To cure mental disorders the Psychiatrist of the future will need to discover the causes of mental disorders
1) Reformulate mental disorders as brain-disorders
2) Validate the brain disorders
3) Develop cure intervention/device
Psychiatric diagnosis is descriptive; it is based on signs (the patient looks sad) and symptoms (the patient complains of depression).
I feel depressed

I look depressed
While most clinicians agree that mental disorders are **brain** disorders, psychiatric diagnosis is not Brain-related
The term "brain" is not included in psychiatric taxonomy.
Without knowing exactly what is wrong with the brains of our patients we will never be able to cure (fix) them
In recent years we have learned a lot about the brain
For example we know that the brain is organized as a network.
We also know that the brain is organized as a *Small World* network with *Clusters* and *Hubs*.
We know that Small World brain organization is optimal for modal-specific specialization and multimodal integration.
We also know that **Small World** brain organization supports **Hierarchy** with higher-level processing.
We know that such Small World brain organization is optimal for coherent integrated conscious experience.
The brain is **Plastic**. Neurons continually create (Synaptogenesis) and lose (Atrophy) connections.
The **Plastic Brain** interacts with the Environment

- **Environment**
- **Sensation**
- **Action**

( Diagram of a brain with arrows indicating the flow of interactions between the environment and the brain. )
The Plastic Brain learns (Hebb) from the environment, memories.
The Plastic Brain uses memories to create an Internal-Representation of the environment an internal model of the world.
When ‘Adaptive’ the internal model matches the environment, difference (free energy) between environment and internal representation is reduced.
Once created the internal model determines how we view the world and react to it,

Experience-Dependent-Plasticity updates continually our internal model of the world
Experience-Dependent-Plasticity updates continually our internal model of the world

The internal model determines how we view the psychosocial world and react to it, this is our personality style.
Each of the organizational dynamics described so far can be disturbed in the brain of our patients.
Network
Organization
Can be disturbed
Plasticity and Adaptability Can be disturbed
Internal Representations Can be disturbed
Multiple disturbances typically occur together to various extents.
Each type of disturbance generates (causes) a different set of phenomenology (suffering)

Network organization

Plasticity and Adaptability

Internal Representations Can be disturbed
Disturbance to network organization generates disturbed consciousness. Psychosis and schizophrenia.
Disturbances to plasticity and adaptability causes Mood and Anxiety disorders

Mood and Anxiety disorders

Plasticity and Adaptability

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Disturbances to the Internal - Representations cause the different Personality Disorders
All together we begin to see the correlation between brain disturbances and phenomenology.

Disturbed consciousness
Psychosis and schizophrenia

Mood and Anxiety disorders

Personality Disorders

Network organization

Plasticity and Adaptability

Internal Representations

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Thus we can begin and “Translate” phenomenology into brain disorders

Disturbed consciousness
Psychosis and schizophrenia

Mood and Anxiety disorders

Personality Disorders

Disturbed network organization

Disturbed Plasticity and Adaptability

Disturbed Internal Representations
The translation of Phenomenology to brain disturbances can be elaborated to form a comprehensive brain-related psychiatric diagnosis.
For Example:

Disturbance to hierarchy

- Htd: Hierarchical top-down shift
- Hbu: Hierarchical bottom-up insufficiency

Disturbance to connectivity

- Ci: Connectivity integration
- Cs: Connectivity segregation

Disturbance to plasticity-related optimization dynamics

- O: Optimization
- D: De-Optimization
- CF: Constraint frustration
- CF(b): Stimulus bound

Disturbed basic configuration

Network organization

Plasticity and Adaptability

Internal Representations

For Example:

- Disturbance to hierarchy
- Disturbance to connectivity
- Disturbance to plasticity-related optimization dynamics

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Thus can be translated to:

Network organization

Plasticity and Adaptability

Internal Representations

Delusions
Hallucinations
Avolition
Psychosis
Negative signs
Mania
Depression
Anxiety
Phobia
Personality disorder

Htd
Hierarchical top-down shift

Hbu
Hierarchical bottom-up insufficiency

CI
Connectivity integration

Cs
Connectivity segregation

O
Optimization

D
De-Optimization

CF
Constraint frustration

CF(b)
Stimulus bound

DMN
Default Mode Network

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This is how we create, “Clinical Brain Profiling” a brain-related psychiatric diagnosis, translating phenomenology into a profile of brain disturbances.
Clinical Brain Profiling

Brain-related etiopathological

Testable

Personalized
Clinical brain Profiling diagnostic translation is available at: 
http://neuroanalysis.org.il/?page_id=114
All you need to do is enter the signs and symptoms of your patient
“Clinical brain profiling”: A neuroscientific diagnostic approach for mental disorders

Abraham Peled, Amir B. Geva

To read more see PUBMED
To Validate Clinical Brain Profiling (CBP) a battery of various signal-processing methods should be put in place.

- Correlation analysis (non-linear)
- Graph analysis (small-world)
- SPM, DCM
- Entropy measures
Brain organization can be monitored continually using EEG wireless wearables

- Correlation analysis (non-linear)
- Graph analysis (small-world)
- SPM, DCM
- Entropy measures
The Mental Status Examination can be evaluated ("sensed") using wearable, and monitoring of Cyber-activity.

Behavior
Speech
Face expressions
Thought
Cognition
Sensing Mental Status Examination can be synchronized with EEG monitoring

Behavior
Speech
Face expressions
Thought
Cognition
Coupling ongoing phenomenology changes synchronized with ongoing monitoring of brain organization will generate large data that will point to the correlations between mental disorders and brain disturbance – Machine-Learning will probably work here.
It is predicted that Machine-learning alone cannot complete the discovery process and that a theory-driven approach similar to CBP will be required.
Any therapeutic intervention to eliminate CBP disturbances will need a feed-back Loop mechanism one that continually guides and estimates corrections, “Brain-Pacing mechanism”
Such operation will probably require a Head Mounted Platform a hat for the therapy period/session.

A platform to support the sensory-guided intervention.

An intervention engine relevant to activate remote non-invasive mediation to correct CBP disturbances.
Eventually the entire Head Mounted Platform and its operation, will have to be shrunk to the size of a Sticker and the brain intervention miniaturized to injectable (or sniffed) neuronal-related nanoparticles (the CBP algorithm remains).
The intervention at the brain level will need to be both neurological and CBP-relevant, for example here is a predicted intervention to the interneurons of layer 5 of the Prefrontal cortex for its Hub network-controlling effect for whole-brain organization.
Good luck to us in the journey for curing mental disorders

END

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