic is external (e.g. approval, payment etc.)
    - Advantages: Can increase compliance while internal motivation is developed
    - Disadvantages: Can lead to overjustification and a subsequent reduction in intrinsic motivation
  - Often treatment starts with external motivation and moves internal. Note these are relatively higher cognitive functions

# Motivation

- Stages of Change


| Denial/ No intent to change | Awareness/ No intent to change | Intent/ No action to change | Intent/ Action to change | Continue new behavior |
|---|---|---|---|---|

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- Stages of Change


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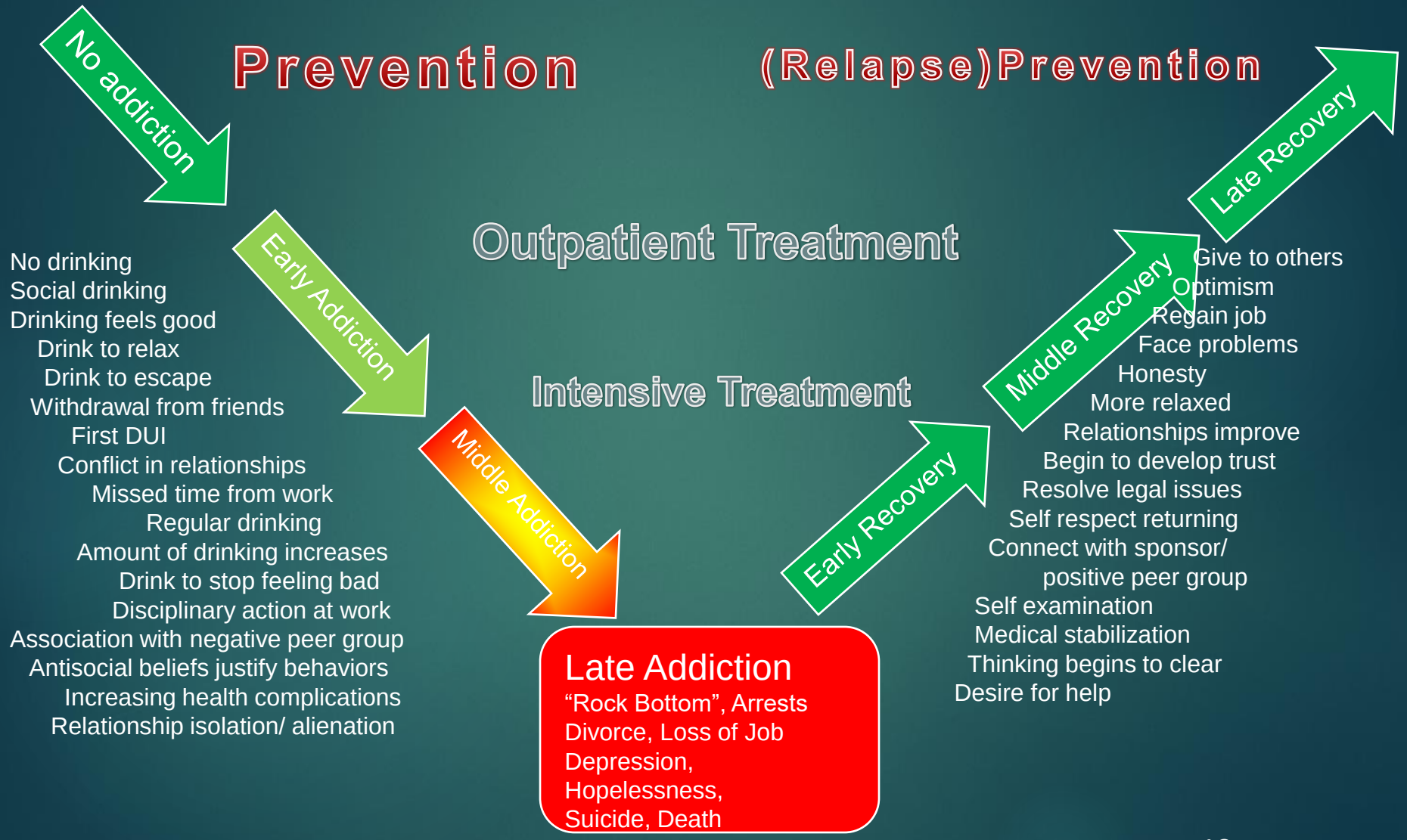
# Progression of a Disease and Recovery



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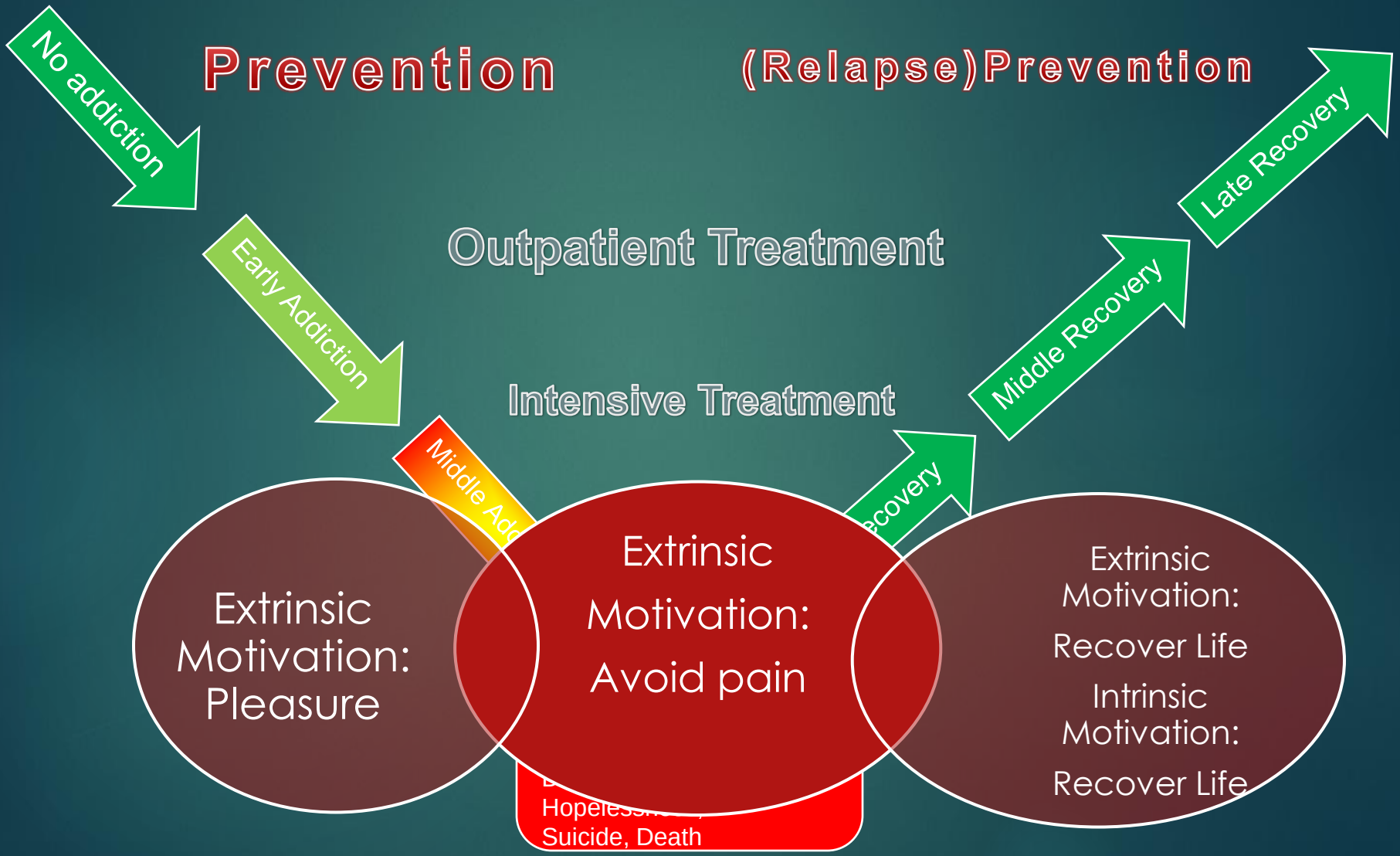


# Memory

## Learned behaviors

Life skills

Addiction behaviors

## Recovery

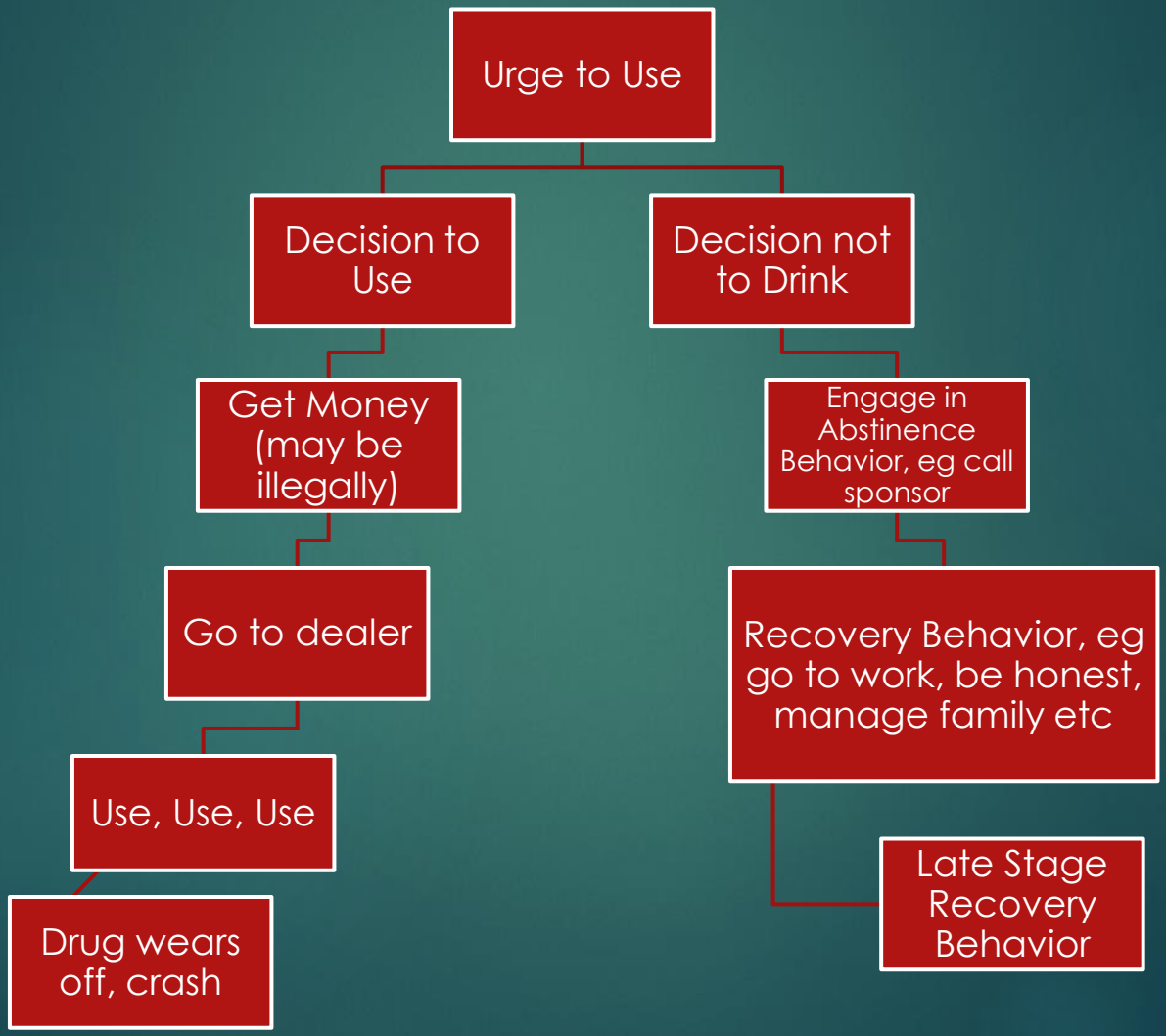
Rehabilitation- Remember and restore prior skills

Habilitation- Learn new/effective skills

What happens if you stop treatment before learning a skill?

What happens if you stop treatment after learning a skill but before practicing it?

# Biology
# Example of 2 Brain pathways



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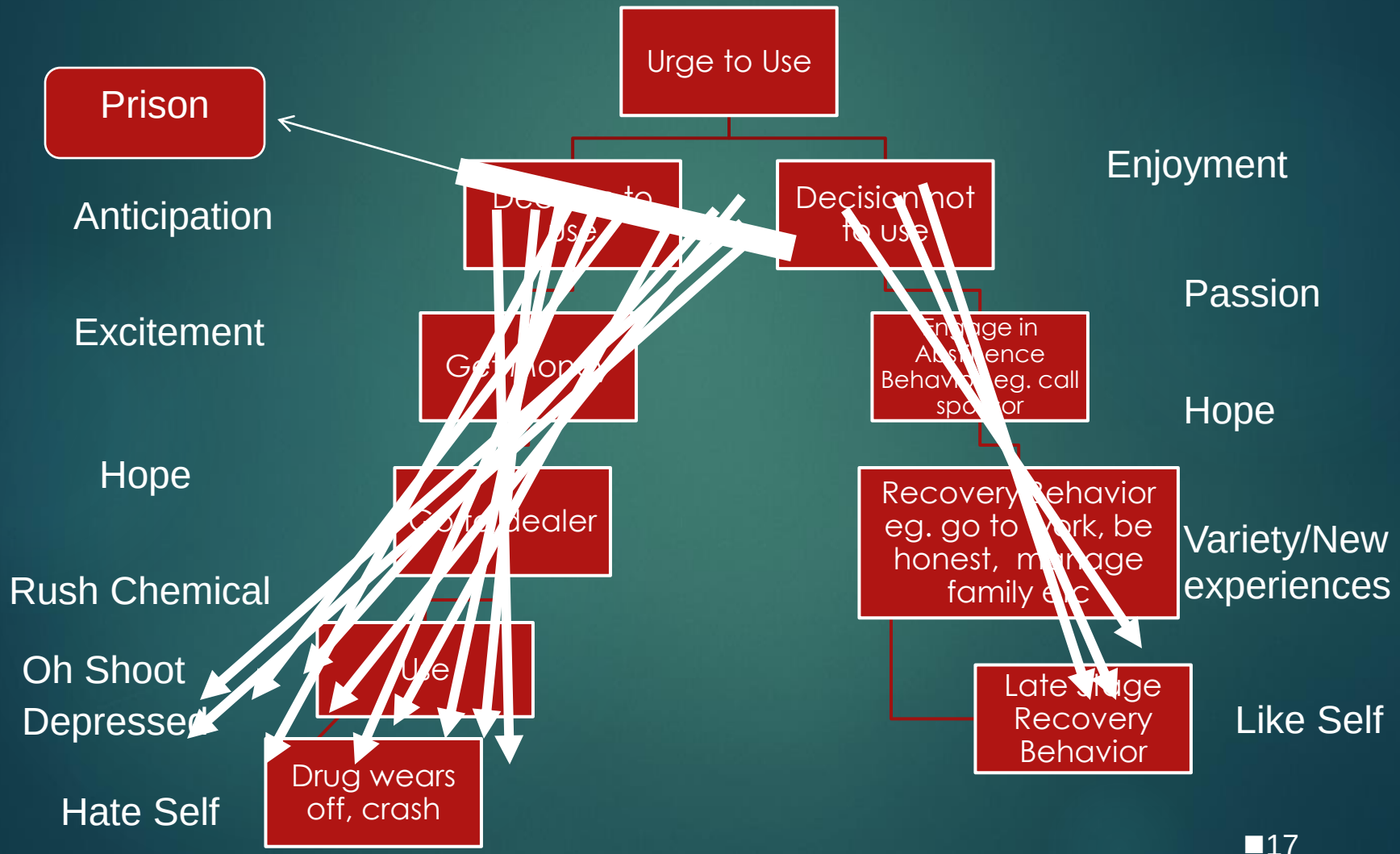

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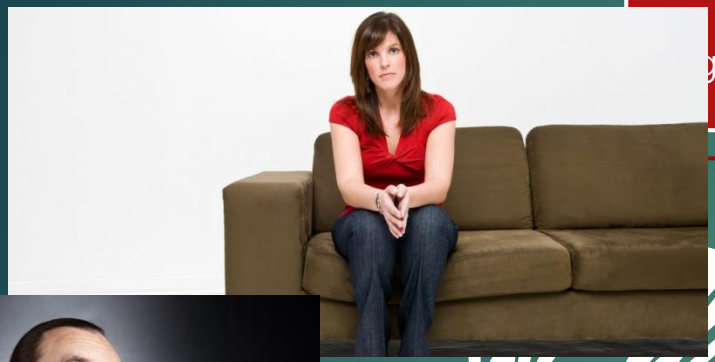
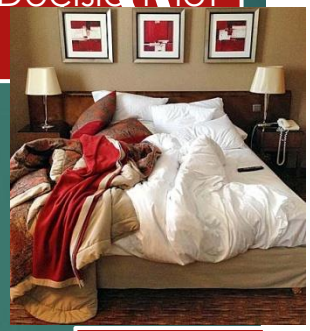
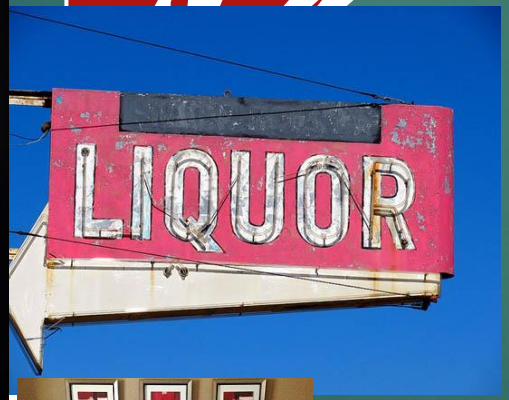


ge to Use

Decision not






Recovery
eg. go to

Behavior


Drug
off, c

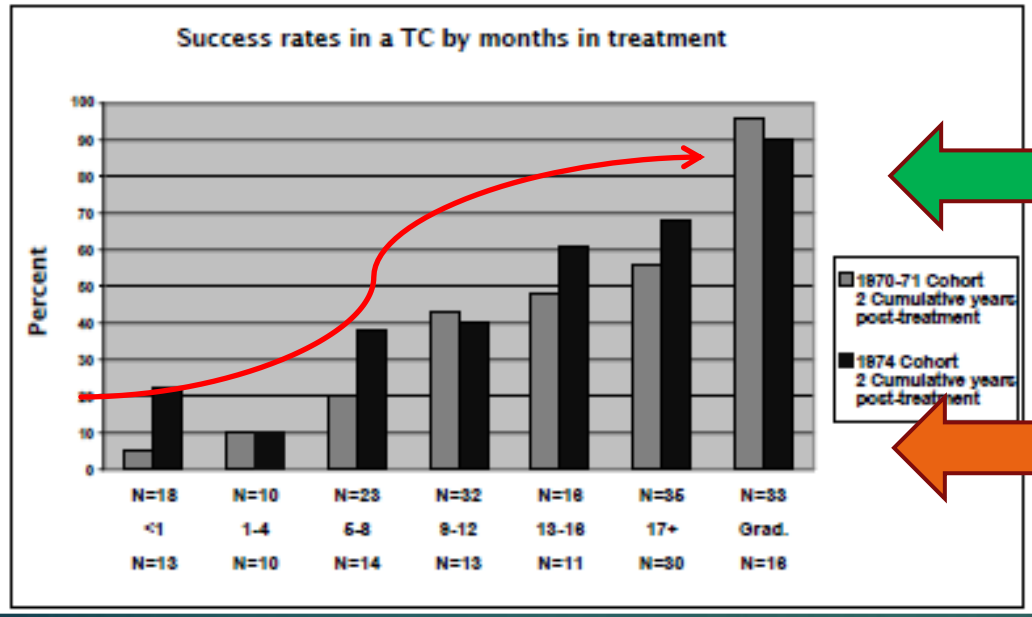
# Research Length of Stay



**Almost 50 years of studies consistently find length of stay as the primary predictor of outcomes, along with intensity of treatment, for 90 days minimum and appropriate continuum of care.**

**1970's**

Figure 1: Success defined as no drug use and no criminal activity through all years of follow-up for primary opioid abusers*




**Do we want:**

**80% success rates?**

**Or**

**20% success rates?**

*Deleon (2010) Is Therapeutic Community an Evidence Based Treatment? What the Evidence Says*

# Research Length of Stay



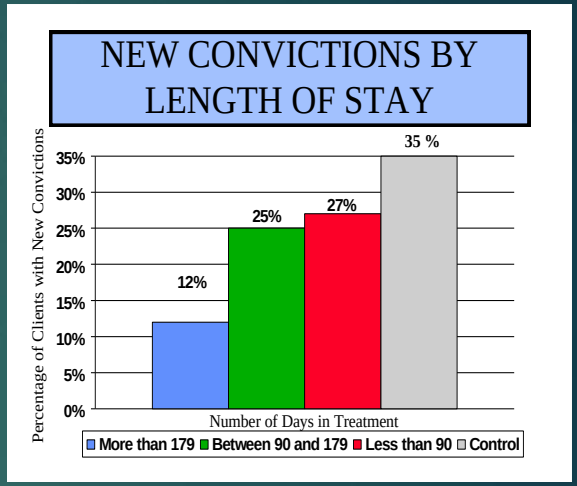
**Almost 50 years of studies consistently find length of stay as the primary predictor of outcomes, along with intensity of treatment for 90 days minimum and appropriate continuum of care.**

1990's

## Overview of 1-Year Follow-Up Outcomes in the Drug Abuse Treatment Outcome Study (DATOS)

Robert L. Hubbard, S. Gail Craddock, Patrick M. Flynn, Jill Anderson, and Rose M. Etheridge
National Development and Research Institutes, Inc.

The Drug Abuse Treatment Outcome Study (DATOS) collected 1-year follow-up outcomes for 2,966 clients in outpatient methadone (OMT), long-term residential (LTR), outpatient drug-free (ODF), and short-term inpatient (STI) programs in 1991–1993. LTR, STI, and ODF clients reported 50% less weekly or daily cocaine use in the follow-up year than in the preadmission year. Reductions were greater ($p < .01$) for clients treated for 3 months or more. Clients still in OMT reported less weekly or daily heroin use than clients who left OMT. Multivariate analysis confirmed that 6 months or more in ODF and LTR and enrollment in OMT were associated with the reductions. Reductions of 50% in illegal activity and 10% increases in full-time employment for LTR clients were related ($p < .01$) to treatment stays of 6 months or longer. The results replicated findings from 1979–1981 for heroin use in OMT and illegal activity and employment for LTR but not for illegal activity in OMT and ODF.




Source: Pennsylvania Department of Corrections (1997) *Pennsylvania FIR Evaluation*

# Research Length of Stay



**Almost 50 years of studies consistently find length of stay as the primary predictor of outcomes, along with intensity of treatment for 90 days minimum and appropriate continuum of care.**

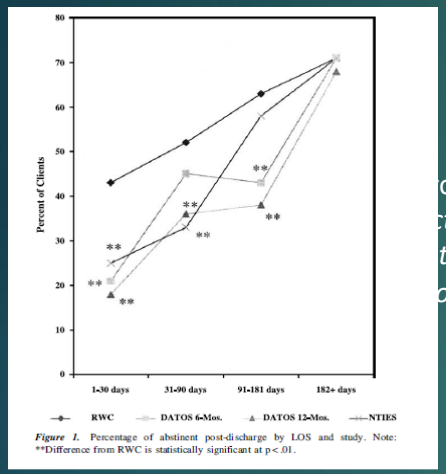



*Figure 1.* Percentage of abstinent post-discharge by LOS and study. Note: **Difference from RWC is statistically significant at p < .01.

## 2000's

ce: Greenfield et al, (2004).
*ctiveness of Long Term Residential*
*tment for Women: Findings from 3*
*onal Studies*

Source: Zhang (2002).
*Does retention matter? Treatment duration and improvement in drug use.*
*(4,005 clients)*

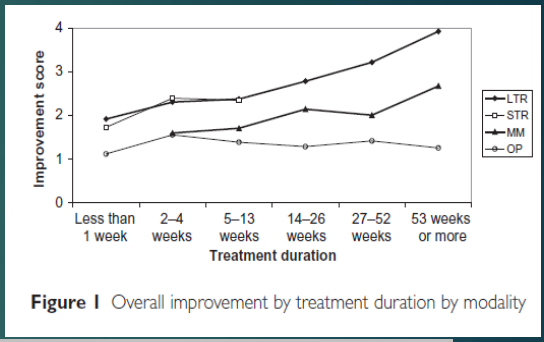



**Figure 1** Overall improvement by treatment duration by modality

**Table 2** Drug use improvement by modality and treatment duration.

| | *Methadone maintenance* | | | *Out-patient non-methadone* | | | *Short-term residential* | | | *Long-term residential* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Improvement* | *<= 3 months* n = 100 | *>3 months* n = 341 | *Raw P-value* | *<= 3 months* n = 780 | *>3 months* n = 923 | *Raw P-value* | *<= 2 weeks* n = 229 | *>2 weeks* n = 441 | *Raw P-value* | *<= 3 months* n = 530 | *>3 months* n = 653 | *Raw P-value* |
| Specific drugs | | | | | | | | | | | | |
| Heroin | 0.59 | 1.12 | 0.0001*** | 0.10 | 0.07 | 0.25 | 0.19 | 0.51 | 0.0001*** | 0.11 | 0.26 | 0.0004** |
| Cocaine powder | 0.41 | 0.53 | 0.37 | 0.29 | 0.27 | 0.62 | 0.43 | 0.61 | 0.07 | 0.46 | 0.62 | 0.01 |
| Crack cocaine | 0.16 | 0.11 | 0.66 | 0.52 | 0.62 | 0.10 | 0.73 | 0.62 | 0.25 | 0.99 | 1.24 | 0.0009** |
| Marijuana | 0.52 | 0.39 | 0.27 | 0.50 | 0.39 | 0.03 | 0.56 | 0.74 | 0.06 | 0.69 | 0.97 | 0.0001*** |
| Overall drug use | 1.67 | 2.33 | 0.03 | 1.41 | 1.33 | 0.51 | 1.91 | 2.47 | 0.01* | 2.24 | 3.07 | 0.0001*** |
| Primary drug use | 1.02 | 1.71 | 0.0005** | 0.82 | 0.79 | 0.67 | 1.14 | 1.38 | 0.09 | 1.36 | 1.83 | 0.0001*** |

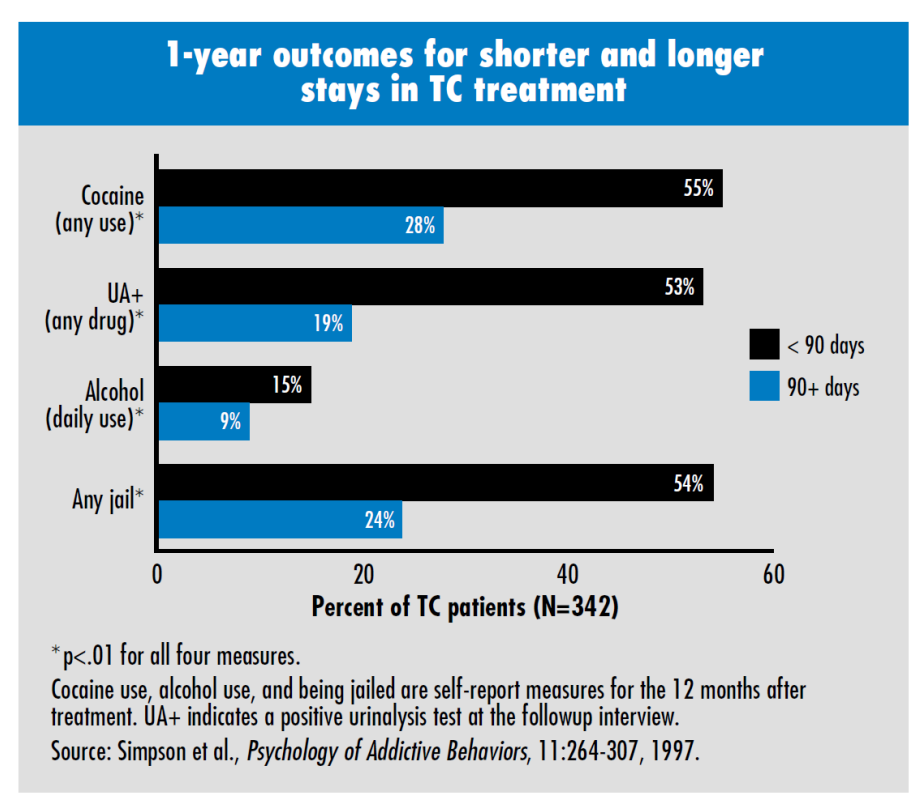
Significance tests (*P < 0.05, **P < 0.01, ***P < 0.001) were conducted to test the mean difference of the improvement scores between the group with shorter treatment duration and the group with longer treatment duration, for each type of substance within each modality. For the improvements on the five the type of substances used as the components of the general drug use improvement, the significance level symbols reported in this table were adjusted with bootstrap method to control for multiple tests by means of Bootstrap through SAS PROC MULTTEST.

*Does Retention Matter? Treatment Duration and Improvement in Drug Use (Zhang, 2003)*
*4005 clients across 62 programs*

# NIDA Research



**Decades of studies consistently find length of stay as the primary predictor of outcomes, along with intensity of treatment and continuum of care.**




"Therapeutic community treatment shows improvements in recidivism and relapse rates, as well as engagement in employment. These improvements are correlated to length of treatment, with highest rates of improvement among those with 9 months of treatment, and reduced effectiveness for treatment of less than 90 days."

*NIDA(2002)* Research Series: Therapeutic Community

# NIDA Research



**Decades of studies consistently find length of stay as the primary predictor of outcomes, along with intensity of treatment and continuum of care.**

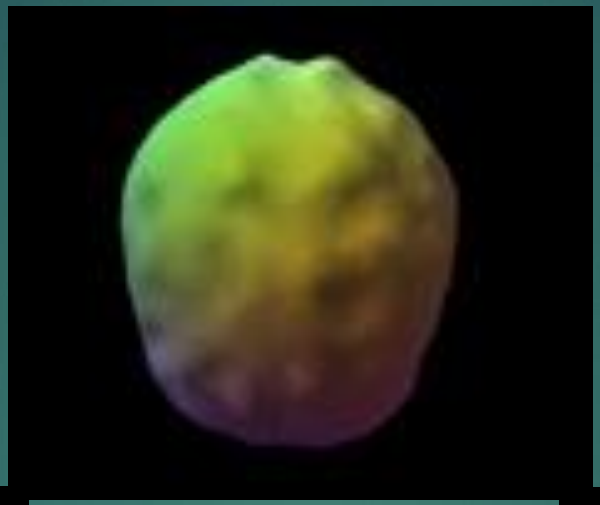
## *NIDA (2018) Principles of Drug Addiction Treatment*

"Research indicates that most addicted individuals need at least 3 months in treatment to significantly reduce or stop their drug use and the best outcomes occur with longer durations of treatment." p. 5

"Research has shown unequivocally that good outcomes are contingent on adequate treatment length. Generally, for residential or outpatient treatment, participation for less than 90 days is of limited effectiveness, and treatment lasting significantly longer is recommended for maintaining positive outcomes. p. 14

"The best known residential treatment model is the therapeutic community (TC), with planned lengths of stay between 6 and 12 months." p. 29

# Which Brain do You Want?



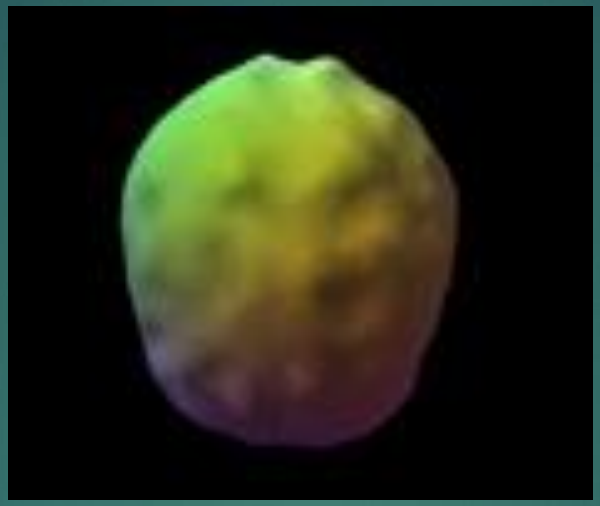
**Normal healthy view.**
**Top down surface view.**
**Full, symmetrical activity**

During substance use disorder

One year drug and alcohol free

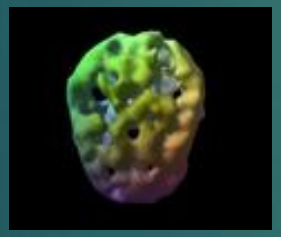
**Notice the overall holes and shriveled appearance during use disorder and marked improvement with abstinence.**

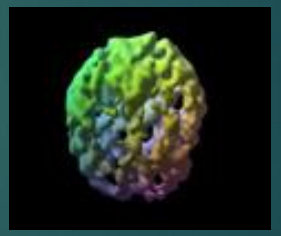
# Which Brain do You Want?



Normal healthy view.
Top down surface view.
Full, symmetrical activity

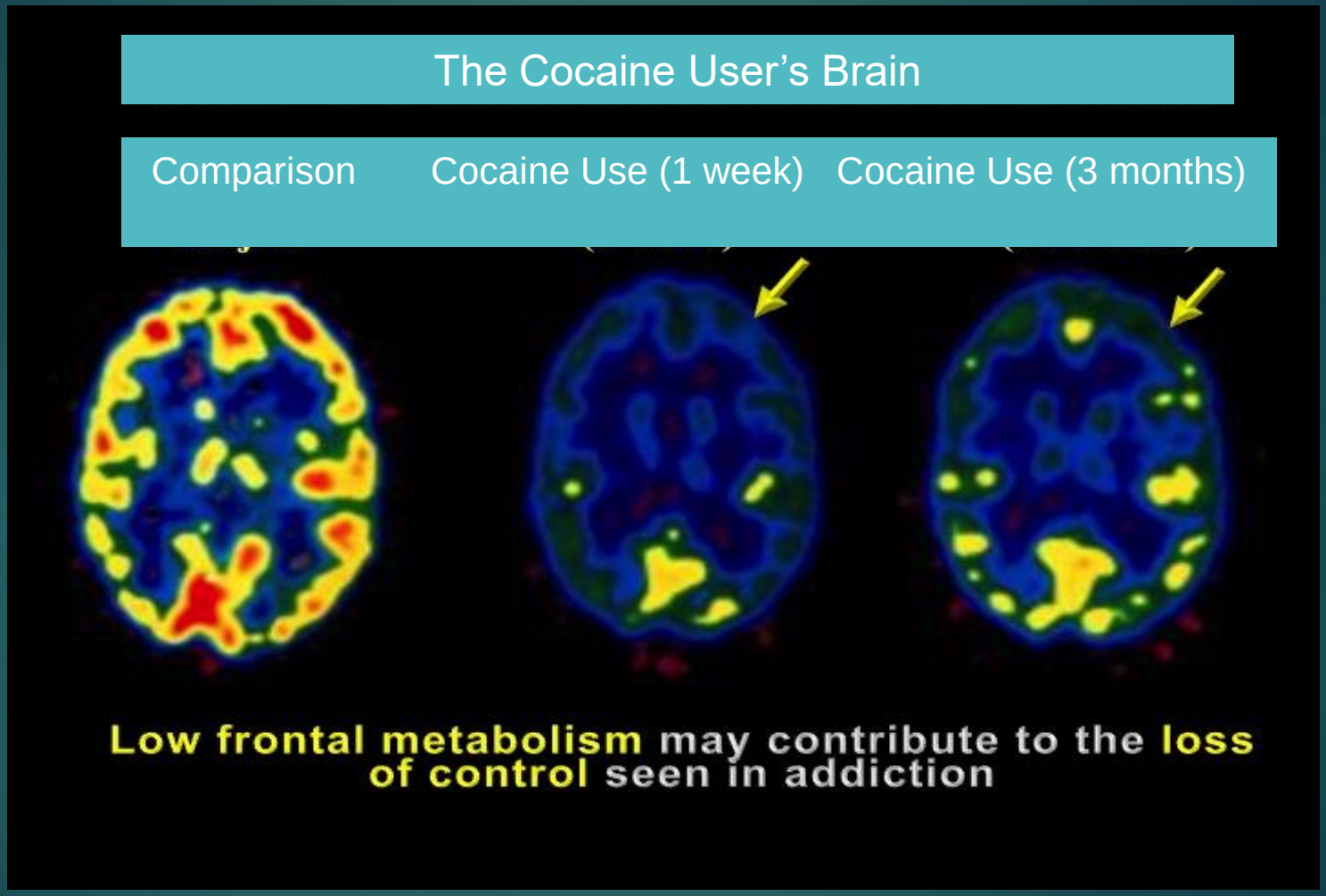
Effects of other substances:





| | | | |
|---|---|---|---|
| Long term alcohol use | 57 y/o 30 years marijuana use (underside view) | 39 y/o – 25 years frequent heroin use | 40 y/o, 7 years on methadone. Heroin 10 years prior. |

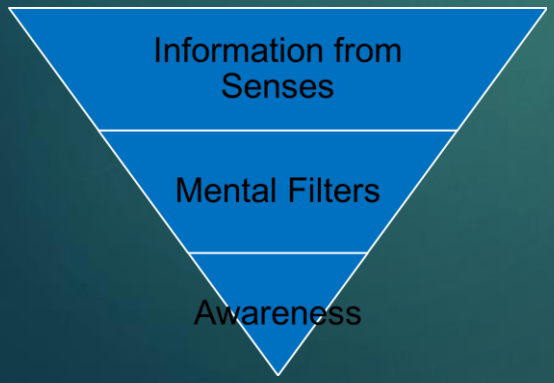
# Which Brain do You Want?



# Mental Filters

- **State Dependent Memory:**
  - **It is easier to remember sad memories when you are sad and easier to remember happy memories when you are happy.**

**Can you see only the options you expect, or can you direct awareness to see option C, D, E…**



# Trauma/Stress

**Acute: e.g. Violent assault**
**Chronic: e.g. Ongoing abuse**

**Intensity: Low/high**

**Flashbulb Memory**

# Treatment

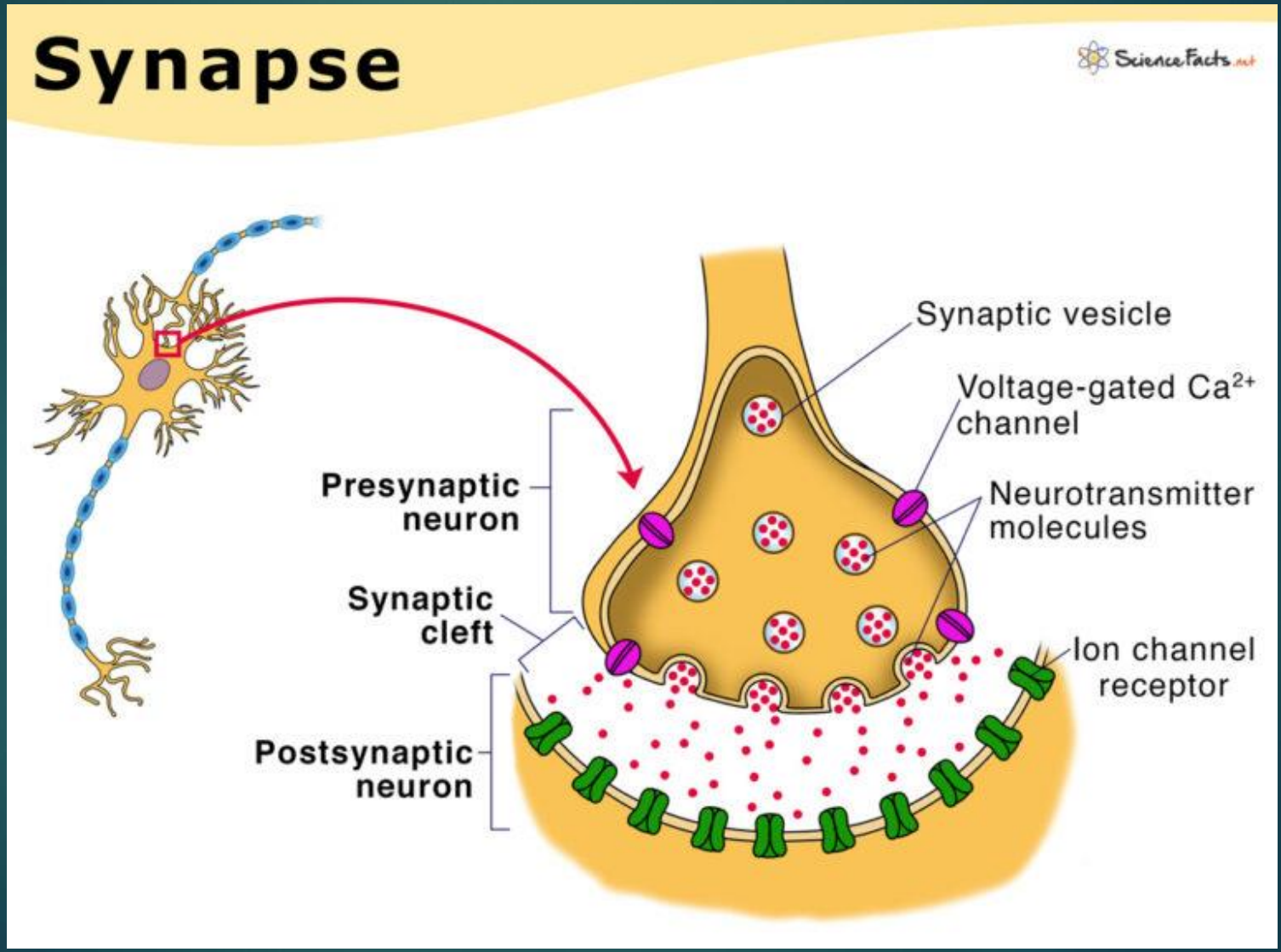
- Motivational Enhancement Therapy
- Cognitive Behavioral Therapy
- Dialectical Behavioral Therapy
- Acceptance and Commitment Therapy
- Trauma Recovery and Empowerment Model
- Seeking Safety
- Therapeutic Community

- Tools
  - EMDR
  - Energy Based: e.g. Emotional Freedom Technique
  - Hypnosis
  - Meditation/Yoga

# Chemistry

- **Dopamine:**
  - **Motivation/Reward, Pleasure, Perseveration**
- **Serotonin:**
  - **Stop/Satiated**

# Upregulating/Downregulating Tolerance



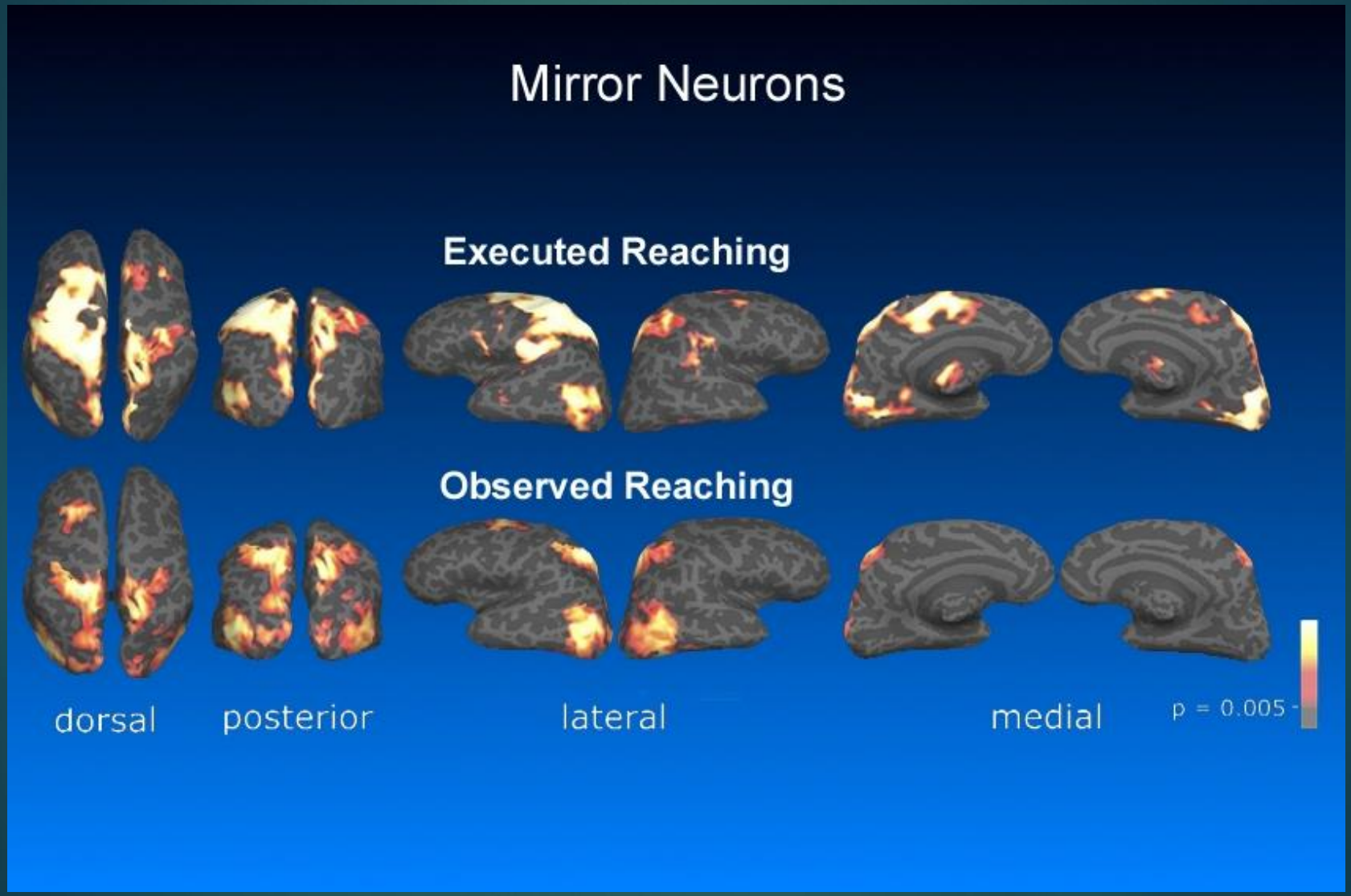
# Relationships and the Brain?

- **Relationships are key predictors in the success of treatment.**
  - **Why?**

- **Mirror Neurons:**
  - **What we observe in others is reflected in our brain**
  - **What if we observe other's anger? Judgment etc?**

- **Benefit:**
  - **Observation is an effective learning tool.**
  - **What happens if a colleague/other group member is punished? Rewarded?**

# Relationships and the Brain?



# Beliefs

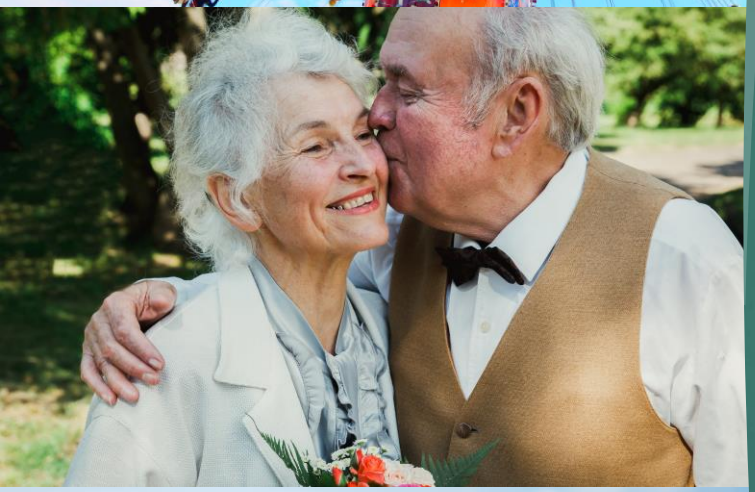
**Core Beliefs Shape Reality:**

- **Filter incoming stimuli based on expectations**
- **Steer responses/behaviors**

  - **The world is a safe place**
  - **The world is a dangerous place**

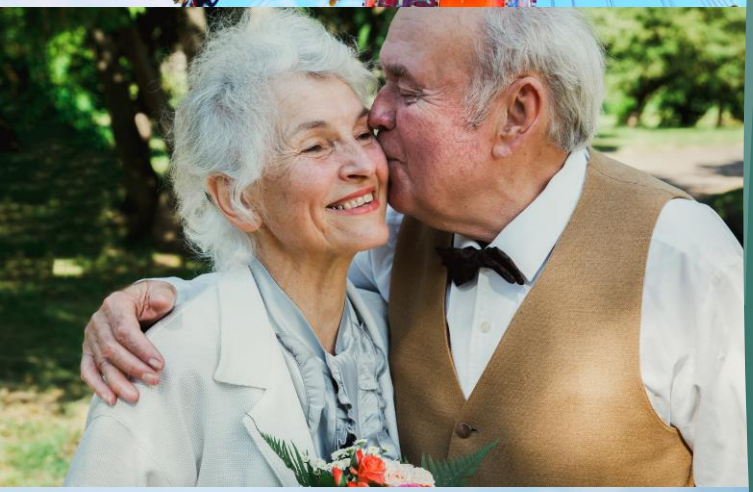
  - **I need this drug.**
  - **I want this drug.**
  - **I want this life.**

  - **Whether you think you can or you can't, you are right.**



# Beliefs/Imagery

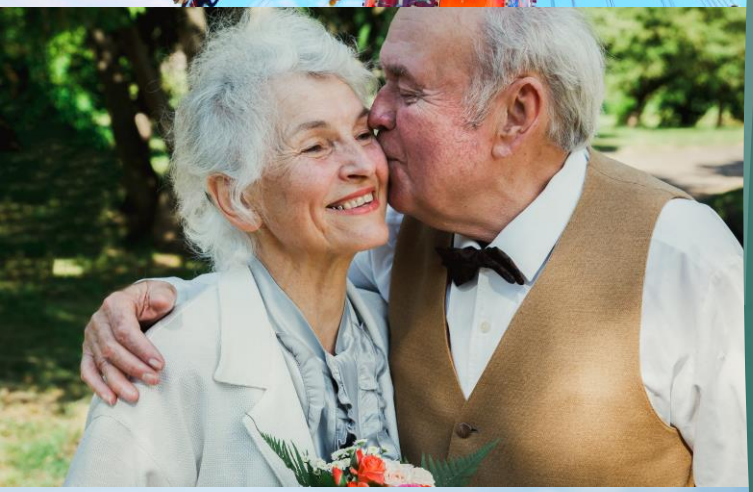
- Three Memories Exercise



# Beliefs

- **Three Memories Exercise**

- **The brain doesn't know the difference between fantasy and reality**
- **The body physiologically reacts to our images**
- **The body responds different to different emotional cues**
- **Emotions can change quickly and this may be the norm**



# Beliefs

- **Three Memories Exercise**
- **Immediate reactions to our thoughts versus our stories**
- **Stories are metacognitions that become rules:**
  - **I am always depressed.**
  - **I can't do XYZ**

# Building A Practice

Form

1. Declaration
2. For the sake of
3. Detail practice
4. Reminder
5. Support

Be Specific, Plan to follow-up afterwards

Example

1. I will,
2. for the sake of [whom],
3. I will [practice],
4. and remind myself by [reminder],
5. with support from [whom]

# Sample Practice

I will, for the sake of Joe, my 42-year old spouse,

[Practice] Write three things I am grateful for in my journal every day, before bed.

[Reminder] I will remind myself by placing my gratitude journal under my pillow

[Partner] I will ask Janet, my best friend, to check in with me discuss with me how I am progressing every Monday morning once the kids go to school.

If I am successful, I get a hug from Janet, if not, I give Janet a hug.

# Sample Practice

I will, for the sake of Mary, my 12-year old daughter,

[Practice] Ask my family how their day was and practice listening for 5 minutes every day, at the beginning of dinner time.

[Reminder] I will remind myself by placing flowers on the table

[Partner] I will ask Jane, my best friend, to check in with me discuss with me how I am progressing every Saturday morning over coffee.

If I am successful, I get a cookie (or *cookies*) to go with it. If I am not successful, I buy a cookie for Jane.

# Put it into Action

| Brain Feature | Function | Application |
|---|---|---|
| Motivation | Intrinsic/Extrinsic | Move from external motivation to internal motivation |
| Motivation | Reptilian Brain/ Mammalian Brain | Move from instinctual reactions to thoughtful responses. Level of care for adequate support |
| Circuitry | Rote Learning | Need time and repetition for learning of recovery behaviors: Length of stay in treatment |
| Circuitry | Mirror neurons | Value of social learning in group and residential treatment center with senior clients. |
| Circuity | Trauma learning/ Flashbulb learning | Needs specialty interventions for change, but only after stabilization |
| Circuitry | State Dependent Memory | Purposely create high level emotional experiences |
| Circuitry | Mirror neurons | Value of social learning in group and residential treatment center with senior clients. |
| Language | Problem focused vs goal directed | Use goal directed language |

# Put it into Action

- How else can I apply these principles in my work by  tomorrow?
- Will I go back to doing the same thing as yesterday or will I commit to doing one new thing this week?

# Contact Information

- Ken Martz, Psy.D.
- DrKen@DrKenMartz.com
- www.DrKenMartz.com

- **Free Tools**
- https://tiny.one/MTOOLS