

NEUROCOUNSELING: HOW TO TRANSLATE BRAIN-BASED KNOWLEDGE TO CLIENTS

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Introductions

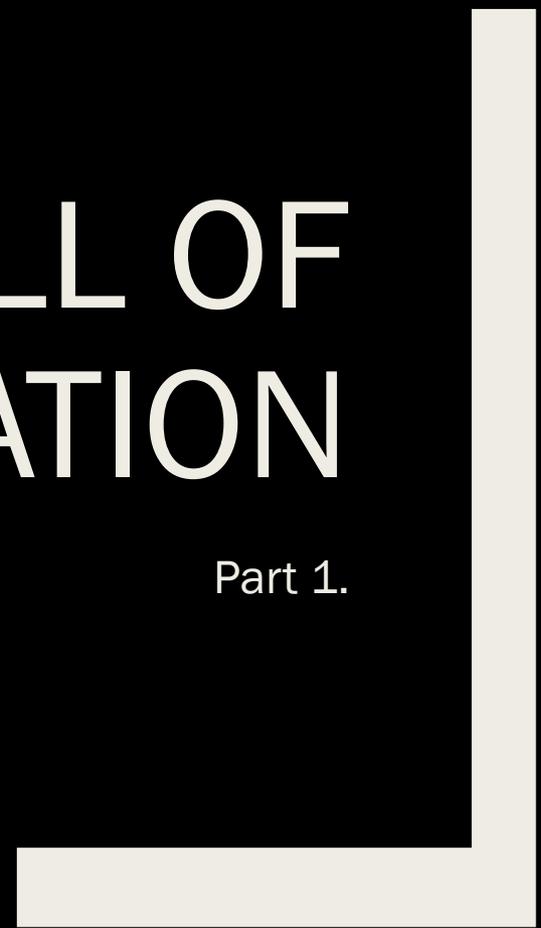
- Neuroscience Interest Networks
 - *ACA*
 - *AMHCA*
 - *ACES*

Overview of Presentation

- Part 1: The Skill of Translation
- Part 2: Translating core neuroscience knowledge:
 - *Translating brain anatomy*
 - *Translating top down/bottom up processing*
 - *Translating self-regulation*
- Part 3: Practice Role-Play

THE SKILL OF TRANSLATION

Part 1.



The Skill of Translation

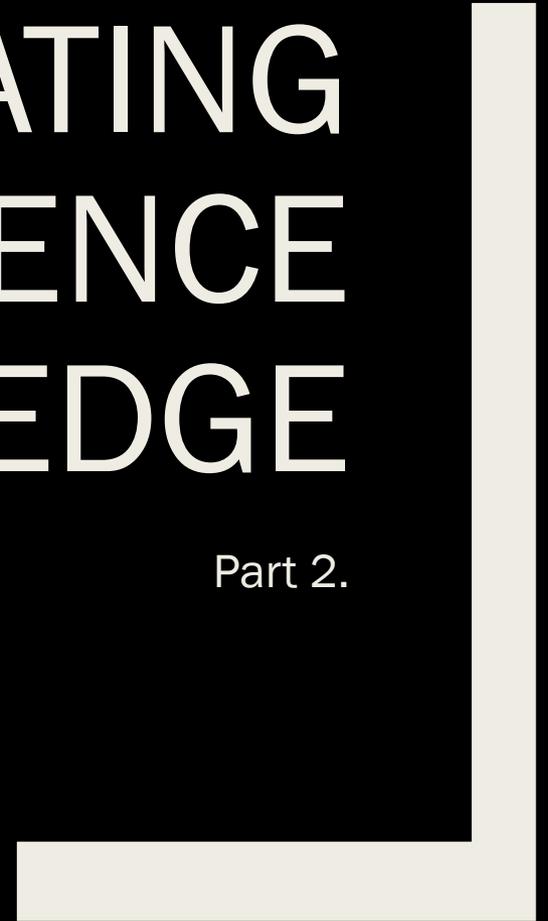
- A skill in its own right
- How do we take complex information and make it understandable and digestible to the lay person?
- For many, scientific terminology is akin to “a foreign language”
- Distilling without diluting
 - *What do clients need to know?*
 - *How can we help them to know?*

The Skill of Translation

- Why brain-based education can be useful
 - *Normalizes experience*
 - *Reduces shame*
 - *Informs parenting*
 - *Some clients want medical explanations*

TRANSLATING NEUROSCIENCE KNOWLEDGE

Part 2.



Translating Structural and Functional Brain
Anatomy:
From Connections to
Cognitions, Feelings, & Behaviors



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Why do we care about anatomy?

- Serves as a foundation for our application
- Theory (Anatomy)  Interventions
- Enhances intentionality
- Facilitates translation of research to practice
- Improves cross-disciplinary/integrated care practice

The Developing Brain

- Brain Develops from the Inside Out
 - *Evolutionarily*
 - *Within Individuals*
- Order:
 - *Brain Stem*
 - *Diencephalon*
 - *Telencephalon*
- Survival before conscious thought and decision making
- Refining of connections
 - *Critical Periods*
 - *Effects on behavior, cognition, emotions, and feelings*
 - *Age differences*
 - *Variations due to sex hormones*

Inside the Brain – Major Structures

- Thalamus
- Pituitary Gland
- Ventral Tegmental Area
- Basal Ganglia
 - *Caudate nucleus*
 - *Putamen*
 - *Globus Pallidus*
 - *Substantia Nigra*
- Hypothalamus
- Amygdala
- Hippocampus
- Cingulate Gyrus

Brain Stem

- Midbrain (Mesencephalon)
- Pons (Metencephalon)
- Medulla Oblongata

Relaying Information

White Matter:

- Comprised mainly of myelinated axons
- Connect cortical regions
- Carry messages to the cortical areas
- “Network Cables”

Grey Matter:

- Comprised mainly of neuronal cell bodies
- Includes regions of the brain involved in muscle control, sensory perception such as seeing and hearing, memory, emotions, and speech
- Actual “computers”

Relaying Information

Components of a Neuron:

- Dendrite
- Neuron Cell Body
- Axon
- Axon Terminal

Space between Neurons:

- Synaptic Cleft

These neural informational processing pathways become the basis for all of our thoughts, sensations, feelings, and behaviors

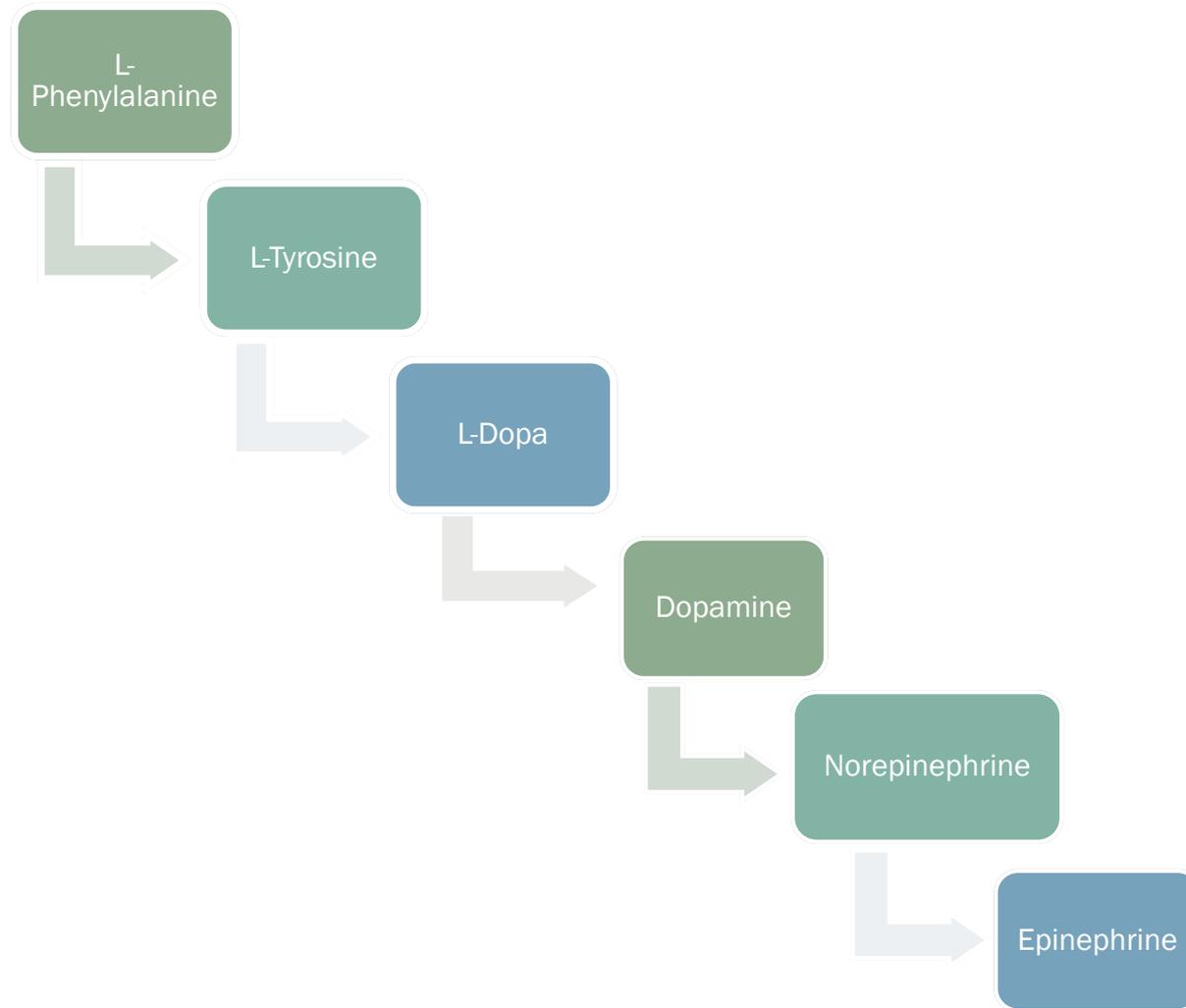
How many are there?

- Adults have ~ 1 billion neurons (Lent et al., 2012)
- Each connects to ~10,000 others
- Creating over 100,000 trillion synaptic connections
- Two times as many neuronal connections in a 3 year old than an adult
- These connections are constantly being modified by internal and external experiences

Neuroplasticity

- Process by which the brain adapts and reorganizes when presented with new information, events, or experiences
- Occurs through:
 - *Growth of new neurons of new neurons (Neurogenesis)*
 - *Dentate Gyrus of the Hippocampus*
 - *Subventricular Zone of Lateral Ventricles*
 - *Developing new connections (Synaptogenesis)*
 - *Enhancing the strength of connections*
 - *Pruning of connections (Extinction)*
- Learning and memory are the primary sources

Catecholamines



Primary Types of Neurotransmitters...

Amino Acids:

- GABA (gamma-aminobutyric acid)
- Glutamate

Monoamines:

- Dopamine
- Serotonin
- Norepinephrine
- Ephinephrine
- Acetylcholine

Neuropeptides:

- Neuropeptide Y

Others:

- Acetylcholine

There are still others:

- Gaseous signaling molecules (Nitrous Oxide)
- Purines (ATP)

Stress Response System

1. Autonomic Nervous System

- *Sympathetic*
 - Splanchnic Nerves
- *Parasympathetic*
 - Vagus Nerve

2. Hypothalamic-Pituitary Adrenal Axis

Translating Anatomy into Symptoms

- Depression
- Anxiety
- Posttraumatic Stress Disorder
- Substance Abuse/Addiction
- Schizophrenia
- ADHD

Using Brain Anatomy Models with Clients

- 3-D models
- Siegel hand model

Translating Top-Down and Bottom-Up Processing



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How the Brain Processes Information

■ Top-down:

- *Conscious*
- *Rational*
- *Explicit*
- *Declarative memory*
- *Secondary response (meta)*
- *Regions: Cortex*

■ Bottom-up:

- *Pre-conscious*
- *Intuition*
- *Implicit*
- *Non-declarative memory*
- *Primary response*
- *Regions: Limbic and brain-stem*

Examples of problematic top-down processing

- Adjustment problems
- Excessive rumination
- Traditional cognitive distortions
 - *E.g., jumping to conclusions*
- Intellectualization

Examples of problematic **bottom-up** processing

- Trauma and dissociation
- Panic and anxiety
- Substance use
- Intermittent explosions (anger outbursts, “blackouts”)
- Other forms of compulsive behavior and process addictions (cutting, stealing, etc.)
- Learned helplessness (Seligman, 1972)

Empirical example: “Cognitive emotion regulation fails the stress test”

(Riao et al., 2013)

- Data collected: cortisol and norepinephrine (adrenaline) concentrations in saliva, self-reported fear ratings
- Two groups:
 - “Stress group”: submerged arms into ice-cold water for 3 minutes (acute stress induction)
 - “Control group”: submerged arms into room-temperature water

“Elevated noradrenaline levels during stress lead to rapid alterations in executive functioning and impair the PFC.”

- Despite training, cortisol levels remained high in stress group

Importance of memory systems

- Ingrained memories: memory as a survival function
 - *Certain events/experiences have stronger pathways*
- Relationship between memory and emotional systems (hippocampus, amygdala, thalamus)
- Repetition and memory development
 - *Limits of working memory and benefits of automaticity*

What does this mean for clients?

- “I don’t know why I responded that way”
- Sensory-based (smell, for example)
- Projections and transference reactions
- Hypersensitivity to threat (survival mechanism)

“Survival mode”

- Humans find it *incredibly hard* to rewire low-road processing through “thinking before acting”
- Automatic systems take over
- Amygdala reroutes messages to avoid pfc (“amygdala hijack”)
- Conscious awareness, if it does occur, happens *after* the client is already distressed

Translating top-down and bottom-up processing

- Explain to clients...
 - *Their brain is trained to respond a certain way*
 - *Re-training takes time and practice; need for patience*
 - *Importance of state-dependent learning (cf. Gottman); Learning coping techniques in controlled conditions isn't always useful*

Translating top-down and bottom-up processing

- Provide techniques for clients to practice daily in stress situations
 - *Diaphragmatic breathing (note parasympathetic nervous system and vagus nerve)*
- We have plenty of other options for helping clients achieve improved self-regulation...

Physiological and Emotional Self-Regulation and Neurotherapy Interventions



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Primary Physiological and Emotional Self-regulation Treatment Interventions

- Peripheral Skin Temperature Training
- Heart Rate Variability (HRV)
- Diaphragmatic Breathing
- Neurofeedback (NF)
- Dietary Supplements
- Counseling

Peripheral Skin Temperature Training

- Calms any sympathetic response, teaches self-regulation and facilitates NF.
- Take baseline temperature (84 or \leq tense).
- Ask client to increase it on their own.
- Assist with breathing, muscle relaxation, closing eyes and mental imagery.
- Reassess temperature (90 or \geq relaxed).
- Give client a home-use thermometer for practice.
- Advise client to use during NF.

Heart Rate Variability

- Creates a state of coherence of breathing, heart rate and brain activity, to produce a parasympathetic (healing/recovery) response and self-regulation.
- Attach plethysmograph to client's ear or finger.
- Observe their usual breathing trace line (irregular and jagged).
- Teach diaphragmatic breathing and/or use the Emwave's Coherence Coach (Heartmath)-6 cycles per minute.
- After some success, return to the original breathing trace line screen and ask the client to replicate the sinusoidal trace line (regular and rounded).
- Log the coherence percentages and advise client to use during NF.

Neurofeedback

- Uses **behavioral principles** to **reward or inhibit brainwave** activity related to emotional, cognitive, or behavioral problems. Also used for peak performance.
- The **Basic Brainwaves**: Delta, Theta, Alpha, SMR, Low Beta, High Beta and Gamma
- Employs the **10-20 International System** to locate and place sensors on the client's head.
- Select a **Training Protocol**: LoBeta, SMR, Theta/Beta, Alpha, Low Frequency, TAG Synchrony, and/or Z-Score training.
- Select **Training Approach**: Single site, coherence between two sites, two or four site z-score training, or 19 channel training.
- Train to first **identify** and then **strengthen the response**.
- Train an average of **20 to 40 sessions**, sometimes more.
- Assess progress every **10 sessions** with **Symptom Checklist**.

Dietary Supplements

- Management of Inflammation:
 - *Omega 3 Fatty Acids (fish oil)*
 - *Curcumin (turmeric)*
- Soften OCD or Stubbornness:
 - *N-acetylcysteine (NAC)*
- Mood Regulation:
 - *GABA for Anxiety*
 - *S-adenosyle-methionine (SAME) for depression*
- Note: Consult functional medicine physician and dietician to avoid side effects, interaction with other meds and toxicity

Additional Self-regulation Techniques

- **Therapeutic Harmonics:** Subliminal sound below the threshold of hearing that affect mood, thoughts, and brainwave activity (Swingle).
- **Audio-Visual Entrainment:** alternating sound (binaural beats) and flashing lights to access various brainwave states (Siever).
- **Cranial Electrical Stimulation and Transcranial DC Stimulation:** small, battery driven electrical current (1 or 2 milliamperes) directly stimulates the nervous tissue of the brain (Daily).

Therapeutic Harmonics, Audio-Visual Entrainment, & Direct DC Stimulation

Therapeutic Life Changes (TLC's)

- TLC's were developed by (Ivey, Ivey, & Zalaquett, 2014).
- The big five for stress management are:
 - *1. exercise*
 - *2. nutrition and weight management*
 - *3. social relationships*
 - *4. challenge and stimulate the brain*
 - *5. sleep hygiene.*

More Strategies for Self-Regulation

- **Mental Imagery & Hypnosis:** Alpha-theta states
- **Exercise:** Brain derived neurotropic factor
- **Diet:** Organic, low carb, high protein
- **Sleep Hygiene:** Limit screen time, consolidates learning
- **Daylight:** Vitamin D (physical and mental health) and melatonin (sleep and circadian rhythm)
- **Relationships:** Social engagement system
- **Spirituality:** meaning, resilience, social support
- **Hormone Assessments:** progesterone, testosterone, estradiol, thyroid, zinc, iodine, magnesium, etc.

Translating Self-Regulation

- How can we...
 - *Translate the **importance** of self-regulation to clients, and*
 - *Help them understand the **purpose** of these interventions*

PRACTICE ROLE-PLAY

Part 3.



Putting it all together

■ Case:

- *Presenting problem: 42 yo client experiences anxiety at new job and in long-standing dating relationship (7 years), and has been drinking to cope.*
- *Current functioning: sleeps 4-5 hours per night, binge eats in the evening, drinks alcohol mostly at night (4-5 units)*
- *Treatment history: Client has ADHD, and has been taking Adderall 20mg BID.*
- *Medical history: Born at 28 weeks (premature)*
- *Family history: Emotional abuse by father*

Practice Role Play

- Practice using the following terms to help client understand their current struggles.
 - *Which areas of the brain are being compromised*
 - *How stimulants can interact with alcohol*
 - *How anxiety happens in the body*
 - *The potential impact of emotional abuse*
 - *How to tame anxiety without using alcohol*
 - *Why the client might struggle to “think their way out” of anxiety*

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- Seligman, M. E. P. (1972). Learned helplessness. *Annual Review of Medicine* 23(1), 407-412.