Luria's Theory of Higher Cortical Functions

- The concept of function equivalent to complex functional systems distributed in broad areas of the brain

Luria's Theory of Higher Cortical Functions

- The functional system is the collaboration of specific, cortical elements ensuring the operation of the functional system

Luria's Theory of Higher Cortical Functions

- If "function", defined as the function of a specific tissue, is to be "localized" in a specific area of the secretory system or the nervous system, the "functional system" obviously cannot be "localized" in a specific area of cerebral tissue.

Definition of a Functional System

- Brain functioning is not localized in a specific area of cerebral tissue, but is distributed in a constellation of cooperating zones of the cerebral cortex and the sub-cortical structures

Luria's Theory of Higher Cortical Functions

- There are three fundamental areas of the brain which necessarily participate in any, even the least complex, psychological activity, each of which exerts a special influence in the organization of psychological processes

Luria's Theory of Higher Cortical Functions

- 1.
- The first general part includes the apparatus of the upper brain stem and the limbic cortex, designating the area of tonus or the energy area.

Luria's Theory of Higher Cortical Function

2.

The second part includes the posterior areas of the cortex (occipital, parietal, temporal), designating the area for reception, processing, and storage of information

Luria's Theory of Higher Cortical Functions

3.

The third part includes the frontal cortex, designating the area for programming, regulation, and control of movements and activity

The Luria Neuropsychological Investigation

The goal is

- A qualification of deficits
- An analysis of the factors underlying these deficits

Luria's Neuropsychological Investigation

- A: A qualitative investigation
- B: A specific method and an adequate analysis
- C: The goal, to obtain a thorough qualification of syndromes

During the second World War in the Soviet Union Luria developed his investigation method in a rehabilitation hospital in the Urals.

- Soldiers were investigated in accordance with the theory
- Rehabilitative interventions were planned .

Luria's Theory of Rehabilitation

- Two types of disturbances were described
- A: Inactivation
- B: Irreversible damage

The Theories of A.R. Luria

Anne-Lise Christensen
San Sebastian May 2003

- Application for Assessment
- Application for Rehabilitation

Luria's Theory of Higher Cortical Functions

- The higher psychological processes represent complex functional systems
- They are social in their genesis
- Mediated by language in their structure
- Conscious in their performance

Luris's Theory of Rehabilitation

- Inactivation:
- Functions reactivated in their original form through deinhibition
- Pharmacological treatment
- Training and relearning

Luria's Theory of Rehabilitation

- Irreversibel Damage:
- A: Activation of intact neural elements
- B: Change of function to intact neural constructs
- C: Creation of new neural constructs

Luria's Theory of Rehabilitation

- Reconstruction of function by means of functional reorganization:
- A: Intrasystemic reorganization
- B: Intersystemic reorganization

Luria's Theory of Rehabilitation

Complications of reorganization:

- A: Lack of motivation
- B: Anatomical destruction
- C: Inhibition of development of new functional systems

The Influence of A.R.Luria on Western Neuropsychology:

- Luria´s Neuropsychological Investigation
- Luria´s Theory of Rehabilitation

The Introduction of Luria´s Theory and Method in Neurology and Neurosurgery (1)

- A theoretically based neuropsychological method became available:
- Psychological processes are investigated in their organization - not as
- Processes based on preconceived classifications of ”functions”

The Introduction of Luria´s Theory and Method in Neurology and Neurosurgery (2)

- A method that is compatible with: neurological terminology
- Objective neuroradiological techniques and
- Neurosurgical operation techniques

Luria´s Neuropsychological Investigation (LNI) (1)

- A qualitative analysis of the level of functioning
- Combining symptoms into syndromes
- Recognizing the uniqueness of the individual
- Identification of disturbed functions
- Clarifying coping mechanisms

Luria´s Neuropsychological Investigation (LNI) 2

- Applicable at the patient´s bedside
- Meaningful to the patient
- Providing feedback
- Teaching compensation

Christensen, A-L.: Luria’s Neuropsychological Investigation, Munksgaard, 1974

Kolb and Wishaw: Advantages (1)

- The Luria procedure is based on theoretical principles of neuropsychological functioning, making the interpretation a logical conclusion of the theory

Kolb and Wishaw: Advantages (2)

- The Luria procedure is thorough, inexpensive, easy to administer, flexible, and brief, taking only about 1 hour to administer

Kolb and Wishaw: Advantages (3)

The Luria procedure measures the actual behavior of the subject rather than inferred cognitive processes, thus making interpretation more straightforward

Kolb and Wishaw: Disadvantages (1)

- The scoring is subjective and is based on clinical experience. It is unlikely that a novice to neuropsychology or neurology could easily master the interpretation without extensive training. On the other hand, experienced neuropsychologists or neurologists ought to find the battery easy to learn

Kolb and Wishaw: Disadvantages (2)

- Because the manual that accompanies the battery offers no validation studies, it must be taken on faith that the tests really measure what Luria claim.This criticism is the most serious, because most Western neuropsychologists are likely to continue to use psychometric assessment tools reporting validation studies

LNI as the Basic Tool in Rehabilitation

- Provides insight into intact as well as disturbed functions
- Can be verified by Teuber´s Double Dissociation Principle
- Makes it possible to distinguish between primary and secondary disturbances
- Implies a phenomenological approach

Introduction of rehabilitation into a neurosurgical department

- Investigating patients with the LNI
- Qualifying symptoms into syndromes
- Planning rehabilitative intervention
- Treating patients according to Luria’s theoretical method
- Follow up over time

Influence and inspiration from USA

- Attending Lance Trexler's conferences in Indianapolis
- Visiting George Prigatano's program in Oklahoma
- Visiting Yehuda Ben Ishay's program at N.Y. University, Medical School

The Founding of CRBI at the University of Copenhagen 1985

- A three year grant from the Egmont Foundation
- Location at the University of Copenhagen
- The Planning of a Day Program running for one semester
- Creation of the interdisciplinary team

Original Goal of the CRBI

- " The purpose of the institution is to undertake neuropsychological investigations and treatment in the service of rehabilitating brain-injured persons, and at the same time perform research and teaching within the area"

Rehabilitation options

- The centers day program
- A reduced program (i.e. less hours, smaller groups) most often offered to older "students"
- Advisory assistance, specific education, assessment

Referrals sources

- Neurosurgical and neurological departments
- General physicians
- Municipality systems

Referral system (1)

- Evaluation of application by a review committee

  - consisting of the center's director, secretary and a neuropsychologist from the team and
  - a consulting neurosurgeon
  - a consulting neurologist
  - a consulting psychiatrist

Referral system (2)

- Preliminary assessment cognitively, emotionally, physically
- Report based on the teams observations
- Discussed with the student
- Sent to primary physician
- Referral source
- Social case worker

Acceptance to program

- Agreement of payment from referral source
- Student's acceptance of collaboration with:
  - the team
  - the allocated "primary therapist"
  - fellow students

Planning of individual program

- Luria' Neuropsychological Investigation (LNI)
- European Brain Injury Questionnaire (EBIQ) students and a relative
- Physical examination
- Thorough Anamnesis
- Tools for individually specific needs

CRBI day program

- A course at the University
- 4 month
- 4 days weekly
- 8 months follow-up (or as needed)

Rehabilitation goals

- To plan a rehabilitation program for the individual person
- To obtain integration in his/her family
- To achieve social integration/ education, work
- To achieve participation in leisure activities and social life

The multidisciplinary team

- Neuropsychologists
- Physiotherapists
- Teachers and speech and language therapists
- Occupational therapists
- Consulting medical staff
- Administration staff

Program activities

- Cognitive activities
- Physical activities
- Social activities
- Psychotherapeutical sessions
- Individual activities
- Family interaction
- Work preparation

Role of primary therapist

- Close interaction with the student regarding the findings of the preliminary evaluation
- Defining the rehabilitation plan together with the student through ongoing contact with all contributing team members
- Continuous hypothesis testing and feed back in the work with the student

Responsibilities of the primary therapist (1)

- Completion of collecting research data from the student and the family
- Systematizing data for clinical planning
- Contact to primary physician
- Contact to social system
- Collecting information about social situation

Collaboration with family members (2)

- Contact to partners and children
  - to parents and siblings
  - to close friends
- Invitations to the centers parties
  - a welcome and in the end a farewell reception
  - to individual meetings if wanted

Collaboration with place of education or work

- Contact to former situation: school, university or work
- Supported work initiation
- Follow-up

Course of rehabilitation

- Initial evaluation
- Progress reports
- Concluding evaluation
- Making plans for the immediate future
- Follow up sessions

Special program interventions

- Morning meeting
- Various projects, adapted to individuals or small groups
- Participation in social affairs

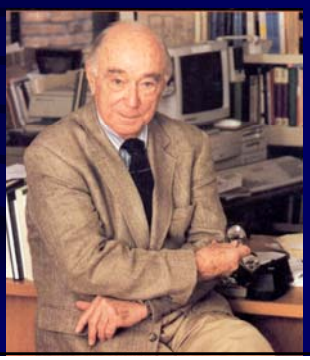
Theoretical implications for the program content and planning

- Kurt Goldstein´s Organismic Theory
- Jerome S. Bruner´s Concepts of Cognition and Education
- Donald G. Stein´s Research on Neurorecovery Mechanisms and Brain Plasticity and his Contextual View on Individual Variables

Statements from Goldstein

- Disordered behavior and anxiety are the objective of danger in which the organism is when it is no longer able to actualize its essential and subjective expressions of the situation capabilities i.e. to ”exist”
- Understanding and analyzing symptoms of brain injury is a psychological task

Jerome S. Bruner



Bruner´s View

- Acquired knowledge most useful, when ”discovered” through the learner´s own cognitive efforts
- Facilitated by the structure of knowledge
- The object of instruction not coverage but depth
- A guide to understanding

Donald Stein´s recommendations

- Early treatment
- Combined pharmacological and psychological intervention
- Careful attention to past history, health status, age and experience
- Supportive environment
- Particular schedules for men and women

Basic rehabilitation principles at CRBI from 1985 -1998 (1)

- Based on a thorough medical, scientific background
- Based on thorough clinical and dynamic evaluations and individual planning
- Respecting the individual differences
- Timed according to level of insight
- Including current and premorbid functions

Basic rehabilitation principles at CRBI (2)

- Paying attention to the physical state and condition
- Including hopes and goals for the future
- On the whole integrating the fund of knowledge that psychology has provided from cultural and social psychology, cognition, education and psychotherapy

First outcome study

- The grant a three-year trial
- The demand to continue was the obtainment of public payment
- A socio- economic study was initiated to measure outcome with respect to:
  - living conditions
  - work
  - leisure activities

Profile of 106 Students at CRBI 1985-1988

(Christensen, Pinner, Teasdale et al.)

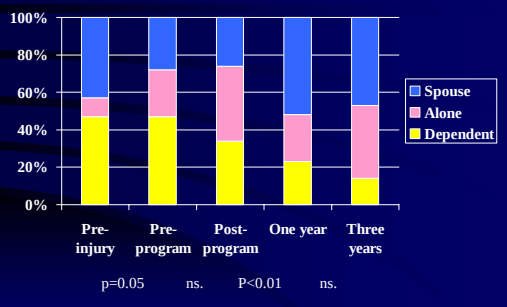
Type of injury	No.	%
TBI	75	42.6
CVA	68	40.2
Others	26	17.2
Males	103	60.9
Females	66	39.1

Profile of 106 Students at CRBI 1985-1988

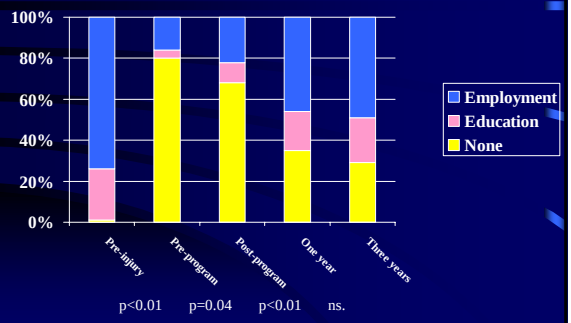
(Christensen, Pinner, Teasdale et al.)

Age at injury:	Median	31.3 years
	Quartile Range	19.5-40.81
Time since injury:	Median	1.9 years
	Quartile Range	1.2-2.9
Hospitalisation:	Median	74 days
	Quartile Range	30-161

Domestic Situation



Occupation



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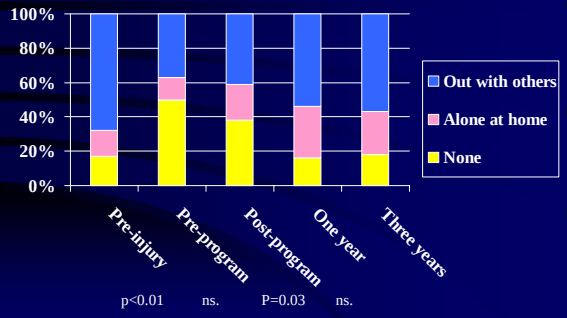
Leisure Activities



p<0.01 ns. P=0.03 ns.

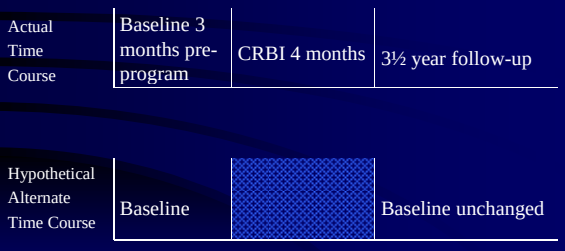
Persons with Brain Injury
Center for Rehabilitation of Brain Injury

N=20 (program 1987)

Males	10	50%
Females	10	50%
TBI	11	55%
CVA	6	30%
Other	3	15%

	Mean	SD	Range
Age at Injury (years)	24.4	8.9	8 – 40
Coma Duration (days)	17.6	12.3	1 – 42
Hospitalization Duration (days)	153	138	21 – 395
Time to Program Entry (years)	3.0	2.4	0.7 – 9.6

Study Design
Tracking Public Financial Support in the Health, Social and Educational Sectors



Combined sector savings up to 3½ years post-program

Health	4360 $
Social	15630 $
Education	8071 $
Total	28061 $
CRBI cost	30230 $
Net saving per patient	**-2170 $**

NB employment is not calculated (11 were in work)

CONCLUSION

The cost of the rehabilitation program may be substantially regained 3½ years after program

Net projected saving 5 years after program: 9860 $ per patient

Cognitive function (1989-92)

(Teasdale et al.)

No = 55	Males: 33	TBI: 22
	Females: 22	CVA: 19
		Other: 14

Age at injury	30.9	(13.2)
Hospitalization (days)	78.2	(68.3)
Coma duration (days)	6.7	(6.6)
Time since injury	3.3	(1.5)

Employment at follow-up: work/edu: 58%
no work: 42% (External tester)

Conclusions

- Significant improvement in 6 of 10 tests but never reaching normal levels
- No correlation between gains on test and employment/education
- Those in work/education a little better test scores pre-programs

The Main Issues

- Importance of a thorough and personalized anamnesis
- Attention to the brain injured persons own goals
- Creating motivation for a dynamic development and growth adapted to current insight

The Main Issues

- Availability of a close follow up
- Support and belief in improvement from:
  - the therapist
  - the family
  - society

SØREN KIRKEGAARD
Danish philosopher
1810-1855

- If one is to succeed in guiding a person from one state to another, one must first ensure that one can identify where the person is to be found and start there. This is the secret of helping.
- **All true helping begins with humility.**
- The helper must first humble him/herself to the person that he/she wishes to assist and from this position understand that helping is not to dominate but to serve.

The Claim of Luria

- Preserving the whole wealth of living reality in diagnostics and treatment is of most importance (1977)