

HISTORY OF PSYCHIATRY
&
GENERAL PSYCHOPATHOLOGY
Seminars for Residents in Psychiatry
1994

Part Two: General Psychopathology

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Part Two

GENERAL PSYCHOPATHOLOGY

For Residents in Psychiatry

Eight Seminars

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READINGS

1. Karl Jaspers General Psychopathology
University of Manchester, Chicago
and Tronto Press

Manchester, Chicago and Tronto 1962
2. Max Hamilton (ed) Fish's Clinical Psychopathology
Signs and Symptoms in Psychiatry
Wright, Bristol 1985
3. Michael Alan Taylor The Neuropsychiatric Mental Status
 Examination
Pergamon Press, New York 1981
- . . .
4. Thomas A. Ban Conditioning and Psychiatry
Aldine, Chicago 1964
5. Ernst Franzek Influence of Carl Wernicke on Karl
 Leonhard's Nosology
Psychopathology 23: 277-281, 1990

DEFINITION: SCOPE AND BOUNDARIES

First Seminar

PLACE IN PSYCHIATRY

Two Major Disciplines which Serve as Foundation for Modern Psychiatry

<u>PSYCHOPATHOLOGY</u> General Psychopathology	<u>NOSOLOGY</u> Clinical Psychopathology
1. Pathology of subjective experiences	Formation of disease entities
2. Pathology of objective performances	Classification of disease entities
3. Symptoms and signs "create" illness	Illness "creates" symptoms and signs

ROOTS

DESCARTES	1642	Dualism	Mind and Body
STAHL	1707	Animism	Soul (Psyche) Maintains the Functioning of the Body
REIL	1803	Mentalist tradition	Psychiaterie (Introduction of Term)
HEINROTH	1818	Mentalist tradition	Psychiatrie (Psychiatry) (Discipline that Deals with Disorders which Result from Sin or Misdeed)
FEUCHTERSLEBEN	1845	Mentalist tradition	Psychosis (Introduction of Term)
EMMINGHAUS	1878	Mentalist tradition	Psychopathology (Introduction of Term)
JASPERS	1913	Mentalist tradition	General Psychopathology (Introduction of Term)

DEFINITION

General Psychopathology is the Scientific Discipline that deals with the

IDENTIFICATION

DESCRIPTION

CONCEPTUALIZATION

of Symptoms and Signs which Occur in Psychiatric Disorders

ROLE

General Psychopathology Provides:

1. **SYMPTOMS AND SIGNS WHICH ARE DETECTABLE**
Essential prerequisite for psychiatric clinical practice
2. **SET OF CONCEPTS WHICH CAN BE COMMUNICATED TO OTHERS**
Essential prerequisite for psychiatric education and training
3. **CONCEPTUAL FRAMEWORK WHICH CAN BE REFERRED TO**
Essential prerequisite for psychiatric research

COMPONENTS

THE FOUR COMPONENT DISCIPLINES OF GENERAL PSYCHOPATHOLOGY:

PHENOMENOLOGY or SUBJECTIVE PSYCHOPATHOLOGY

Provides a concrete description of the psychic states
experienced by the patient
Presents these psychic states accessible for observation
Renders (pathologic) psychic realities intelligible by
concepts and provides a suitable terminology which can
be communicated to others.

OBJECTIVE PSYCHOPATHOLOGY

Deals with observable performances
and
Somatic (physical) accompaniments or consequences of psychic
events

UNDERSTANDING PSYCHOPATHOLOGY

Deals with meaningful connections
and
Comprehensible relations

EXPLANATORY PSYCHOPATHOLOGY

Deals with causal connections
and
Causal explanations

(i.e., with findings by repeated experience that a number of
phenomena are regularly linked together in a particular manner
with another intrinsic or extrinsic factor.)

RELATED DISCIPLINES

A closely related discipline to general psychopathology is

PATHOPSYCHOLOGY or ABNORMAL PSYCHOLOGY

In PATHOPSYCHOLOGY Abnormal Mental Phenomena Are Perceived and Understood in Terms of Deviations From The Statistical Mean (Norm) Accepted as Normal For Subject's Social Background

In PSYCHOPATHOLOGY Pathological Mental Phenomena Are Perceived And Understood in Terms of And Within The Frame of Reference of Patient's Mental Illness

PURPOSE

To Establish Psychopathologic Symptom Profile on the Basis of

PHENOMENOLOGIC EXPLORATION
&
OBJECTIVE PERFORMANCE TESTING

Limitations of Psychopathologic Symptom Profile in Terms of

PRACTICAL USEFULNESS
&
HEURISTIC IMPLICATIONS

Led to a Loss of Interest in General
Psychopathology by the 1950's

REVIVAL

Development of psychopharmacology and introduction of modern biochemical and neurophysiological instrumentation led to better understanding about the biologic substate of pathologic mental phenomena.

Increasing acceptance that identification of psychopathologic symptoms and signs plays a similar role in the diagnosis of mental illness as identification of signs and symptoms in the diagnosis of other medical illness (Galen) led to revival of interest in general psychopathology.

BASIC CONCEPTS: THE PSYCHIC REFLEX

Second Seminar

UNIT

Elementary Unit: Psychopathologic Symptom - Pathologic Subjective Experience
Psychopathologic Sign - Pathologic Objective Performance

Psychopathologic Symptom (Sign): Concept

Content - derived from past experience (subject matter a person talks about)

Form - characteristic of illness (how a person is talking, i.e., process)

PHENOMENOLOGY

Pathology of Subjective Experience

KANT	Critiques of Pure Reason	1781
	Practical Reason	1788
	Judgement	1790

Experience through senses provides only the surface of things PHENOMENON
Transcendental leap through the mind to know "the thing in itself" NOUMENON
Knowledge is the result of sensations and the activity of the mind that organizes them in time and space with the help of a priori (categories: quantity, quality, relation, modality) CATEGORIES

HUSSERL	Ideen zu einer reinen <u>Phänomenologie</u>	1913
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Phenomenology, or the study of subjective experience is the science that preceded all others
Phenomenology describes the form and content of subjective psychological experiences
Psychology "explains these experiences" and their "causal relationships"

DILTHEY		(1833-1911)
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Introduced the concept of understanding in psychology
Pointed out the need to understand individual as a whole
Contrasted "understanding" with analytical explanatory methods of natural science

DISCIPLINES WHICH DEAL WITH CONTENT

Empathic Psychology	". . . must think ourselves into his/her situation or try to understand why he/she is behaving in certain way . . ."
Interpretative Psychology	". . . ideas which have been obtained by empathizing with patient are formulated in terms of some general theory . . ."
Psychoanalytic Interpretative Psychology	". . . understanding of patient is formulated in terms of general theory derived to some extent from mythology ..."
Existentialist Interpretative Psychology (Binswanger 1958)	". . . understanding of patient is formulated in terms of general theory derived from the philosophy of Heidegger (1889 - 1976) . . ."

CLINICAL PSYCHIATRY: DEALING WITH FORM

DEFINITION: Mode -- perception, thought -- by which subject is presented with object

EXAMPLE: Hypochondriacal complaints, a content may appear in the form of bodily hallucinations, compulsive ideas, hypochondriacal delusions, etc.

PATIENT: deals with CONTENT
(Lay Person)

PSYCHIATRIST: deals with FORM
(Diagnostician)

Psychic life: total relational context in constant flux with patients
conscious state and mood
simultaneous presence (or quick succession) of same content in varied forms
not an agglomeration of isolated phenomena

Mental status: separate form from content
identify all different forms in which content (behavior) is presented to and (experienced or displayed by) patient
forms relevant to patient's illness clearer and sharper than others

REFLEX: HISTORICAL DEVELOPMENT

DESCARTES	1649	Introduced term (Des Passions de l'Ame)
WHYTT	1751	Adopted term into physiology (On the Vital and Other Involuntary Motions of Animals)
GRIESINGER	1843	Described psychic reflex
SECHENOV	1866	Extended concept of psychic reflex to include all activities of the brain (Reflexes of the Brain)
WERNICKE	1899	Adopted psychic reflex as the functional unit of psychiatric disease

WERNICKE'S CONCEPTUAL FRAMEWORK

Psychosensory Path

hyperesthesia

paresthesia

anesthesia

Intrapsychic Path

hyperfunction

parafunction

afunction

Psychomotor Path

hyperkinesia

parakinesia

akinesia

Consciousness
Integrating Function

Body - Somatopsyche
External World - Allopsyche
Personality - Autopsyche

NYIRO'S SYNTHESIS
(1958)

WERNICKE	1899 (1900)	Psychic Reflex (psychosensory, intrapsychic and psychomotor)
PAVLOV	1900	Conditional Reflex (differential and retarded inhibition)
JASPERS	1913	General Psychopathology (phenomenology)

MENTAL STRUCTURE

COGNITIVE
(Psychosensory)

RELATIONAL
(Intrapsychic)

ADAPTIVE
(Psychomotor)

Abstract Ideation

Ethical, Moral &
Social Emotions

Automatisms

Concrete Ideation
Image Formation

Intellectual Emotions
Sensorial Emotions

Voluntary Coordinations
Instinctual (Emotional)
Stereotypes

Differentiated Perception
Diffuse Sensation

Vital Emotions
Undifferentiated
Primitive Signal

Uncoordinated Activities
Simple Autonomic
Reflexes

CONSCIOUSNESS

SCREENING

INTEGRATION

Awareness - lowered
clouded
narrowed

Self - identity
integrity
boundaries

Attention - concentration
vigilance
tenacity

Memory - acquisition
retention
recall

PSYCHOPATHOLOGIC SYMPTOMS: BIOLOGIC SUBSTRATE

Recognition that psychopathologic symptoms are
accessible to pharmacologic manipulation
and control by psychotropic drugs

Psychotropic drugs are substances with an effect on
the transmission of impulses at the synaptic cleft

Psychopathologic symptoms are manifestations of
pathology in the processing of
experience in the brain

Recognition that the grouping of psychopathologic
symptoms at a particular point in
time alone does not express mental
illness as a whole

DISORDERS OF THE PSYCHOSENSORY PATH

Third Seminar

DEVELOPMENT OF CONCEPTS

GRIESINGER	1843	Psychic reflex described
WERNICKE	1899	Psychic reflex adopted Psychosensory path - (sensory area) Intrapsychic path - (association area) Psychomotor path - (motor area)
JASPERS	1913	General Psychopathology (terminology)
NYIRO	1958	Terminology adopted (pathology) Sensation Perception Ideation

CONCEPTUAL FRAMEWORK

In the development of "cognitive structure" (from "diffuse sensation" to "abstract ideas" differential inhibition plays a prominent role.

DIFFUSE SENSATION
Differential Inhibition
DIFFERENTIATED PERCEPTION
Differential Inhibition
IMAGE FORMATION
Differential Inhibition
IDEATION - CONCRETE
Differential Inhibition
IDEATION - ABSTRACT

MORPHOLOGY OF SENSATION

". . . primary phenomenon is the sensation produced by an impulse conducted by sensory nerves from external and internal world to CNS . . ."

The primary sensory center is modality specific:

visual	along the calcarine fissure in occipital lobe (Brodmann 17)
auditory	Heschl gyrus in the temporal lobe (Brodmann 41 & 42)
somatosensory	postcentral gyrus in parietal lobe (Brodmann 1, 2 & 3)

PATHOLOGY OF SENSATION

CHANGES IN INTENSITY

Hyperesthesia	hyperacusis	depression
Hypoesthesia	hypoacusis	delirium
Anesthesia	conversion	hysteria

SHIFTS IN QUALITY

Xanthopsia	yellow	treatment with "santonin"
Chloropsia	green	toxic substance
Erythropsia	red	pre-retinal vitreous hemorrhage

ALTERATIONS IN SPATIAL FORM

Dysmegalopsia		
Macropsia	object seen larger	delirium or
Micropsia	object seen smaller	temporal lobe lesion or
Porropsia	object seen farther	retinal disease

OTHER PATHOLOGY

Concomitant perception	sensation of color with musical note	normal (Franz Liszt) or schizophrenia
Splitting of perception	bird separated from chirruping	mescaline or schizophrenia

MORPHOLOGY OF PERCEPTION

". . . perceptions arise when new sensations activate traces of similar former sensations . . . the excitation induced by the sensation becomes restricted (differentially inhibited) . . ."

". . . content of perception is determined by the characteristics of the object, that through the sense organs/acts on parietal, temporal and/or occipital analysers of the brain . . ."

PATHOLOGY OF PERCEPTION

Esquirol (1838) subdivided false perceptions into

1. ILLUSIONS - distortion or misinterpretation of a real perception
2. HALLUCINATIONS - perceptual experience without corresponding stimulus in the environment

ILLUSIONS

". . . in all illusions stimuli from a perceived object are combined with a mental image . . . and all illusions are perceptions which are transpositions and distortions of real sensations . . ."

Illusions usually result from:

INATTENTIVENESS AFFECT	overlooking a misprint mistaking a tree trunk or a rock for a human when walking alone in woods	normal subjects normal subjects
FATIGUE	pareidolia - - sees vivid pictures in fire	normal subjects
ILLNESS	fantastic illusions - - sees the head of a pig instead of his/her own head in mirror	schizophrenic patients

HALLUCINATIONS: TRUE vs. PSEUDO

Perceptual Experiences without Corresponding Stimuli in the Environment

TRUE

PSEUDO (PALE)

Appears as Concrete Reality

Does not Appear as Concrete Reality

Has Character of Objectivity

Has Character of Subjectivity

Appears in External Objective
Space

Appears in Inner Subjective Space

Cannot Be Distinguished from
Real Perception

Can Be Distinguished from Real
Perception

Cannot Be Controlled Voluntarily

Can Be Controlled Voluntarily to
Some Extent

PALE

Griesinger

1845

Baillarger

1846

Kahlbaum

1866

PSEUDO

Hagen

1868

Kandinski -

1913

Jaspers

HALLUCINATIONS: SENSORY MODALITIES

AUDITORY	- Akoasmas (elementary)	Functional psychoses
	Phonemes (voices)	Organic functional psychoses
VISUAL	- Photomes (elementary)	Organic psychoses
	Scenic (elaborate)	Alcoholic delirium/schizophrenia
	Autoscopic (self)	Epileptic aura
	Extracampine (outside visual field)	Functional psychoses
OLFACTORY/GUSTATORY		Organic psychoses
		Temporal lobe epilepsy
		Schizophrenic subtypes
		Depressive subtypes
VESTIBULAR	- Flying through air	Acute organic states (delirium tremens)
	Sinking through the bed	Normal subjects
COENESTHETIC	- Formication (animals crawling)	Cocaine psychosis
	Sexual	Hypochondriacal depression
		Hypochondriacal paraphrenia
		Eccentric hebephrenia
	Phantom Limb	Amputees

HALLUCINATORY SYNDROMES

CONFUSIONAL HALLUCINOSIS	prominent visual hallucinations with clouded consciousness
SELF-REFERENCE HALLUCINOSIS	voices are talking about him/her, but cannot reproduce content
VERBAL-HALLUCINOSIS	voices are talking about him/her and can reproduce content
FANTASTIC HALLUCINOSIS	hallucinations with impossible content

HALLUCINATIONS; NORMALS vs. PSYCHOTICS

NORMALS

Phantom Limb (amputees)
Hypnagogic (going to sleep)
Hypnopompic (awakening from sleep)

PSYCHOTICS

Catatonic Schiz Command
Paraphrenic Schiz Fantastic

RESPONSE TO HALLUCINATIONS

DELIRIOUS PATIENTS Feel terrified
DEPRESSED PATIENTS Not bothered
PHONEMIC PARAPHRENICS Troubled by abusive content
HYPOCHONDRIACAL PARAPHRENICS Troubled by hearing voices
INCOHERENT PARAPHRENICS. Interact with voices

MORPHOLOGICAL SUBSTRATE OF HALLUCINATIONS

AUDITORY	Stimulation of first temporal convolution on both sides
VISUAL	Stimulation of visual projection areas in the walls of calcarine fissure (Brodmann areas 17, 18 and 19)
TACTILE	Stimulation of parietal cortex and adjacent subcortical area
GUSTATORY	Stimulation in the depth of the Sylvian fissure around the transverse temporal gyrus
MULTISENSORY (WITHOUT COENESTHESIAS)	Temporal lobe epilepsy (somatic sensory area is separated from temporal lobe by Sylvian fissure)

DISORDERS OF THINKING

Fourth Seminar

IDEAS

". . . ideas or concepts are at the highest level of the cognitive structural organization. They develop from perceptions through image formation . . ."

PERCEPTIONS

Perceptions are of concrete reality
They have a character of objectivity
Perceptions appear in external objective space
Perceptions are clearly delineated, are complete and detailed
Perceptions are constant and can easily be retained unaltered
Perceptions are independent of will and cannot be voluntarily recalled or changed
Perceptions are accepted with feeling of passivity

CONCEPTS - IDEAS

Ideas are figurative
They have a character of subjectivity
Ideas appear in inner subjective space
Ideas are not clearly delineated, are incomplete and crude
Ideas dissipate and have always to be recreated
Ideas are dependent on will and can be voluntarily recalled or altered
Ideas are produced with feeling of activity

THINKING

Thinking refers to any train of ideas and/or ideational activity initiated and directed to the solution of a problem.

Thinking differs from association of ideas by its goal directedness.

- Rational or Conceptual Thinking - Reality oriented and goal directed that attempts to solve a problem
- Imaginative Thinking - A form of rational thinking which even if not reality oriented it is goal directed and does not go beyond the rational and possible
- Dereistic or Autistic Thinking - Undirected fantasy thinking governed by personal needs and fantasies

DISORDERS OF THINKING

- Disorders of content - beliefs
- Disorders of form - reasoning

FORMAL THOUGHT
DISORDERS

Symbolization
 Use of Symbols
Stream of Thought
 Tempo
 Processing
 Continuity

CONTENT DISORDERS
OF THOUGHTS

Regressive Thinking
 Primary Incoherence
Overvalued Ideas
 Obsessive Thoughts
 Delusions

DISORDERS OF SYMBOLIZATION

Disorders of symbolization are disorders of the form of thinking which may lead to the formation of faulty concepts, the faulty use of symbols and/or idiosyncratic speech.

Formation of Faulty Concepts

Contamination	Fusing elements from two words into one word, e.g., surstonished from surprised and astonished
Condensation	Combination of more or less unrelated widely diverse ideas into one concept; two ideas with something in common are blended into a false concept

Faulty Use of Symbols

Concreteness	Using the concrete aspects of the concept instead of its symbolic meaning (e.g., "there's a stork clapping in my body", i.e., I am pregnant)
Substitution	Replacement of a familiar concept with an unusual one

Idiosyncratic Speech

Neologisms	Building new words in which the usual language conventions are not observed
Onomatopoesis	Building new phrases (language) in which the usual language conventions are not observed

DISORDERS OF TEMPO

Disorders of tempo are disorders of the form of thinking which may lead to acceleration or deceleration of thinking process.

ACCELERATION (in mania)

Accelerated thinking

Increase in the number of ideas and in the flow of ideas with voluble speech

Prolixity

Ordered flight of ideas

Flight of Ideas

Ideas flow so rapidly that sentences are not complete because thinking is continuously interrupted by diverse associations - often clang associations

Pressured thinking

Flight of ideas subjectively experienced

Secondary incoherence

Thoughts and speech as a result of acceleration have no longer understandable connections

DECELERATION

Retarded thinking (depression)

Thinking is slowing down

Inhibited thinking (schizophrenia)

Thinking is slowed down (by force)

DISORDERS OF PROCESSING

Disorders of processing are disorders of the form of thinking which may lead to a variety of characteristic manifestations.

Alogia	No new thoughts emerge	Schizophrenia
Restricted Thinking	Poverty of ideas	Depression
Rumination	Endless repetitions of and/or incessant concern with unpleasant thoughts	Depression
Circumstantial	Overbearing elaboration on insignificant details without losing track	Neuropsychiatric disorders Early dementia Epilepsy
Overinclusive	Cannot maintain boundaries of determining idea	Schizophrenia
Tangential	Talking past the point	Schizophrenia
Derailment	Slips into new direction	Schizophrenia
Drivelling	Grammar and syntax good but content is utter drivel	Schizophrenia
Asyndetic	Lack of causal links (vague)	Schizophrenia
Primary Incoherence	Thought and speech has no understandable connections	Schizophrenia
Agrammatism	Less necessary words are omitted	Schizophrenia
Omission	Part of thought is dropped	Schizophrenia

DISORDERS OF CONTINUITY

Disorders of continuity are disorders of the form of thinking which interfere with the proceeding toward determining idea (goal).

Thought Blocking	Sudden interruptions in the flow of thought process without obvious reason	Schizophrenia
Perseveration	Persistent repetition of words, phrases or sentences	Coarse brain disease
Verbigeration	Severe form of perseveration; through the repetition the words, phrases or sentences become senseless and meaningless	Coarse brain disease
Palilalia	Form of perseveration characterized by repetition with increasing speed but diminishing audibility	Alzheimer's disease
Logoclonia	Form of perseveration in which the last syllable of the last word is repeated	Alzheimer's disease

DISORDERS OF CONTENT

Disorders of content of thought refers to pathologically overvalued ideas which include

OBSESSIVE THOUGHTS DELUSIONS

Obsessive thoughts: Thoughts which persist against one's will. Their persistence and penetrance is senseless and meaningless. (Prevalent in obsessional disorders)

Delusions: False beliefs based on a priori evidence, which are unaffected by reasonable demonstration of their untruth and are not in keeping with one's sociocultural background. Delusions are contradictions of reality which are not supported by the collective beliefs and concepts of mankind. (Present in psychoses)

DELUSIONS

Formal Aspects:	Onset (origin) -	delusional mood delusional perception sudden delusional ideas
	Course -	fleeting persistent
	Intensity -	delusional dynamics
	Outcome -	unsystematized systematized interpretative passionate
Content:	Reference (schizophrenia, delusional disorder)	
	Love (erotomania) (delusional disorder)	
	Persecution (litigious) (delusional disorder, schizophrenia)	
	Jealousy (delusional disorder)	
	Guilt (depression)	
	Grandeur (mania)	
	Nihilistic (schizophrenia, depression)	
	Hypochondriacal (schizophrenia, depression)	

PRIMARY vs. SECONDARY

Primary
or
True

Secondary
or
Delusional
or
Delusion-like
ideas
(may result from mood)

Result from Delusional mood

- affect which forms the background of delusional experience. An atmosphere of perplexity and involvement in which one feels that "something is in the air"

Delusional perceptions -

a normally perceived event endowed with abnormal significance; a delusional misinterpretation of a real perception.

Sudden delusional ideas -

out of the blue experience of a delusional notion

STRUCTURE ANALYSIS

- First Axis - constituting elements
Paralogical or bizarre
vs.
Logical or non-bizarre
- Second Axis - in relationship to mood state
Mood incongruent
vs.
Mood congruent
- Third Axis - in relationship to environment
- Autistic - patient lives exclusively in delusional world
 - Polarized - delusional ideas meshed with real world
 - Delusions in juxtaposition - independent coexistence of real and delusional world
- Fourth Axis - in relationship to reality
Impossible
vs.
Implausible

DISORDERS OF INTRAPSYCHIC PATH

Fifth Seminar

INTRAPSYCHIC PATH
Relational or Emotional

Emotions
are

subjectively experienced psychic phenomena in which one's relations to his/her external and internal experiences are reflected (Emotions are immediate subjective relational responses; feelings are the subjective experience of emotions)

COGNITIVE
(Psychosensory)

Diffuse Sensation
Differentiated Perception
Image Formation
Concrete Ideation
Abstract Ideation

RELATIONAL
(Intrapsychic)

Undifferentiated Primitive Signal
Vital (including Instinctual) Emotions
Sensorial Emotions
Intellectual Emotions
Ethical, Moral & Social Emotions

CHARACTERISTICS OF EMOTIONS

Source

Range

Accessibility

Quality

Intensity

Duration

Effects (or effectiveness)

SOURCE AND RANGE OF EMOTIONS

SOURCE	Sensorial emotions	Instinctual Vital Sensory - Perceptual
	Activity emotions	
	Intellectual emotions	
RANGE	Restriction (Constriction) Conditions:	Mental Subnormality Organic Dementias Schizophrenias Depressions

ACCESSIBILITY OF EMOTIONS

APATHY	(Negative Pole)	Inaccessibility of emotions with absence of feelings (psychoses)
ANXIETY	(Positive Pole)	Extreme accessibility of emotions with feelings of apprehension and physiologic arousal (neuroses)
FEAR		Reaction to identifiable external danger
PHOBIA		Persistent fear reactions to specific external stimuli which are not rationally recognized as threatening
FREE FLOATING ANXIETY		Persistent anxiety that is unrelated to external stimuli
PANIC		Spontaneous attacks of intense anxiety

QUALITY OF EMOTIONS

POLARITY of Emotions

VITAL Emotions

tired - fit
limp - vigorous
weak - strong
ill - healthy

Euphoria vs. Dysphoria

OTHER Emotions

Pleasant vs. Unpleasant
(Signaling Reward) (Signaling Punishment)

AMBIVALENCE of Emotions

Coexistence of opposite feelings with regard to a person or situation

INAPPROPRIATE Emotions

Emotional response discordant with the content of speech

INTENSITY OF EMOTIONS

Sensorial > Activity > Intellectual

- BLUNTED - observable decrease in emotional responsiveness (emotional indifference)
- FLAT - severe blunting with lack of signs of emotional expression (e.g., immobile face, monotonous speech)

DURATION OF EMOTIONS

Sensorial < Activity < Intellectual

EMOTIONAL RIGIDITY	Persistence of emotions without modulation or oscillation regardless of external situation
EMOTIONAL PERSEVERATION	Persistence of certain emotions (e.g., anger) over extended periods (epilepsy)
EMOTIONAL LABILITY	Rapid and abrupt shifts in emotions
EMOTIONAL INCONTINENCE	Extreme form of lability with lack of control (SDAT & MID)

EFFECTS (EFFECTIVENESS) OF EMOTIONS

NORMAL	Changes in autonomic (vegetative) nervous system activity Changes in endocrine system activity
PATHOLOGICAL	Narrowed (restricted) consciousness Affective amnestic transformation Katathymic changes

MORPHOLOGIC SUBSTRATE OF EMOTIONS

AROUSAL	intensity of feelings		Reticular Activating System
EMOTION	quality of feelings		Limbic System
APPERCEPTION	cognitive evaluation of feelings		Neocortex
LIMBIC SYSTEM	1939	PAPEZ	anterior thalamus (dorsomedial nuclei) cingulate gyrus septum hypothalamus hippocampus amygdala

DEFINITION OF MOOD

Emotions are relations which depend on the presence of an object, while mood is independent of object although it may affect the subjects relations (experienced in the emotions) to the object.

Mood is not just an integral sum of simultaneously present emotions or an emotion of prolonged duration.

MOOD IS A CERTAIN FEELING TONE WHICH UNDERLIES ALL OUR EXPERIENCES.

POLARITY OF MOOD

Negative Pole
Dysthymia

Middle Position
Euthymia

Positive Pole
Hyperthymia

Quantitative Pathology:

- (1) Morbid Depression
- (2) Morbid Elation

Qualitative Pathology:

- (3) Morbid Anxiety
- (4) Irritability
- (5) Expansiveness
- (6) Perplexity
- (7) Delusional Mood
- (8) Parathymic Mood

MORBID DEPRESSION

A state of lowered affect, a mood of prevailing sadness which predetermines one's perceptual, cognitive and emotional experiences with an effect on overt behavior

Characteristic Symptoms: Feelings of

- Inadequacy
- Guilt
- Impoverishment
- Loss of vitality
- Loss of feelings
- Complaintativeness

Morbid Sadness may be associated with Morbid Thinking which may reach Delusional Intensity

MORBID ELATION

A state of heightened affect, a mood of prevailing joy and pleasure, which transforms all experiences. It is a positively tinged affective state which covers a wide spectrum of feelings.

Characteristic Symptoms: Euphoria
Cheerful thoughts
Exaggerated self esteem
Lack of consideration for others
Faulty judgement

Morbid Elation may be associated with Morbid Thinking which may reach Delusional Intensity

OTHER DISORDERS OF MOOD

- Anxious - Feeling of apprehension and psychologic arousal (from mild unease to intense dread); associated with anticipation of impending calamity or disaster
- Irritable - Feeling of tension; easily annoyed and provoked to anger
- Expansive - Lack of restraint in one's feelings; overvaluation of one's significance or importance
- Perplexed - A mood of uncertainty or puzzlement ("What's the matter? What is happening? I don't understand")
- Delusional - Background of delusional experience ("Something is in the air, something's about to happen")
- Parathymic - Paradoxical mood (e.g., laughing while describing torment)

MOOD STATES AND DIAGNOSIS

Dysthymic/Hyperthymic

Affective Disorders

Anxious

Anxiety Disorders

Perplexed

Mixed (or Cycloid) Psychoses

Delusional

Schizophrenic Disorders

MORPHOLOGICAL SUBSTRATE OF MOOD

Original Proposition

Reserpine produces depression (early 1950's)
depletion and inactivation of NE centrally
depletion and inactivation of 5HT centrally
central cholinomimetic

Imipramine lifts depression (late 1950's)
NE re-uptake inhibition
5HT re-uptake inhibition
central anticholinergic

Revised Proposition

Antidepressants Bind with high affinity to ACh muscarinic receptors
Highly significant correlation between potencies of
TA's for inhibition of ³H-Imipramine binding
sites and inhibition of ³H-5HT uptake sites
Beta-adrenergic receptor down regulation (up-
regulation by reserpine) and down regulation of
NA transmission

Pharmacological manipulation of mood - Reserpine
Cyclic Antidepressants
MAOI's
Lithium

DISORDERS OF THE PSYCHOMOTOR PATH

Sixth Seminar

STRUCTURAL CONNECTIONS

Psychosensory

Diffuse Sensation
Differentiates Perception
Image Formation

Ideation - Concrete
Ideation Abstract

Psychomotor

Simple Autonomic Reflexes
Uncoordinated Activities
Instinctual (Emotional)
Stereotypes
Voluntary Coordinations
Automatisms

Intrapsychic

Undifferentiated Primitive Signal
Vital Emotions
Sensorial Emotions

Intellectual Emotions
Ethical, Moral & Social Emotions

Psychomotor

Simple Autonomic Reflexes
Uncoordinated Activities
Instinctual (Emotional)
Stereotypes
Voluntary Coordinations
Automatisms

NEUROLOGIC vs. PSYCHIATRIC

Neurology

- Well defined neurologic signs
- Intrinsically linked to structural impairment of the brain
- Indicating the site of the lesion

Psychiatry

- Ill defined changes in the formal characteristics of psychomotility
- In the absence of structural impairment of the brain
- Interpretable only within the context of a well defined mental illness

CONCEPTUALIZATION

Phenomenologic (German)

Disorders of Drive
and
Psychomotility

(Drive is
perceived as the
energizing force,
i.e., the impetus
behind the tempo,
intensity and
endurance of
psychologic
performances that
is independent of
will)

Behavioral (American)

Motor Behavior
and
Catatonic Syndrome

Social (British)

Motor Disorders
Adaptive Movements
Non-adaptive
Movements
Motor Speech
Posture
Abnormal Complex
Patterns

PHENOMENOLOGIC APPROACH: DRIVE

Disorders of drive are dealt with primary consideration of patient's subjective experience, i.e., within a phenomenological context

1. Lack of drive
 - Feeling of deficient energy and/or initiative
 - Subjectively experienced
 - Objectively observed
2. Increased drive
 - Feeling of increased energy and/or initiative
 - Subjectively experienced
 - Objectively observed
3. Inhibition of drive
 - Feeling of being slowed down (without the feeling of deficient energy and/or initiative)
 - Subjectively experienced as braking once energy and/or initiative in such a forceful manner that is not possible to overcome the restraint
 - Objectively observed as slowed down - braking
4. Motor restlessness
 - Feeling that one must move (without the feeling of increased energy and/or initiative)
 - Subjectively experienced as unpleasant and that it is difficult to overcome it
 - Objectively observed as aimless and purposeless motor activity with or without (circumscribed) locomotion

PHENOMENOLOGIC APPROACH: PSYCHOMOTILITY

Disorders of psychomotility are dealt with almost exclusively on the basis of the formal characteristics of motor behavior

1. Mutism • Parsimonious speech or the absence of speech
2. Logorrhea • Voluble speech (comprehensible or incomprehensible)
3. Mannerisms • Natural--expressive--movements, such as gestures, facial expression and speech, are exaggerated, posed and/or baroque
4. Histrionics • Natural--reactive--movements are theatrical and/or demonstrative
5. Parakinesis • Qualitatively abnormal complex movements which often affect gestures, facial expressions or speech

PHENOMENOLOGIC APPROACH: PARAKINESIAS

- A. 1. Posturing • Assuming odd posture
- 2. Waxy flexibility • Allows to be placed in odd postures
- 3. Catalepsy • Maintaining odd posture
- B. 4. Motor stereotypy • Tendency to repeat--in exactly the same form and often for a long time--spontaneous speech or motoric expressions
- 5. Automatic acts • The carrying out of acts of behavior spontaneously, i.e., automatically, without perceiving in having them carried out intentionally
- C. 6. Echo symptoms • The immediate and involuntary repetition of words (Echolalia) and/or acts (Echopraxia) displayed by someone in proximity
- 7. Automatic obedience • The immediate and involuntary following of commands

BEHAVIORAL APPROACH: MOTOR BEHAVIOR
Quantitative Changes in Behavior

- Stupor • Extreme form of hypoactivity
- Hypoactivity • Decreased frequency of activities
• Goal directed (activity)
- Excitement • Extreme form of hyperactivity
• Interrupts one activity to begin with another
- Agitation • Increased frequency of motor behavior
• Non-goal directed
- Restlessness
 Circumscribed • e.g., hand rubbing, foot stepping
 General • e.g., pacing
- Catatonic Activity • Periods of extreme
 HYPERACTIVITY (excitement)
 and/or
 HYPOACTIVITY (stupor)

BEHAVIORAL APPROACH: CATATONIC SYNDROME
Qualitative Changes in Behavior

- A. 1. Unresponsive • Passive Negativism
- 2. Gegenhalten • Active Negativism
Oppositional
Resist with equal strength for
being moved
- B. 3. Flat face • Expressionless face
- 4. Mutism • Lack of responsiveness
- C. 5. Posturing • Assuming odd postures
- Grimacing • Mild form of facial posturing
- Snout cramp • Severe form of facial
posturing
- 6. Waxy flexibility
- 7. Catalepsy
- D. 8. Stereotypy • Repetitive non-goal directed
behavior (different
definition)
It is not experienced as
foolish (distinct from
obsessive-compulsive
behavior)
- E. 9. Echolalia • Repetition of words displayed
by someone in proximity
- 10. Echopraxia • Repetition of acts displayed
by someone in proximity
- F. 11. Automatic obedience
- 12. Mitgehen • Going with
Cooperation
Non-verbal automatic obedience
Responds to light pressure
even if instructed to the
contrary
- 13. Mitmachen • Making with
Non-verbal automatic obedience
The cooperation followed by
slow return to prior
position

SOCIAL APPROACH: ADAPTIVE MOVEMENTS

A. Disorders of Expressive Movements

1. Diminished
or
Absent
2. Excessive
or
Exaggerated
3. Tearfulness
4. Grimacing
5. Snout Spasm
6. Athanassio's Omega Sign Greek letter "Omega" (Ω)
in the forehead above
the root of the nose
(excessive action of
corrugator muscle)
7. Veraguth's Fold Main fold in the upper
lid is angulated
upwards and backwards
at the junction of the
inner third with the
middle third of the
fold

B. Disorders of Reactive Movements

8. Diminished
or
Lost
9. Increase in the startle reflex

C. Disorders of Goal-Directed Movements

10. Psychomotor retardation
11. Obstruction Psychomotor inhibition
Sperrung
Reaction at the last
moment (Kleist)

SOCIAL APPROACH: NON-ADAPTIVE MOVEMENTS

A. Spontaneous Movements

1. Stereotypy
2. Parakinesis • Continuous irregular movements of the musculature (different definition)
3. Handling • Touching and handling everything within reach
4. Intertwining • Continuously intertwining fingers, grasps clothes and kneads a small piece of cloth

B. Abnormal Induced Movements

5. Automatic Obedience
6. Echopraxia
7. Forced Grasping • Magnet reaction (Kleist)
8. Mitgehen
9. Mitmachen
10. Opposition
11. Ambitendency • Presence of opposing tendencies to action
12. Adversion • Turning towards examiner
13. Aversion • Turning away from examiner

SOCIAL APPROACH: SPEECH

Motor Speech Disorders

1. Muteness
2. Voluble Speech • Speak excessively and nonstop
3. Wurgstimme • Whispers or speaks with a
strange strangled voice
• Lack of intonation
4. Monotonous • *Lack of modulation*
5. Echolalia

SOCIAL APPROACH: POSTURE

Disorders of Posture

- | | | |
|----|-----------------------------------|---|
| 1. | Flexibilitas Cereae
(Wernicke) | Waxy flexibility |
| 2. | Catalepsy | Maintenance of odd
postures |
| 3. | <u>Psychological Pillow</u> | • Lies with head two or
three inches off the
pillow |

SOCIAL APPROACH: COMPLEX PATTERNS

Non-Goal Directed

- Stupor
(Bumke) • A state of more or less complete
loss of activity with no reaction
→ to external stimuli
- Catatonic • Dead-pan facial expression
• Changes in muscle tone
• Catalepsy
• Stereotypes
• Urinary incontinence
- Depressive • Depressive faces
• Normal muscle tone
• Response to emotional stimuli
• Absence of incontinence

Goal Directed

- Compulsive Rituals • Repetition of particular activity
to ensure that it is properly
done

CONSCIOUSNESS: DISORDERS OF SCREENING AND ATTENTION

Seventh Seminar

CONSCIOUSNESS: ORIGINAL DEFINITION

In psychic (mental) life everything is connected with everything else and each element is colored by the state and content within which it occurs.

An analysis of an individual case cannot consist simply in breaking up the situation into its elements, but needs to have a constant referral to the psychic state as a whole.

JASPERS (1913): Refers to the "state of consciousness" as the "momentary whole" of the "psychic state".

CONSCIOUSNESS: CURRENT DEFINITION

State of Awareness of the SELF and the ENVIRONMENT.

One may distinguish the **CONTENT** of consciousness from the
ACTIVITY of consciousness which entails
the functions of: **SCREENING**
INTEGRATION

DISORDERS OF CONSCIOUSNESS

Disorders of consciousness are manifest in the following states of consciousness:

- a. LOWERED (depressed)
- b. HEIGHTENED (expanded)
- c. CLOUDED (dream-like)
- d. RESTRICTED (narrowed)

LOWERED CONSCIOUSNESS

Lowered consciousness is experienced as a rise in the threshold of incoming stimuli resulting in a situation in which patients respond poorly or not at all to environmental contingents.

Level of awareness are: BENOMENHEIT
SOMNOLENCE
SOPOR (TORPOR)
PRECOMA
COMA

HEIGHTENED CONSCIOUSNESS

Heightened or expanded consciousness refers to an intensified awareness of inner and outer events and is seen in:

AURA to precede EPILEPTIC ATTACK
PRELUDE for development of COMPULSIVE STATES

Special forms of expanded consciousness are:

ECSTASY

Meditation
Drug induced

DISTORTED CONSCIOUSNESS

Endogenous psychoses
schizophrenia
mania
Pharmacologically induced

CLOUDED CONSCIOUSNESS

Clouded consciousness may be displayed in 1 of 3 forms:

ONEROID STATE

Dream-like state of consciousness. Seen in:
Bouffee delirante
Oneirophrenia
Physical illness
Induced by tea or coffee

SUBACUTE DELIRIOUS STATE

Confusional state with incoherence of thinking and disintegration of mental faculties. Seen in:
Toxic confusional state
Senescence (Sundowner)
Senility (PDDAT, MID)

DELIRIUM

Inability to distinguish between mental images and perceptions; illusions, hallucinations with severe anxiety and restlessness (more severe at night). Seen in:
Symptomatic psychoses
Organic dementias

NARROWED CONSCIOUSNESS

Break in the continuity of consciousness with restriction of what enters into consciousness. Seen in: HYSTERIA
EPILEPSY

The two closely related forms of narrowed consciousness are:

TWILIGHT STATE
FUGUE STATE

Break in continuity
Ordered twilight state

MORPHOLOGY OF CONSCIOUSNESS

LATERAL LEMNISCAL PATHWAYS	Conduction of sensory impulses which contribute to perception, recognition, localization and qualitative discrimination of stimuli
MEDIAL LEMNISCAL PATHWAYS (Ascending Reticular System)	Screening incoming information and integration of incoming information with continuously changing background of internal (somatic) and external (environmental) data Initiation and maintenance of conscious state

DRUGS AND CONSCIOUSNESS

ANTICHOLINERGIC DRUGS Atropine	Produce manifestations related to integrative function of consciousness: Mental disintegration Toxic confusional state Delirium
CHOLINERGIC DRUGS Physostigmine	Corrects atropine-induced disintegration
SEDATIVES Barbiturates	Decreases arousal reaction to peripheral and direct stimuli
NEUROLEPTICS Chlorpromazine	Decrease arousal reaction to peripheral stimuli only Increase of screening function SCHIZOPHRENIA: Favorable effect NORMAL: Somnolence SENILITY: Confusion

ATTENTION: DEFINITION

The field of clear consciousness within the total conscious state is termed the FIELD OF ATTENTION

Constellation of consciousness in which sensorial perceptions are foremost

ACTIVE AND PASSIVE ATTENTION

Active

Passive

Purposeful Focusing
on some
External or Internal Event

One or Another Object
Becomes
Center of Consciousness Spontaneously

Diminished

Decreased

Diminished Ability to Maintain
and
Focus Attention on Topic

Attention Wanders
from
One Object to Another

Distractable

Diminished active
or
Decreased passive
attention

DISORDERS OF ATTENTION

Disorders of attention are displayed in one or more of the following variables:

CONCENTRATION	Ability to exclude all associations irrelevant to a certain theme
Disturbance	Inability to focus on a topic and remain focused
TENACITY	Ability to keep one's attention focused on a certain subject continuously
Disturbance	Decreased ability to keep one's attention focused on a certain subject Decreased ability to distract one's attention from a certain subject
VIGILANCE	Ability to direct one's attention to a new subject
Disturbance	Hypervigilance Hypovigilance

PATHOLOGY OF ATTENTION

Hyperprosexia:	hypervigilance with hypotenacity
Hypoprosexia:	hypovigilance with hypotenacity

CONSCIOUSNESS: DISORDERS OF INTEGRATION AND MEMORY

Eighth Seminar

DISORDERS OF THE SELF

EGO refers to the SELF which in the course of its development grows aware of itself (PERSONALITY)

SELF AWARENESS or SELF REFLECTION at every moment and across time is the highest integrative function of consciousness

Disorders of the self are displayed on 1 of 4 parameters:

1. UNITY
2. IDENTITY
3. BOUNDARIES
4. INTEGRITY

UNITY OF THE SELF

The oneness of the self (ego) at any moment of time.

Disorders of the Unity of the Self:

Simultaneous Presence: BEING IN TWO
BEING DOUBLES

Disorders: Schizophrenias

IDENTITY OF THE SELF

The sameness of the self (ego), i.e., one's identity, through the passage of time.

Disorders of the Identity of The Self: BEING BORN AGAIN
TRANSFORMATION DELUSIONS
Lycanthropy
Other Sex

Disorders: Schizophrenias
Dissociative
Disorders

INTEGRITY OF THE SELF

Experiencing psychic manifestations as they were not one's own, but alien, automatic and/or coming from elsewhere.

Disorders of the Integrity of the Self (Schneider's First Rank Symptoms):

- THOUGHT INSERTION
- THOUGHT WITHDRAWAL
- AUDIBLE THOUGHTS
- THOUGHT BROADCASTING
- THOUGHT ALIENATION

Disorders: Schizophrenias

BOUNDARIES OF THE SELF

Experiencing one's self as distinct from environment.

Disorders of the Boundaries of the Self:

DEREALIZATION The experience that one's environment being unreal, strange or otherwise changed

DEPERSONALIZATION The experience that one's self is being unreal, detached, strange, changed or unidentifiable

Disorder: Panic Disorder
Phobix - Anxiety - Depersonalization
Syndrome (Roth)

DISORDERS OF PSYCHIC INTEGRATION

Integration of experiences from the outer world, one's own body and one's self; and orientation regarding the outer world, one's own body and one's self.

<u>VARIABLES</u>	<u>INTEGRATION</u>	<u>ORIENTATION</u>
ALLOPSYCHIC	Experiences from the outer world	Time Place Person
SOMATOPSYCHIC	Experiences from one's own body	Body
AUTOPSYCHIC	Experiences from one's self	Self
	Orientation Disorders:	Disorientation in Situation Double Orientation
	Disorders of (Integration):	
	Allopsychic:	Exogenous Psychoses
	Somatopsychic:	Somatization disorders
	Autopsychic:	Dissociative disorders
	Disorders of (Orientation):	
	Neuropsychiatric Disorders (Dementias)	

MEMORY: DEFINITION

General term to denote the conscious revival of past experiences.

Refers to specific reflections of the experience in subjects thoughts which are revived.

The three phases of the "memory" are:

REGISTRATION	Acquisition Learning Memorization
RETENTION	(Engram)
RECALL	

DISORDERS OF REGISTRATION

Amnesias are memory gaps; they are perceived as disorders of Memorization or Registration.

There is no memorization if consciousness is lost; and depending on the time relationship between the loss of consciousness and lack of memorization one may distinguish among:

ANTEROGRADE AMNESIA
CONGRADE AMNESIA
RETROGRADE AMNESIA

Other amnesias:

SYSTEMATIZED (specific to content). . . psychogenic

DISORDERS OF RETENTION

Reduction or loss of ability to retain previously learned material:
 Focal Cerebral Pathology
 Generalized Cerebral Pathology

DISORDERS OF RECALL

Difficulty or loss in the recollection of facts or events.

Abnormality of Form: Hypomnesia - Decreased
Hypermnesia - Increased
Conditions: Hyperpyrexia
Life-threatening
situation
Drug-induced

Pathology of Content: Distortion of Memories
Distortion of Recognition

DISTORTION OF MEMORIES

Distortions or falsifications of memories are referred to as paramnesias. Paramnesias include:

ECMMESIA	Disturbance in time sequencing of past Seen: Emotionally loaded states Senility
RETROSPECTIVE FALSIFICATION	Distortion of memories from past Seen: Affective Disorders
DELUSIONAL MEMORIES	Backdating one's delusions
CONFABULATION	Filling in memory gaps with imagined or supposedly experienced events Seen: Organic states
PSEUDOLOGIA FANTASTICA	Pathological lying Seen: Psychopathy

DISTORTION OF RECOGNITION

FALSE RECOGNITIONS - Deja - Vu (Aura)
Jamais - Vu

MISIDENTIFICATIONS - Positive (strangers as friends)
Negative (friends as strangers)
In cycloid and schizophrenic psychoses

CAPGRAS SYNDROME - Person is double of person he
claims to be

AMPHITYRON ILLUSION - Believes that spouses are double

SOSIAS ILLUSION - Believes that other people are
doubles

KORSAKOFF PSYCHOSIS

Amnesia - Disturbance of Memorization
Allopsychic Disorientation - Time, Space & Person
Confabulations - Filling in of Memory Gaps
Impairment - Lack of Spontaneity & Absent Insight

Pathology: Lesion of mammillary bodies
dorsomedial thalamic nuclei
diencephalon
region of 3rd & 4th ventricles
along the pathway of monoamine
containing neurons: low CSF-NE conc
low CSF-MHPG conc

Related to absolute or relative thiamine (B₁) deficiency.
Associated with abnormality of transketolase, a thiamine regulated enzyme.

Seen: Chronic Alcoholism
Aged

BIOLOGY OF MEMORY

Learning involves a synthesis of mRNA with a highly specific base composition, and the synthesis of certain specific acidic protein fractions, the biochemical substrates of memory (Hyden, 1970).

Drugs which inhibit protein synthesis e.g., puromycin, impair memory storage.