Alysis Reliability Study: Rearranging Phenomenology into Etiology in Mental Disorders

Abraham Peled

Ma'ale HaCarmel Mental Health Center

Affiliated to

Rappaport Faculty of Medicine, Technion Israel Institute of Technology

Correspondence:

Prof. Abraham Peled

Ma'ale HaCarmel Mental Health Center

POB 9

Tirat Carmel, 30200

Israel

Email: Neuroanalysis@gmail.com

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Abstract

‘Alysis’ (abbreviation of Neuroanalysis), - is the chosen definition for the rearrangement of psychiatric phenomenology to approximate the hypothesized etiology of mental disorders.

Currently the relevant scales such as Positive and Negative Symptoms Scale (PANSS) for schizophrenia and the Hamilton scales for depression and anxiety, and Mania Rating Scale have no specific guiding principle in the order of items. ‘Alysis’ is a reorganization of multiple known scales to fit a future brain-related diagnostic approach to mental disorders.

Due to the regrouping of items from different scales and reorganizing them according to a brain-related hypothetic order, it is necessary to reassess the reliability of the new ‘Alysis’ rearrangement.

In this work the new ‘Alysis’ format is described and then using t-scores analysis, compared to the widely-used Brief Psychiatric Rating Scale (BPRS) scale for mental disorders. It is shown that ‘Alysis’ is reliable thus can be a good diagnostic platform to go ahead and generate personalized testable-predictions about brain-related diagnostics for psychiatric patients.

Introduction

Over the years many scales have been developed in an attempt to quantify psychiatric phenomenology. These scales have been tested and researched and became accepted, reliable tools for clinical assessments and research in psychiatry. The order of the items in these scales have no particular guiding principles and each scale is oriented (and named) after a specific phonological category. For example, the Hamilton Depression scale for depression (HAM-D) (Hamilton 1960, Hedlund and Viewig, 1979; Maier et al., 1988) and the Positive and Negative Symptoms Scale (PANSS) (Kay et al 1987; 1991; Hunsley & Mash 2008; Stanley 1991), for psychosis of schizophrenia and so on.

In this study we combined and rearranged items from the PANSS (Kay et al 1987; 1991; Hunsley & Mash 2008;), HAM-D (Hamilton 1960; Maier et al., 1988), Hamilton Anxiety Scale (HAM-A) (Hamilton, 1959) and the Young Mania Rating Scale (YMRS) (Young et al 1978; Gracious et al 2002), in a novel tool called Alysis, which is more appropriate for a brain-related approach to mental disorders. a, Alysis is thus more suitable for generating brain-related explanations (aetiologies) for mental disorders. The alterations and regrouping of items necessitate a reliability assessment to show that it is As-Good-As the reliability of the original scales. For this purpose we used t-scores to show the reliability of Alysis in comparison to the relevant items of the Brief Psychiatric Rating Scale (BPRS) (Höschl et al 1994; Overall and Gorham, 1962). In short Alysis is introduced as an assessment tool with a novel mixture of items rearranged toward a brain-related hypothesis of symptoms. This study which compared reliability and validity of Alysis to that of the BPRS is presented, to substantiate the efficacy of the Alysis tool, which is compatible with brain related aetiologies of mental disorders.

Etiology and Neuroanalytic (Alysis) Theory

Psychiatric diagnosis is descriptive based upon phenomology (signs and symptoms) rather than on etiology (pathology). This is due to the fact that the etiology of mental disorders is unknown. In recent years there is a body of knowledge accumulating under the title ‘Computational Neuroscience’ (Kringelbach and Deco, 2020) recently also known as ‘Computational Psychiatry’ (Hitchcock et al., 2021). According to emerging insights from these disciplines it seems that a general theory for the etiology of mental disorders can be rather straightforward. It is based on two assumptions:

1) Emergent properties from the brain, and 2) Brain network dynamics.

Emergent properties are typically defined synergistically; the “whole is greater than the sum of its parts”. This is true for systems characterized by non-linear interacting elements. The emergent properties evolving from the complexity of the brain are phenomena such as consciousness, mood and personality. One neuron, or even a large group of neurons, do not have characteristics such as consciousness, mood and personality. However, the whole brain integrative activity does. Thus, in disturbances to consciousness, mood and personality, we assume that whole brain organization will be influenced.

As for the second assumption, that of brain network dynamics, the hypothesis is that mental disorders are disturbances to the optimal whole brain organization with hubs set as Central Executive Networks for fast millisecond range plasticity, Default-Mode Network for lifelong stable plasticity and Salient Network for in-between months, weeks, plasticity adaptations. Different phenomenological manifestations of mental disorders are caused by different types of neuronal network “breakdown” patterns. These can be conceptualized in terms of disturbances to plasticity network dynamics.

Plasticity is the term reserved for interactions taking place between, and among, neuronal network systems in the brain (neurogenesis and synaptic activity). These are typically interactive with external environments via sensation (sensory systems) and actions (motor activity).

The disturbances to brain plasticity-dynamics can be defined by their time-scales and interactions with the environment. “Fast Plasticity” is in the millisecond range integrating brain organizations, that of Central Executive Network, from instant to instant with the emergent property of consciousness and the capabilities of cognitive functions such as problem solving and action planning. The brain is organized as a network with connectivity and hierarchy. Thus, altered fast plasticity involves disconnection or over-connection and hierarchical bottom-up or top-down connectivity alterations.

“Reactive Plasticity” is somewhat on a longer timescale. Reactive Plasticity, that of minutes to hours, stabilizes (keep constraint organization) the fast plasticity in the face of perturbations caused from large alterations of environmental dynamics (i.e., stress). Large alterations of environmental dynamics, that typically characterize stressful occurrences perturb and destabilize the fast (millisecond-range) plasticity and thus requires a more lasting connectivity stabilization of Reactive Plasticity to “hold it together.”

“Adaptive Plasticity” is slower and spans time-scales of weeks. It reflects Hebbian Dynamics (Hélie et al., 2011) creating memories where neurons that fire together increase the connections between them (wire-together). Adaptive Plasticity sustains memories, which in turn build internal representations of the environmental occurrences. In effect, the fast Fast

Plasticity, slower Reactive Plasticity and even slower Adaptive Plasticity generate an internal model of the environmental events in the brain. Such an internal model of the world organizes brain dynamics to predict and optimize the interactions with the environment assuring optimal effective survival for the individual. The brain acts to minimize the differences (Delta) between psychophysical occurrences in the environment and the internal brain-model of these same environmental occurrences. This is done by continuous “update” of the internal model based on sensory activity and by continuous adaptive interventions in the environment via motor activity in the surrounding environment. Thus, the slower Adaptive Plasticity is responsible for minimizing brain-environment bias (reducing free energy or delta in mathematical physical terms). This is done with Bayesian dynamics where the brain continually makes error predictions and corrections interacting with the environment. The Salient Network subcortical hubs are probably most operational for such intermediate-range (weeks. months) plasticity regulation activity

Finally, “Developmental Plasticity” results from life-long processes of all the above plasticity dynamics. This lifelong developmental process is often defined as “Experience- Dependent Plasticity” and is composed of long-lasting, memories embedded in the brain network-configurations because of life-long Hebbian dynamics. The total life experiences acting on the developing brain from its first developmental stages create a lasting stable basic neural-network organization in the brain that encodes internal representations of the environment including occurrences that are more complex; those of social interactions including self and others-representations. Such neuronal network organization in the brain is basic (at rest), and is conceptualized as the “Default-Mode-Network” because it is apparent when the brain is not engaged in stimulated rapid cognitive-related action. The emergent property from the activity

of basic developmental Default-Mode-Network is the personality style, reflected in the reactions and attitudes “shaped” by the life-long experiences of the individual.

According to the above conceptualizations, psychiatric disorders can now be reformulated. Disturbances to the fast millisecond-range Fast Plasticity will disturb conscious integration with symptoms of psychosis and schizophrenia. Disturbances to Reactive Plasticity, the reactive stabilization of neural networks in the face of environmental perturbations, result in the emergent phenomenology of anxious sensations and anxiety symptoms. Disturbances to slower Adaptive Plasticity that optimizes internal representations and reduces predictive error will result in mood disorders. The de-optimized brain with free energy results in the emergent property of depression and vice versa. Optimization dynamics is mood elevating i.e., possible manic symptoms. Finally, altered internal representations of psychosocial occurrences due to “immature” biased Default-Mode resting brain network organization result in personality-related distortions, which lead to ineffective, biased social interactions and an emergent property of personality disorders. Table 1 summarizes the plasticity disturbances and their phenomenological correlates.

Table 1: Plasticity disturbances and their phenomenological correlates

Plasticity disturbance	Network involved	Brain system disturbance	Psychiatric phenomenology
Fast Plasticity	Central Executive Network	Disturbance of millisecond range integrating brain organizations. Disconnection or over-connection and hierarchical bottom-up or top-down connectivity are disturbed	Psychosis and schizophrenia (negative signs)
Reactive Plasticity	Salient Network	Disturbances of longer timescale those of minutes to hours, the stabilizing network plasticity in the face of perturbations caused from large alterations of	Anxiety (general, reactive, phobia)

		environmental dynamics (i.e., stress).	
Adaptive Plasticity	Salient Network	Disturbance of slower time-scales, those that span hours to weeks and are responsible for reducing free energy. The differences between internal representations (memory constructs) and external environmental occurrences. De-optimization takes place when free energy increase and mismatch between internal representations and external events becomes larger	Mood disorders
Developmental Plasticity	Default mode network	Disturbances of the Default-Mode Retesting brain network organization resulting in distortions of internal representations of the psychosocial world which lead to ineffective biased social interactions	Personality disorders

The theory briefly outlined above is defined as ‘Neuroanalysis (Peled, 2012) as it offers a theoretical conceptualization for mental disorders based on analysis of neuronal organization in the brain

‘Alysis’ a Neuroanalytic Rearrangement of phenomenology

Based on the insights above it seems that the currently accepted psychiatric Diagnostic Statistical Manual (DSM)-Related phenomenology in the form of validated scales should be rearranged to match the underlying brain hypothesis of their origin.

Based on the assumptions summarized in Table 1 we aim to explain that disturbances to ‘Fast Plasticity’ dynamics are relevant to the etiology of positive and negative symptoms of schizophrenia, with disconnection and over connection dynamics, respectively causing these disturbances. These are also related to the hierarchal structure of the brain with top-down shifting dynamics comprising a portion of the etiology of positive signs with delusions and bottom-up hierarchical insufficiency related to negative signs with Avolition (Peled and Geva, 2014). Thus the phenomology of ‘Positive Symptoms’ and ‘Hallucinations’ emerge from disconnection and disintegration of cortical organization, ‘Positive Symptoms’ and ‘Delusions’ emerge from hierarchical top-down shift. ‘Negative Symptoms with ‘Alogia’ are caused by over-connectivity dynamics and ‘Negative Symptoms with ‘Avolition’ are caused by bottom-up hierarchal insufficiency Peled, 2011). Disturbances to ‘Reactive Plasticity’ perturbing ‘Constraint organization’ governed by ‘Salient Network’ in the minutes range time window cause the emergent property sensation of ‘Anxiety.’ Disturbances to Adaptive plasticity in the form of Deoptimization and Hyperoptimization dynamics caused by the Salient Network in weeks to months dynamics, is responsible for Depression and Mania respectively. Finally, personality disorders emerge from altered ‘Developmental Plasticity’ lifelong time-scale of the ‘Default Mode Network’ leaving the default network with its internal representations immature and biased. Table 2 summarizes these phenomology versus hypothetical etiology formulations.

Table 2. Phenomology-Etiology hypothesis

Phenomenology	Etiology
Positive Symptoms and Hallucinations'	Overconnectivity brain dynamics Executive Network millisecond range plasticity
Positive Symptoms and Delusions	Top-down hierarchal shifting dynamics Executive Network millisecond range plasticity
Negative Symptoms with Alogia	Over-connectivity dynamics Executive Network millisecond range plasticity
Negative Symptoms with Avolition'	Bottom-up hierarchal insufficiency Executive Network millisecond range plasticity
Anxiety	Reactive plasticity disturbance to Constraint organization Salient Network minutes range time window
Depression	Adaptive plasticity Deoptimization dynamics Salient Network weeks to months dynamics
Mania	Adaptive plasticity Fyper Optimization dynamics Salient Network weeks to months dynamics
Personality disorders	Devlopmental Plasticity lifelong time-scale immature biased Default Mode Network organization and it's internal representations.

Rearranging the scales

As mentioned above, the currently accepted scales of PANSS (Kay et al 1987; 1991; Hunsley & Mash 2008), HAM-D (Hamilton 1960 ; Maier et al., 1988), HAM-A (Hamilton, 1959), YMRS (Young et al 1978; Gracious et al 2002), are collectively used in the 'Alysis' reformulation, and for simplified usage are redivided to fit a three-level rating of 'Mild,' 'Moderate' and 'Marked' severity. Table 3 presents the reorganization of the scales and their rating levels to create the Alysis reformulated etiologically oriented combination, summarized in Table 3.

Table 3. Scales reorganized

Phenomenology Item	Non =0	Mild =1	Moderate =2	Marked =3
Positive signs loosening Hallucinations		<p>Thinking is circumstantial, tangential, or para-logical. There is some difficulty in directing thoughts toward a goal and some loosening of associations may be evidenced under pressure. Tends to be slightly agitated, hypervigilant, or mildly over aroused. Slight awkwardness in movements.</p> <p>One or two clearly formed but infrequent hallucinations, or else a number of vague abnormal perceptions which do not result in distortions of thinking or behavior. presents a guarded or even openly distrustful attitude, but thoughts, interactions, and behavior are minimally affected.</p> <p><i>PANSS P2 Conceptual disorganization 2,3, PANSS P4 Excitement 2,3, PANSS G5 mannerism posturing 2,3, PANSS P3 Hallucinatory behavior 2,3,</i></p>	<p>Generally has difficulty in organizing thoughts, as evidenced by frequent irrelevances, disconnectedness. or loosening of associations even when not under pressure Agitation or over arousal is clearly evident; episodic outbursts occur sporadically, Movements are notably awkward or disjointed.</p> <p>Hallucinations occur frequently but not continuously. These may involve more than one sensory modality, and tend to distort thinking and/or disrupt behavior</p> <p><i>PANSS P2 Conceptual disorganization 4,5, PANSS P4 Excitement 4,5, PANSS G5 mannerism posturing 4,5, PANSS P3 Hallucinatory behavior 4,5,</i></p>	<p>Thoughts are disrupted to the point where the patient is incoherent. There is marked loosening of associations, marked excitement delimits attention, and affects personal functions such as eating and sleeping Frequent repetition of bizarre rituals, mannerisms, or stereotyped movements.</p> <p>Hallucinations are present almost continuously, causing major disruption of thinking and behavior. Patient treats these as real perceptions, and functioning is impeded by frequent emotional and verbal responses to them.</p> <p><i>PANSS P2 Conceptual disorganization 6,7, PANSS P4 Excitement 6,7, PANSS G5 mannerism posturing 6,7, PANSS P3 Hallucinatory behavior 4,5,</i></p>
Positive signs Delusions		<p>Presence of one or two delusions which are vague, un-crystallized delusions that do not interfere with thinking, social relations, or behavior.</p>	<p>Presence of numerous well-formed delusions that are tenaciously held and occasionally interfere with</p>	<p>Presence of a stable set of delusions which are crystallized, possibly systematized, tenaciously held, and clearly interfere with thinking, social relations,</p>

		<p>Thought content is somewhat peculiar or idiosyncratic, or familiar ideas are framed in an odd context.</p> <p><i>PANSS P1 Delusions 2,3, PANSS G9 Unusual thought content 2,3, PANSS P6 persecution 2,3,</i></p>	<p>thinking, social relations, or behavior.</p> <p>Distrustfulness is clearly evident, Patient shows marked distrust, there are clear-cut persecutory delusions that have limited impact on interpersonal relations and behavior Ideas are frequently distorted and occasionally seem quite bizarre.</p> <p><i>PANSS P1 Delusions 4,5, PANSS G9 Unusual thought content 4,5, PANSS P6 persecution 4,5,</i></p>	<p>and behavior. These frequently result in inappropriate and irresponsible action, which may even jeopardize the safety of the patient or others.</p> <p>Clear-cut pervasive delusions of persecution which may be systematized and significantly interfere in interpersonal relations. Patient expresses many illogical or absurd ideas or some which have a distinctly bizarre quality</p> <p><i>PANSS P1 Delusions 6,7, PANSS G9 Unusual thought content 6,7, PANSS P6 persecution 6,7,</i></p>
Negative signs Alogia		<p>Some rigidity shown in attitudes or beliefs. Tends to give literal or personalized interpretations to the more difficult proverbs and may have some problems with concepts that are fairly abstract or remotely related Conversation shows little initiative. Patient's answers tend to be brief and unembellished.</p> <p>There is evidence of some indecisiveness in conversation and thinking, which may impede verbal and cognitive processes to a minor extent. Changes in facial expression and communicative gestures seem to be stilted, forced, artificial, or lacking in modulation.</p>	<p>Thinking is rigid and repetitious thus conversation is limited to only two or three dominating topics Deals primarily in a concrete mode, exhibiting difficulty with most proverbs and many categories. Conversation lacks free flow and appears uneven or halting. marked lack of spontaneity and openness, replying to questions with only one or two brief sentences.</p> <p>Affect is generally ~flat-, with only occasional changes in facial expression and a paucity of communicative gestures.</p> <p><i>PANSS N5 Abstract thought 4,5,</i></p>	<p>Thinking, behavior, and conversation are dominated by constant repetition of fixed ideas or limited phrases, leading to gross rigidity, inappropriateness, and restrictiveness of patient's communication. Can use only concrete modes of thinking. Shows no comprehension of proverbs, common metaphors or similes, and simple categories. Patient's responses are limited mainly to a few words or short phrases intended to avoid or curtail communication. Conversation is seriously impaired as a result.</p> <p>Marked flatness and deficiency of emotions exhibited most of the time. Patient seems constantly to show a</p>

		<p>Conversation is characterized by a stilted strained or artificial tone. It may lack</p> <p><i>PANSS N5 Abstract thought 2,3, PANSS N6 flow conversation 2,3, Stereotyped N7 2,3, PANSS N1 Blunted affect 2,3,</i></p>	<p><i>PANSS N6 flow conversation 4,5, Stereotyped N7 4,5,</i></p> <p><i>PANSS G13 Dist' Volition 4,5, PANSS N1 Blunted affect 4,5, PANSS N2 Emotional withdrawal 4,5, PANSS N3 Poor Rapport 4,5, PANSS N4 Apathetic withdrawal 4,5,</i></p>	<p>barren or "wooden" expression.</p> <p>Patient is highly indifferent, with marked interpersonal distance. Eye and face contact are frequently avoided.</p> <p><i>PANSS N5 Abstract thought 6,7, PANSS N6 flow conversation 6,7, Stereotyped N7 6,7,</i></p> <p><i>PANSS G13 Dist' Volition 6,7, PANSS N1 Blunted affect 6,7, PANSS N2 Emotional withdrawal 6,7, PANSS N3 Poor Rapport 6,7, PANSS N4 Apathetic withdrawal 6,7,</i></p>
Negative signs Avolition		<p>Usually lacks initiative and occasionally may show deficient interest in surrounding events.</p> <p>Emotional depth or tend to remain on an impersonal, intellectual plane. Shows occasional interest in social activities but poor initiative</p> <p><i>PANSS G13 Dist' Volition 2,3, PANSS N2 Emotional withdrawal 2,3, PANSS N3 Poor Rapport 2,3, PANSS N4 Apathetic withdrawal 2,3,</i></p>	<p>Disturbance of volition interferes in thinking as well as behavior. Patient shows pronounced indecision that impedes the initiation and continuation of social and motor activities, and which also may be evidenced in halting speech.</p> <p>Patient is clearly detached emotionally from persons and events in the milieu, resisting all efforts at engagement. Patient appears distant, docile, and purposeless. Patient typically is aloof, act bored, or express disinterest. Dis-involvement is obvious and clearly impedes the productivity of the interview. Patient may tend to avoid eye or face contact.</p>	<p>Disturbance of volition interferes in the execution of simple, automatic motor functions such as dressing and grooming, and markedly affects speech. Failure of volition is manifested by gross inhibition of movement and speech, resulting in immobility and/or mutism.</p> <p>Patient is almost totally withdrawn, uncommunicative, and neglectful of personal needs as a result of profound lack of interest and emotional commitment.</p> <p>Apathetic and isolated, participating very rarely in social activities and occasionally neglecting personal needs.</p> <p><i>PANSS G13 Dist' Volition 4,5,</i></p>

			<p>Passively participates in only a minority of activities and shows virtually no interest or initiative</p> <p><i>PANSS G13 Dist' Volition 4,5, PANSS N1 Blunted affect 4,5, PANSS N2 Emotional withdrawal 4,5, PANSS N3 Poor Rapport 4,5, PANSS N4 Apathetic withdrawal</i></p>	<p><i>PANSS N1 Blunted affect 4,5, PANSS N2 Emotional withdrawal 4,5, PANSS N3 Poor Rapport 4,5, PANSS N4 Apathetic withdrawal</i></p>
Generalized Anxiety		<p>Expresses some worry, over concern, or subjective restlessness, but no somatic and behavioral consequences are reported or evidenced. Mild Worries, anticipation of the worst, fearful anticipation, irritability. Feelings of tension, fatigue, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax. Mild fears of dark, of strangers, of being left alone, of animals, of traffic, of crowds. Mild difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors. Mild combined somatic symptoms</p> <p><i>PANSS G2 Anxiety 2,3, PANSS G4 Tension 2,3, HAM-A Anxious mood 1, HAM-A Tension 1, HAM-A Fear 1, HAM-A Early insomnia 1,</i></p>	<p>Serious problems of anxiety which have significant physical and behavioral consequences, such as marked tension, poor concentration, palpitations, or impaired sleep. Moderate worries, anticipation of the worst, fearful anticipation, irritability. Feelings of tension, fatigability, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax. Moderate fears of dark, of strangers, of being left alone, of animals, of traffic, of crowds. Moderate difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors. Moderate combined somatic symptoms</p> <p><i>PANSS G2 Anxiety 4,5, PANSS G4 Tension 4,5, HAM-A Anxious mood 2, HAM-A Tension 2, HAM-A Fear 2,</i></p>	<p>Subjective state of almost constant fear associated with phobias, marked restlessness, or numerous somatic manifestations. At times reaches panic proportions or is manifested in actual panic attacks. Marked worries, anticipation of the worst, fearful anticipation, irritability. Feelings of tension, fatigue, startle response, moved to tears easily, trembling, feelings of restlessness, inability to relax. Marked fears of dark, of strangers, of being left alone, of animals, of traffic, of Crowds. Marked difficulty in falling asleep, broken sleep, unsatisfying sleep and fatigue on waking, dreams, nightmares, night terrors. Marked combined somatic symptoms</p> <p><i>PANSS G2 Anxiety 6,7, PANSS G4 Tension 6,7, HAM-A Anxious mood 3, 4, HAM-A Tension 3, 4, HAM-A Fear 3, 4, HAM-A Early insomnia 3, 4,</i></p>

		<i>HAM-A somatic (combined) 1,</i>	<i>HAM-A Early insomnia 2, HAM-A somatic (combined) 2,</i>	<i>HAM-A somatic (combined) 3, 4,</i>
Depression		<p>Expresses some sadness or discouragement only on questioning. but there is no evidence of depression in general attitude or demeanor. Questioning elicits a vague sense of guilt or self-blame for a minor incident, but the patient clearly is not overly concerned. Slight but noticeable diminution in rate of movements and speech. Patient may be somewhat underproductive in conversation and gestures.</p> <p><i>PANSS G6 Depression 2,3, PANSS G3 Guilt feeling 2,3, PANSS G7 motor retardation 2,3, HAM-D depressed mood 1, HAM-D Guilt 1, HAM-D Suicide 1, HAM-D late insomnia 1, HAM-D Work and activity 1, HAM-D retardation 1, HAM-D loss of weight mild</i></p>	<p>Distinctly depressed mood is associated with obvious sadness, pessimism, loss of social interest, psychomotor retardation, and some interference in appetite and sleep. The patient cannot be easily cheered up. Patient expresses a strong sense of guilt associated with self-deprecation or the belief that he deserves punishment. The guilt feelings may have a delusional basis, may be volunteered spontaneously, may be a source of preoccupation and/or depressed mood, and cannot be allayed readily by the interviewer. Patient is clearly slow in movements, and speech may be characterized by poor productivity, including long response latency, extended pauses, or slow pace.</p> <p><i>PANSS G6 Depression 4,5, PANSS G3 Guilt feeling 4,5, PANSS G7 motor retardation 4,5, HAM-D depressed mood 2,3, HAM-D Guilt 2,3, HAM-D Suicide 2,3, HAM-D late insomnia 2, 3, HAM-D Work and activity 2,3,</i></p>	<p>Depressive feelings seriously interfere in most major functions. The manifestations include frequent crying, pronounced somatic symptoms, impaired concentration, psychomotor retardation, social disinterest, self-neglect, possible depressive or nihilistic delusions, and/or possible suicidal thoughts or action. Strong ideas of guilt take on a delusional quality and lead to an attitude of hopelessness or worthlessness. The patient believes he should receive harsh sanctions for the misdeeds and may even regard his current life situation as such punishment. Movements are extremely slow, resulting in a minimum of activity and speech. Essentially the day is spent sitting idly or lying down.</p> <p><i>PANSS G6 Depression 6,7, PANSS G3 Guilt feeling 6,7, PANSS G7 motor retardation 6,7, HAM-D depressed mood 4, HAM-D Guilt 4, HAM-D Suicide 4, HAM-D Late insomnia 4, HAM-D Work and activity 4, HAM-D retardation 4, HAM-D loss of weight marked</i></p>

			<i>HAM-D retardation 2,3, HAM-D loss of weight moderate</i>	
Mania		<p>Hypomania Increased rate or amount of speech at times, verbose at times, content Special project(s); hyper-religious Some expansiveness or boastfulness is evident, but without clear-cut grandiose delusions. Definite subjective elevation; optimistic, self-confident; cheerful; appropriate to content, Motor animated; gestures increased Definite subjective increase of sexual interest Irritable at times episodes of anger or annoyance Sleeping less than normal by more than one hour</p> <p><i>PANSS P5 Grandiosity 2,3, YMRS Elevated mood 1, YMRS motor energy 1, YMRS sexual interest 1, YMRS Sleep 2, YMRS irritability 1, YMRS Speech rate amount 1, YMRS Content grandiose 1,</i></p>	<p>Mania Consistently increased rate and amount of speech, difficult to interrupt Content Grandiose or paranoid ideas; ideas of reference Feels distinctly and unrealistically superior to others. Some poorly formed delusions about special status or abilities may be present but are not acted upon. Elevated; inappropriate to content; humorous Excessive energy; hyperactive at times; restless Elaborates on sexual matters; hypersexual Decreased need for sleep</p> <p><i>PANSS P5 Grandiosity 4,5, YMRS Elevated mood 2, YMRS motor energy 2, YMRS sexual interest 2, YMRS Sleep 3, YMRS irritability 2, YMRS Speech rate amount 2, YMRS Content grandiose 2,</i></p>	<p>Mania psychosis Pressured, uninterruptible, continuous speech. Content marked Delusions, paranoid grandiose. Clear-cut delusions of remarkable superiority. Thinking, interactions, and behavior are dominated by multiple delusions of amazing ability, wealth knowledge, fame, power, and/or moral stature. Euphoric; inappropriate laughter; singing Motor excitement; continuous hyperactivity (cannot be calmed) Sexual interest involves overt sexual acts. Hostile, uncooperative; interview impossible Denies need for sleep</p> <p><i>PANSS P5 Grandiosity 6,7, YMRS Elevated mood 3, 4, YMRS motor energy 3, 4, YMRS sexual interest 3, 4, YMRS Sleep 4, YMRS irritability 3, 4, YMRS Speech rate amount 3, 4, YMRS Content grandiose 3, 4,</i></p>
higher personality organization		<p>Rigid predictable restricted behaviors attitudes and traits Indirect or restrained communication of anger such as sarcasm, disrespect, hostile expressions,</p>	<p>Rigid predictable restricted behaviors attitudes childish immature personality egocentricity dependency are marked</p>	<p>Dominant restricted behaviors attitudes Dependent immature personality dependency is marked to extent that hampers any functional challenge</p>

		<p>and occasional irritability.</p> <p>Patient tends to be easily angered and frustrated when facing stress or denied gratification but rarely acts on impulse.</p> <p><i>PANSS G14 poor impulse control 2,3, PANSS P7 Hostility 2,3, PANSS G14 poor impulse control 2,3, PANSS P7 Hostility 2,3,</i></p>	<p>Special sensitivity to criticism, need for attention low impulsive threshold</p> <p>Presents an overtly hostile attitude, showing frequent irritability and direct expression of anger or resentment. Patient exhibits repeated impulsive episodes involving verbal abuse, destruction of property, or physical threats.</p> <p><i>PANSS G14 poor impulse control 4,5, PANSS P7 Hostility 4,5, PANSS G14 poor impulse control 4,5, PANSS P7 Hostility 4,5,</i></p>	<p>Unstable, impulsive, inability to regulate or control emotions. Tends to split (all-or-none-all good all bad attitude) when under stress becomes paranoid (brief psychotic episodes)</p> <p>Uncooperativeness and verbal abuse or threats are typical and seriously impact upon social relations. Patient may be violent and destructive and is physically assaultive toward others. Patient frequently is impulsive aggressive, threatening, demanding, and destructive, without any apparent consideration of consequences. Shows assaultive behavior and may also be sexually offensive</p> <p><i>PANSS G14 poor impulse control 6,7, PANSS P7 Hostility 6,7, PANSS G14 poor impulse control 6,7, PANSS P7 Hostility 6,7,</i></p>
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BPRS

The Brief Psychiatric Rating Scale initially developed by Overall and Gorham in 1962

(Höschl et al 1994; Overall and Gorham 1962) was not included in the scales composing the

Alysis tool. It is one of the oldest tools used extensively to measure psychiatric phenomenology

and is used here as a reliability validator for the Alysis reorganization of psychiatric

phenomenology. For a better match between the Alysis format (Tables 2 and 3) the order of

items in the BPRS was altered as follows: Conceptual disorganization, Hallucinatory

behavior, Suspiciousness, Unusual thought content, Blunted affect, Emotional withdrawal,

Anxiety, Excitement, Tension, Depressive mood, Guilt feeling, Motor Retardation,

Grandiosity, Uncooperativeness, Hostility, Mannerism, Somatic concern, Disorientation. This

is an attempt to readjust it to the order of Positive Symptoms, Negative symptoms, Anxiety, Depression, Mania and Personality disorders symptomatology.

Data Collection

The ‘Alysis’ and ‘BPRS’ scales were used to rate all of the patients admitted to closed and open wards at Maale Carmel MHC. The sample included 300 assessments. Most of the patients showed psychotic and schizophrenia symptoms, some had comorbidity with substance abuse. Other patients suffered from schizoaffective disorders, Affective disorders such as depression and mania also made part of the sample. Many patients had also personality disorders. Male to female ratio was approximately 2/3 respectively. Average age of the participants was 26 years (SD±15) Some of the patients were assessed twice and three times during their hospitalization but were not evaluated as a retest analysis because the comparative reliability of the scales was the only interest in this study.

Data analysis and Results

Data analysis used T-scores to measure similarity between ‘Alysis’ rearrangement of phenomenology and the parameters of the BPRS scale. For that comparison pairs of correlating phenomenological findings were chosen, e.g., positive signs of ‘Alysis’ with parameters related to positive signs on the BPRS. A small t-score indicates that the groups are similar, thus demonstrating the high reliability among the measured phenomenological items. Table 4 summarizes the chosen items for comparison and their correlated t scores.

Table 4 Alysis BPRS t-scores

AlYsis	BPRS	t-score
Positive s, loosening hallucinations	Conceptual disorganization	3.15486E-32

Positive s, loosening hallucinations	Hallucinatory behave	1.48149E-22
Positive s, delusions	Suspiciousness	8.49157E-30
Positive s, delusions	Unusual thought content	4.79008E-34
Negative s, Alogia	Blunted affect	2.75064E-47
Negative s, Alogia	Emotional withdrawal	2.5369E-36
negative s, Avolition	Blunted affect	2.23566E-44
Negative s, Avolition	Emotional withdrawal	1.01367E-33
Anxiety	Anxiety	1.29445E-79
Anxiety	Excitement	8.20476E-73
Anxiety	Tension	8.2402E-140
Depression	Depressive mood	3.77331E-35
Depression	Guilt feeling	1.87954E-28
Depression	Motor Retardation	2.84497E-45
Mania	Grandiosity	1.85858E-43
personality dis	Uncooperativeness	1.719E-138
personality dis	Hostility	3.04492E-81
personality dis	Somatic concern	2.16333E-85

As evident, overall it seems that the ‘Alysis’ is highly reliable in comparison to individual items of the BPRS. Low reliability was evident between ‘Positive signs’ on the ‘Alysis’ and ‘Suspiciousness’ on the BPRS. In addition, low reliability characterized ‘Anxiety’ on the ‘Alysis’ and ‘Excitement’ and ‘Tension’ for the BPRS. The items with low reliability were not directly defined as similar between ‘Alysis’ and BPRS. Thus, confirmation of the overall finding that ‘Alysis’ is highly reliable in comparison to the relevant individual items of the BPRS.

Discussion

The fact that ‘Alysis’ is highly reliable in comparison to the relevant individual items of the BPRS should not be surprising because as evident in table 3 ‘Alysis’ itself was composed of items from scales designed to measure the same measurements of the BPRS. Even though the results are naturally expected, the fact that the items of ‘Alysis’ are rearranged differently one would inquire if such reorganization could have hampered the reliability of the new format, that of ‘Alysis’.

In summary, the findings of this study reveal that ‘Alysis’, which is a reorganization of mental health evaluation tools, designed to confirm with future brain related diagnostics in psychiatry is as reliable as currently accepted rating scales such as the BPRS. Thus, Alysis can be a good diagnostic platform for generating personalized testable-predictions regarding brain-related diagnostics for psychiatric patients.

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