The Map is not the Territory: Measurement in Anxiety & Depression

Philip T Ninan MD

Affiliate Professor of Psychiatric Medicine

Brody School of Medicine

East Carolina University

Disclosure

Company Officer & Shareholder/Ownership

eMind Science Corp

Consultant

Lundbeck

Coppola AR, Fitzgerald GA. Confluence, not conflict of interest.
JAMA 2015; 314(17):1791-2

Measurement in Anxiety & Depression

- Why, What & How?
- DSM and RDoC
  - Map vs. Territory
- Measurement of the mind
  - Emotions, Thoughts & Behavior
  - Anxiety, Anger, Sadness & Anhedonia
  - Tracking

Assessment

- Why measure?
  - Value of measurement based care
- What to measure?
  - Severity
  - Dimensions
  - Diagnosis
- How to measure?
  - Revolution in technology

Treatment Guidelines

- APA MDD Practice Guidelines, 2010
  - Measurement-based care may enhance the quality of care and improve clinical outcomes.

- The Kennedy Forum 2015
  - Measurement-based care will help providers determine whether the treatment is working and facilitate treatment adjustments, consultations, or referrals for higher intensity services when patients are not improving as expected.

Trivedi MH et al. Am J Psychiatry 2006;163:28-40
Morris DW et al. Focus 2012;10(4):428-433
www.thekennedyforum.org

Assessment

- Why measure?
  - Value of measurement based care
- **What to measure?**
  - Dimensions
  - Severity
  - Diagnosis
- How to measure?
  - Revolution in technology

Current Measurement Options

- Rating scales
  - Symptom based (HAM-D, MADRS)
  - Based on diagnoses (PHQ-9, IDS)
- Development
  - Theoretical foundation (BDI, BDI-II)
  - Treatment response (HAM-D vs. HAM-A)

Nomenclature in Psychiatry

- DSM-5
  - Manifest phenomena without theoretical orientation
  - Ignores the brain

- Research Domain Criteria (RDoC) [1]
  - Current and future knowledge in neuroscience
  - Ignores the mind

[1] http://www.nimh.nih.gov/research-funding/rdoc/

RDoC Matrix

Domains

- Negative Valence Systems
- Positive Valence Systems
- Cognitive Systems
- Social Processing
- Arousal/Regulatory

Units of Analysis

- Genes
- Molecules
- Cells
- Circuits
- Physiology
- Behavior
- Self-reports

	Units of Analysis				
Domains					

" The map is not the territory "

Alfred Korzybski, 1931

Brain & Mind

- Human brain is the most complex structure in the known universe

- Human mind emerges from the activities of the brain
  - "The mind is what the brain does" *

- The foundations of the mind are representations of actuality mapped by the brain
  - The maps are morphed by weights representing value
  - Mental maps create an alternate reality
  - Much of our lives are spent running simulations in this alternate reality

* The Primordial Emotions. Derek Denton 2009

Emotions, Thoughts and Behaviors

EMOTIONS are feelings you experience that may be difficult to describe in words. Emotions differ from thoughts. Consider the intensity, duration, and any associated distress from emotions and whether they controlled your thinking and behavior.
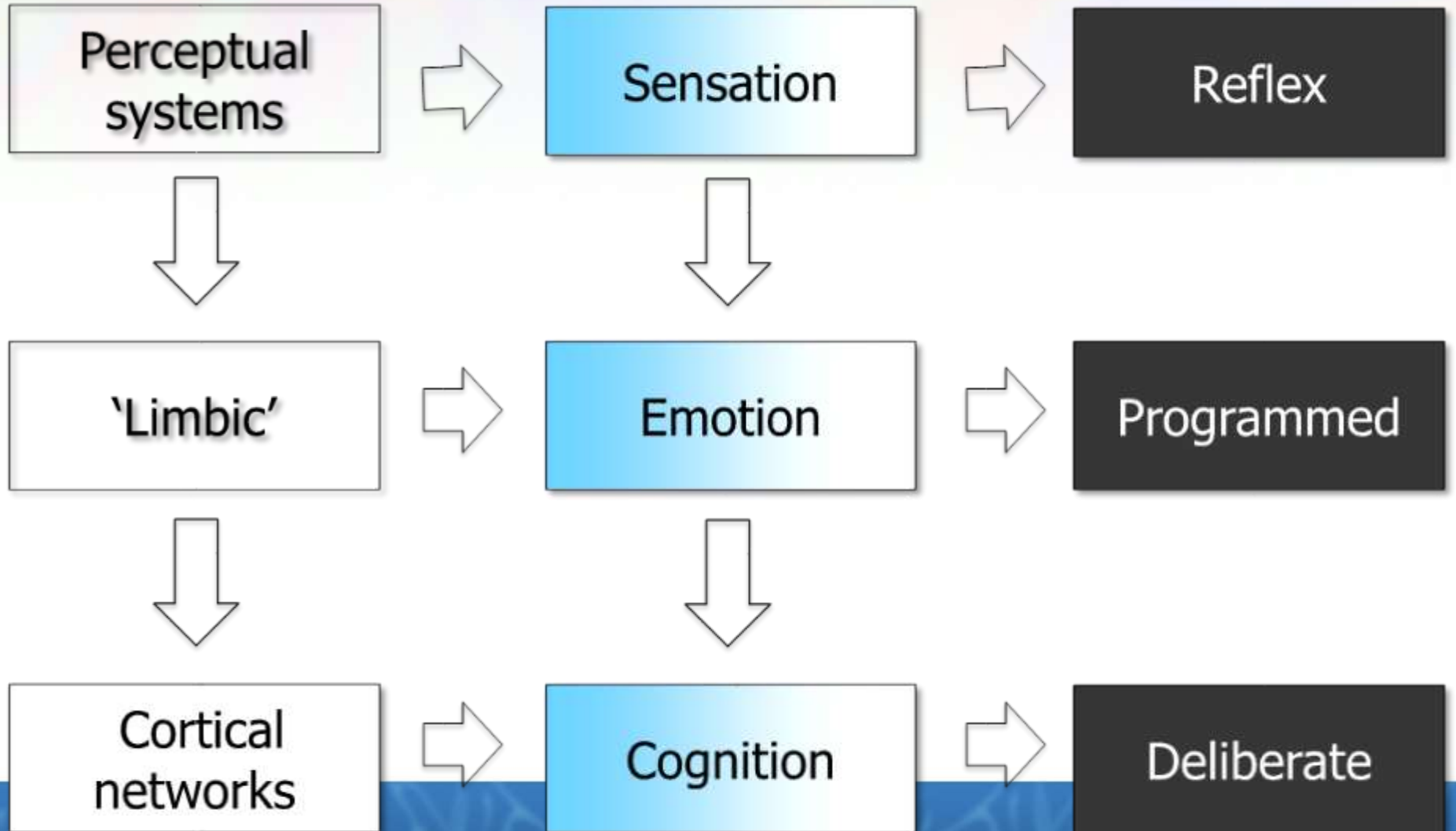
- Feelings, Mood, Affect

THOUGHTS are ideas that are usually reasoned and logical. The substance of thoughts are influenced by emotions. Intense emotions make thoughts disorganized, hard to control and decide purposely.

BEHAVIORS are externally observable actions. They are shaped by emotions and thoughts. Behaviors driven by intense emotions are more difficult to control and less determined and intentional.

Brain Systems	Mental Experience	Behavioral Output
Perceptual systems	Sensation	Reflex
'Limbic'	Emotion	Programmed
Cortical networks	Cognition	Deliberate

Characteristics of Emotions

- Emotions are felt, difficult to describe in words
- Triggers are derived from pattern recognition in threat/reward systems, and hence not logical
  - Variables that influence intensity
- Emotional systems are initiated before conscious awareness of the triggering stimuli
- 'Half-life' of an emotion is longer than a thought
- Emotions drive thoughts
- Cognition can enhance or counter emotions

Threat system

- Anxiety/fear
  - Acute activation, internalized
- Anger
  - Acute activation, externalized
- Sadness
  - Chronic activation, loss

Reward system

- Lack of Pleasure

Thoughts

Cognition is a higher order synthesis of information

- Proportionate, logical, reasoned - analogous
to the premotor vectors for movement

- Summation of implicit parallel, pre-cognitive processing leading to
explicit, serial processing

- Time sequenced - context provided by the past/present

- Goal directed

- Language - value of nuanced differentiations

- Allows willful control and choice

Linas RR. I of the Vortex: From Neurons to Self. Cambridge, MA: The MIT Press; 2002
Ninan PT, et al. Psychopharmacology Bull 2002;36(suppl 3):67-78

Emotions, Thoughts & Behaviors (ETB) Items

	Enhanced Negative Valence (Threat System)			Diminished Positive Valence (Reward System)
EMOTIONS	Anxiety	Anger	Sadness Numb	Lack of pleasure
THOUGHTS	Worry	Blame	Sad thoughts, Suicidal thoughts	Lack of thoughts Futility
BEHAVIORS	Agitation Avoidance	Hostility Impulsivity	Withdrawal	Lack of approach

Emotions, Thoughts & Behaviors (ETB) Indexes

	Enhanced Negative Valence (Threat System)			Diminished Positive Valence (Threat System)
EMOTIONS	**Anxiety**	**Anger**	**Sadness** Numb	**Lack of pleasure**
THOUGHTS	Worry	Blame	Sad thoughts, Suicidal thoughts	Lack of thoughts Futility
BEHAVIORS	Agitation Avoidance	Hostility Impulsivity	Withdrawal	Lack of approach

Description of Item & Wording of Questions

- **Anxiety** is feeling nervous, uneasy, apprehensive or panicky.
  - How **anxious** have you felt during the past 24 hours?

- **Sad thoughts** focus on loss, guilt, worthlessness and hopelessness.
  - How **sad** have your thoughts been during the past 24 hours?

- **Physical fatigue** is the lack of energy, tiredness, heaviness, slowness of movements or need for more than usual effort.
  - How **physically fatigued** have you been during the past 24 hours?

Scale Instructions

■ Read each item and choose the number that reflects your experiences **during the past 24 hours.**

0_____1_____2_____3_____4_____5_____6_____7_____8_____9_____10

None -------Mildly------- ----Moderately---- ------Severely----- Extremely

Guidance for scoring:
- If absent, choose 0; if extreme, choose 10.
- If neither, and the severity is clear, choose 2 for mild, 5 for moderate or 8 for severe.
- if the symptoms are in between two categories, choose a number on the edge between the two (i.e. if moderate but more toward severe, choose 6).

ETB Plus Weekly

- Associated symptoms (w1-7)
  - well-being, fatigue, pain, forgetful, concentration, appetite, sleep

- Stress (w8)

- Interpersonal (w9-11)

- Quality of Life (w12)

- Function (w13-17)
  - Social, work, school, home, grooming/hygiene

Cross-sectional Validation Study

- Study funded by East Carolina University
- Informed consent from 198 random adults from 4 convenience sites (3 subjects excluded).
  - $25 gift cards for participation.
- Emotions, Thoughts & Behaviors (ETB) Scale
  - Daily & Weekly versions
- Hospital Anxiety & Depression Scale as reference
- Demographic and Feedback data

ETB Cross-Sectional Study
(n=195)

- Age   39.8 + 18.66
                         (range 18-83)

- Female   58%

- Race
  - Caucasian   71%
  - African American   21%
  - Asian   5%
  - Other   3%

- Ethnicity
  - Hispanic   4%

- Marital status
  - Single   41%
  - Married/Committed   59%

- Education
  - Attended high school   4%
  - High School graduate   39%
  - College graduate   56%

- Economic status
  - Lower   10%
  - Middle   76%
  - Upper   14%

ETB Cross-Sectional Study

- Disabled: Yes = 9%; No = 91%
- Professional Care for anxiety/depression: 24%
  - Psychotherapy: 10%
  - Medication: 18%
- Time to answer ETB Daily: 7.3 + 4.8 mins
- Time to answer ETB + Weekly: 6.0 + 3.8 mins

Cronbach's Alpha : Measure of Reliability/Internal Consistency

	Mean	± S.D.	Range	Cronbach's Alpha
ETB Daily Total	30.5	22.84	0 -106	**0.94**
Anxiety index	8.6	5.66	0 - 23	**0.85**
Sadness index	5.9	5.91	0 - 25	**0.86**
Anger index	5.9	5.91	0 - 27	**0.81**
Anhedonia index	5.0	5.13	0 - 25	**0.84**
HADS Total	11.5	6.20	0 - 31	**0.86**
HADS Anxiety	7.79	3.79	0 - 19	**0.81**
HADS Depression	3.7	3.25	0 - 16	**0.81**

α ≥ 0.9   Excellent
0.9 > α ≥ 0.8 Good
0.8 > α ≥ 0.7 Acceptable
0.7 > α ≥ 0.6 Questionable
0.6 > α ≥ 0.5 Poor
0.5 > α   Unacceptable

HADS: Hospital Anxiety & Depression Scale
ETB: Emotions, Thoughts & Behaviors Scale

Anxiety Index

Emotion

Anxiety is feeling nervous, uneasy, apprehensive or panicky.

Thought

Worry is thoughts excessive to a threat and difficult to control. Worry can focus on past, present or future concerns.

Behavior

Physical agitation is muscle tension, trembling, restlessness and inability to be still or relax.

Avoidance is shunning specific places, people and situations associated with negative experiences, at times without consideration.

Anger Index

Emotion

Anger is feeling annoyance, irritation or rage.

Thought

Blaming is finding fault, dislike, holding another or self responsible for wrong.

Behavior

Hostility is a tendency or expression of animosity, disparagement, aggression against others or objects.

Impulsivity is acting without thinking or considering the consequences. Lacking self-control.

Sadness Index

Emotion

Sadness is feeling down, despair, lonely, loss or shame.

Numb is feeling emotionally dull, flat or a general lack of feelings.

Thought

Sad thoughts focus on loss, guilt, worthlessness and hopelessness.

Suicidal thoughts is occasional, frequent or constant thoughts/ wishes of death, and urges or plans to end your life.

Behavior

Withdrawal is behaviorally retreating to seek solace, comfort from distress.

Lack of Pleasure Index

Emotion

Lack of pleasure is the inability to feel happiness or enjoy experiences.

Thought

Lack of thoughts is reduced amount of thoughts. Thoughts lack variety and fullness.

Futility is the giving up of effort because of pointlessness or the certainty of failure.

Behavior

Lack of approach is not reaching for new, attractive situations or previously pleasurable experiences.

Validity: Pearson's Correlation Coefficients

	HADS Anxiety	HADS Depression
ETB Anxiety Index	0.66 (p<0.001)	0.49 (p<0.001)
ETB Sadness & Anhedonia Indexes	0.58 (p<0.001)	0.62 (p<0.001)

Strength of Association
.5 to 1.0   Large
.3 to .5   Medium
.1 to .3   Small

HADS: Hospital Anxiety & Depression Scale
ETB: Emotions, Thoughts & Behaviors Scale

College Students scored higher on ETB

	College Students n = 43	Others n = 152	p-value
Daily Total	2.4 ±1.37	1.6 ± 1.36	0.0005
Weekly Associated Symptoms	4.0 ± 1.72	2.6 ± 1.80	<0.0001

'Clinical' Depression & Anxiety

- 'Clinical' based on ETB cross-sectional symptom threshold algorithms from DSM-5 MDD and GAD criteria.

	Anxiety	No Anxiety	Total
Depression	17 (8.7%)	12 (6.1%)	**29 (14.9%)**
No Depression	6 (3.1%)	160 (82.1%)	166 (85.1%)
Total	**23 (11.8%)**	172 (88.2%)	195

- 58.6% (17 of 29) of those with 'clinical' depression had 'clinical' anxiety. Odds ratio = 37.8
- 73.9% (17 of 23) of those with 'clinical' anxiety had 'clinical' depression.

Cross-sectional Validation Study: Conclusions

- ETB demonstrated excellent reliability and large convergent validity.

- Factor analysis generally supported the index structure of the Daily ETB.

- Sex, race and ethnicity did not impact the ETB scores

- Higher ETB scores were associated with lower economic status, less education, being single, receiving professional care and being a college student.

- 11.8% met criteria for 'clinical' anxiety and 14.9% for 'clinical' depression based on imputed algorithmic thresholds.

Assessment

- Why measure?
  - Value of measurement based care
- What to measure?
  - Severity
  - Dimensions
  - Diagnosis
- How to measure?
  - Revolution in technology

Emotions, Thoughts and Behaviors (ETB)

Emotions, Thoughts
and Behaviors (ETB)

www.beta.emindlog.com

Tracking Daily Items

Personalized Data Reporting

Secure, Encrypted, Private and HIPAA Compliant

Tracking Indexes & 'clinical' Thresholds
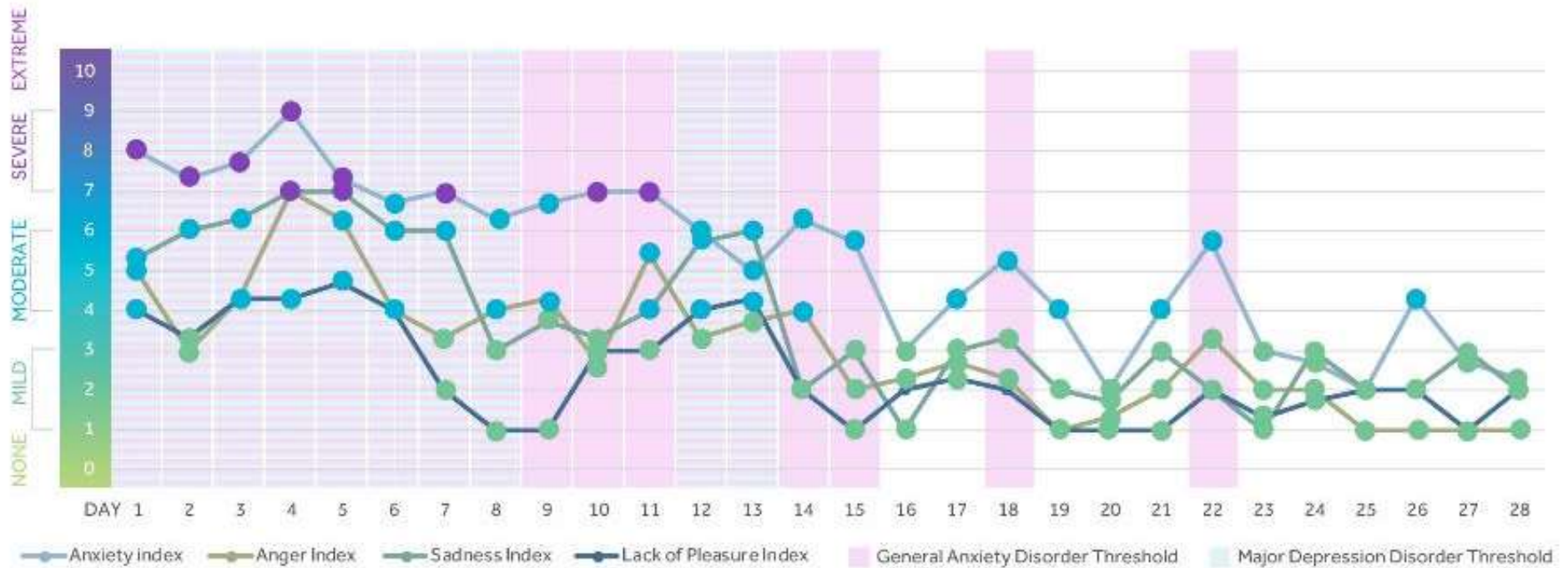
Summary

- Our mind is derived from maps (representations) of reality, constructed by the brain

- Emotions, thoughts and behaviors are the elements of our mental experience

- Tracking key indexes and diagnostic thresholds aid management decisions

- Integrating technology and neuroscience empowers our patients to be partners in their care