Neurocognitive Issues
Section 4

THE ESSENTIAL BRAIN INJURY GUIDE

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Cognitive Complications
Chapter 10

Learning Objectives
- Be familiar with the 5 subtypes of attention
- Gain an understanding of the concepts involved in cognitive rehabilitation
- Be able to distinguish between the 4 types of memory
- Be able to describe the type of damage sustained by TBI that results in delays in information processing
- Be able to articulate the type of damage sustained by TBI that results in delays in information processing
- Be able to articulate the type of damage sustained by TBI that results in delays in information processing

Over 5 million Americans experience disabilities due to brain injury

Long-term care and supervision may be required for persons with brain injury due to cognitive and communication dysfunction, leading to increased caregiver burden and cost of care

Cognitive Impairments
- Include difficulties with:
  - Attention
  - Memory
  - Problem-solving
  - Decision-making
  - and other areas of cognition that can impact a person’s ability to participate in activities of daily living
Cognitive Impairments can Impact:
- Level of independence
- Educational or vocational engagement
- Social interaction
- Family interaction
- Life satisfaction

Remediation can improve a person’s ability to engage in social interactions, recreation, and productive activities like work and school.

What is Cognition?
It is a complex collection of conscious mental activities, such as attention, perception, comprehension, remembering, or using language.

Cognitive Skills and Processes
- Alertness
- Association
- Attention
- Attention Span
- Awareness
- Categorizing
- Comprehension
- Decision-making
- Insight
- Learning
- Maintenance of sequential goal-directed behavior with self-correction
- Maintenance of temporal order of stimuli
- Memory
- Organizing
- Planning
- Problem-solving
- Retention
- Selective Attention
- Stimuli Recognition
- Stimuli Discrimination
- Synthesis of Information
- Thinking

Fundamental cognitive processes, such as sensory perception, attention, information processing, and memory underlie more complex cognitive processes, like categorization, problem solving, reasoning, and abstract thought.

Retraining of fundamental cognitive processes can result in reorganization of higher level or more complex cognitive processes.

For example... damage to the attention network of the brain will affect attention and also memory functions.

Domains of Cognitive Functioning
- Attention
- Comprehension
- Decision-making
- Learning
- Memory
- Organizing
- Planning
- Problem-solving

Attention
- One of the most fundamental cognitive skill sets
- Influences all other cognitive skills
- Deficits in this area are common after brain injury

ATTENTION
### Deficits of Attention

- Rehabilitation interventions for attention deficits vary as a function of the component of attention or the system to be targeted.
- Interventions can include a focus on sharpening the skill with distracters present, as well as training a person with a brain injury to recognize what distracts them and then look for ways to minimize the distractions.
- Retraining systematically increases the level of distracters in an environment to simulate high-level demands.

### Attention Process Training Program (APT)

- A process-specific approach to Cognitive Rehabilitation.
- Hierarchically organized by difficulty.
- Persons progress to a higher level when the easier task is mastered.
- Begins with sustained attention tasks and progresses to selective, alternating, and divided attention.
- Shown to result in improved memory performance in persons with brain injuries.

### Categorization

- **Deficits in categorization can interfere with:**
  - The initiation and performance of ADLs.
  - The acquisition, processing, and learning of new information.
  - Such problems solving and decision-making.
- **Categorization skills are important in:**
  - Speed of processing.
  - Problem solving.
  - Other higher-order cognitive processes (e.g., decision making).

- Individuals with brain injuries tend to base decisions about category membership according to a single attribute and have difficulty responding to more complex and multidimensional stimuli.

### The Categorization Program

- Therapeutic approach aimed at remediating deficits.
- Focuses on categorization.
- Program goals:
  - Improves basic attribute identification and selection.
  - Progresses to higher-level concept formation and rule-based decision-making.

- **Program Tasks**
  - Basic attribute identification and selection.
  - Progresses to higher-level concept formation and rule-based decision-making.

### Categorization Remediation
Memory impairments can arise from difficulty in the encoding, storage or retrieval of information.

**Memory Processes**
- **Sensory Memory**: Holds sensory information for a few seconds after perception.
- **Short Term Memory**: Enables recall of information that lasts a few minutes to hours. Example: the color of a car that just passed you.
- **Working Memory**: Is a central cognitive process responsible for the temporary storage and active processing of information. Example: calculating change in your head.
- **Long Term Memory**: Involves permanent consolidation and storage of information, often lasting a lifetime.

**Sensory Memory**
- Holds information from the senses for a few seconds immediately after the item is perceived.
- There are five sensory memory senses:
  - Taste
  - Vision
  - Touch
  - Hearing
  - Smell

**Short Term & Working Memory**
- **Short Term Memory**: Enables recall of information that lasts a few minutes to hours. Example: the color of a car that just passed you.
- **Working Memory**: Is a central cognitive process responsible for the temporary storage and active processing of information. Example: calculating change in your head.

**Long Term Memory**
- Involves permanent consolidation and storage of information, often lasting a lifetime.
- It is divided into explicit and implicit memory.
Procedural memory allows people to remember how to tie their shoes or ride a bike without consciously thinking about it (i.e. muscle memory).

Cognitive skill memory is for procedures necessary to win a game or solve a problem.

Explicit memory is information that can be consciously declared and is known as semantic memory or episodic memory.

Semantic memory includes general knowledge or facts about the world.

Episodic memory includes personal, autobiographical recollections of experiences.

Processing Speed
- Cognitive reaction time, or the time it takes a person to gather the information presented, process it, and respond.
- When impaired, the rate at which new information can be attended to and later recalled is also impaired.
- Must be targeted across all cognitive skills.

Executive Functions
- Complex cognitive processes that involve reasoning, planning, judgment, intuition, and abstract thinking.
- Injury can result in problems with:
  - Abstract thought
  - Analyzing all aspects of a situation
  - Considering all potential solutions to a problem
  - Executing those solutions
  - Maintaining cognitive flexibility if one solution does not work
  - Self-monitoring
**Executive Skills**

- Individuals with executive functioning deficits often exhibit:
  - Impulsivity
  - Disinhibition
  - Hyper-verbosity
  - Poor control of emotions

- Cognitive Rehabilitation approaches include teaching individuals to use formal problem solving strategies, which include:
  - Approaching novel situations in a systematic manner
  - Analyzing problems
  - Considering alternative solutions
  - Prioritizing solutions
  - Reviewing the outcomes

**Metacognition**

Metacognition is a higher-order, self-reflective function that includes awareness of one's own cognitive processing. There are three levels of impairment in metacognition:

1. Awareness of deficits caused by the injury
   - For example, memory deficits, delays in processing speed
2. Awareness of the functional implications of these deficits
3. Awareness to set realistic goals

**Metacognitive Strategy Training**

- Used to enhance an individual's ability to internalize awareness and control over behaviors
- The primary goal of metacognitive strategy training is to enhance a person's ability to internalize awareness and control over their behavior

**Metacognition & Executive Function**

- Metacognition is conceptualized as a higher order, self-efficacious, cognitive function
- It has an integrative role for other areas of executive functioning (e.g., self-monitoring and information processing)
- Executive functioning and metacognition are not the same processes
- Executive functioning and metacognition do depend on each other - for example
  - An individual can be aware of the struggles they are having with problem solving (intact metacognition), however they may be unable to successfully solve problems (deficit in executive function)

**Executive Functions**

- Diminished self-awareness and failure to recognize a personal disability
- Reduction in self-awareness can have important consequences for outcomes, including:
  - Compliance with rehabilitation
  - Ability to return to independent living
Cognitive function is widely distributed across many regions and structures of the brain.

Frontal Systems
- Emotional control
- Behavioral control
- Verbal expression
- Problem solving
- Decision-making
- Visual control
- Motivation
- Attention

Temporal Systems
- Memory
- Face recognition
- Selective attention
- Locating objects

Parietal Systems
- Object recognition
- receptive language
- Emotional responses
- Language comprehension

Occipital Systems
- Visual stimuli processing

Limbic Systems
- Emotional control
- Behavioral control
- Verbal expression
- Problem solving
- Decision-making
- Visual control
- Motivation
- Attention
- Verbal expression
- Problem solving
- Decision-making
- Social control
- Motivation
- Attention

Factors that interfere with cognitive function following a brain injury:
- Hearing
  - An estimated 44% for non-blast injuries and 62% in blast-related injuries
  - Hearing loss contributes to confusion and deficits in attention and memory
- Vision
  - Prone or susceptible to dysfunction and important to assess

Common Factors that Interfere with Cognitive Function Following a Brain Injury:

Communicative Functions
- Expressive aphasia
  - Refers to the ability to communicate language
- Receptive aphasia
  - Refers to the ability to understand language

Apraxia
- An oral motor speech disorder when an individual cannot translate what they want to say into motor plans to initiate speech
- Dysarthria
  - Muscle weakness that affects speech production

Medical stability
- Medical issues, such as metabolic, pulmonary, endocrine, and sleep dysfunction can compromise cognition

Impairments of emotional & behavioral control can result directly from:
- Damage sustained directly to the brain
- Difficulties adjusting to deficits
- Pre-existing psychological factors
- A combination of these factors

Interfering Factors with Cognitive Function

Co-morbid conditions can impact treatment participation and interfere with cognitive rehabilitation, thereby impacting overall outcomes

Interfering Factors with Cognitive Function

Depression is a common co-morbid condition to brain injury
- Aggression, irritability non-compliance, and emotional lability are commonly seen after frontal lobe damage
- It is important to consider all factors (physical, language and speech, neurologic, and emotional/behavioral) when providing cognitive rehabilitation

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Models of Cognitive Rehabilitation

Compensatory Approach
- Assumes certain cognitive functions cannot be recovered due to damage
- Focuses on development of strategies to accommodate limitations. For example, external devices such as planners, checklists, smart phones
- A functional application is essential

Restorative Approach
- Repeated exposure and repetition of stimulation through experience can change brain's circuitry and reorganization of the brain can occur
- Uses therapeutic exercises designed to reestablish or strengthen specific cognitive skills or processes

Compensatory and restorative approaches are used together to maximize recovery of function after brain injury

Principles of Cognitive Rehabilitation

1. Environmental Stimulus
2. Task Complexity
3. Cognitive Distance (Quiet to Distracting) (Simple to Complex) (Concrete to Abstract)

- When addressing cognitive deficits it is important to view both cognitive skills and their remediation as hierarchical and interrelated
- Basic cognitive skills should be addressed before higher level cognitive skills
- When treating cognition, less complex treatments should supersede treatments of greater complexity
- A hierarchical approach should target attention, perception, categorization, abstract thinking, and memory to restore/reorganize impaired cognition
- Examples include Attention Process Training and the Categorization Program

Overall Principles

Task Complexity
- Begins with single step, simple tasks, and progresses to more complex multi-step tasks as each simpler task is mastered
- Can be decreased or increased depending on the individual’s accuracy and time on task

Overall Principles

Cognitive Distance
- This concept relates to the complexity of information available
- As proximity to the object decreases, available information decreases. In this example, as we get farther away from the red apple, less and less information is available

Overall Principles

Spoken
- Color
- Black & White
- Line
- Word
- Apple
Efficacy for Cognitive Rehabilitation has developed primarily in the last 10-15 years. Cognitive Rehabilitation is a crucial component to brain injury rehabilitation. Extensive reviews of literature have occurred and clinical practice guidelines have been developed. It is essential that interventions must generalize to the “real world” outside of the clinical setting. The disciplines that provide this essential service vary across the U.S.

Neurobehavioral Complications
Chapter 11

Learning Objectives

- Be able to distinguish between positive and negative reinforcement
- Be able to articulate the concept and purpose behind functional analysis
- Be able to identify and define common neurobehavioral complications of brain injury
- Be able to discuss common neurobehavioral treatment interventions
- Be able to explain crisis prevention & behavior management strategies for individuals with a brain injury
- Be able to articulate the concept and purpose behind a functional analysis
- Be able to define common neurobehavioral complications of brain injury

Introduction

- Neurobehavioral issues are often considered to be the most problematic consequence of brain injury by family members, employers, friends, and others.
- Behaviors can impair support systems and opportunities, resulting in loneliness and isolation. For some, the consequences are more severe and can result in incarceration, homelessness, psychiatric hospitalization, substance abuse, and victimization.
- Certified Brain Injury Specialists can play a critical role in implementing and evaluating the effectiveness of interventions.

Factors Influencing Behavior

- Site and severity of damage
- Pre-injury characteristics of personality
- Intelligence and learning style
- The current environment

Common Neurobehavioral Changes after Brain Injury

- Aggression
- Agitation/irritability, poor frustration tolerance
- Poor initiation/apathy
- Denial of deficits/poor self-awareness
- Disinhibition/inappropriate sexual behavior
- Eating disturbances
- Emotional changes including flat/restricted emotions, lability, dysphoria, depression
- Impulsivity
- Poor judgment and reasoning
- Psychosis - delusions, euphoria, hallucinations
- Nighttime disturbances
- Anxiety
Coma-Emergent Agitation

- Treatment of individuals in this stage of recovery can incorporate both medication and behavior-based interventions.
- Prior to admission, the staff must assess and organize a safe environment.
- The focus is on offering a quiet, organized, structured environment with limited and carefully managed stimulation.

The Stability Triangle

The Stability Triangle provides a guiding philosophy for the development of a comprehensive treatment plan.

- The triangle specifies three primary interventions: medication, environment, and activity plan.
- It is applied in an ongoing manner to support individualized rehabilitation and recovery.
- The basic structure is interdependent, yet without any one side, stability is ultimately or indeterminately lost.

Establish Medical Stability

- The following factors are important as they influence how an individual interacts with their environment:
  - Pain
  - Sleep disturbance
  - Incontinence
  - Drug or alcohol use
  - Vomiting
  - Seizure disorders
  - Inadequate or inappropriate medication use
  - Limited opportunities for meaningful engagement in routine activities are natural enemies to stability.

Develop Stable Activity Plan

- The team must look toward helping an individual to explore and develop a stable activity plan.
- They must be proactive in providing education and support associated with specific activities and settings, and work to minimize all related risks.
Applied Behavior Analysis

- The goal of applied behavior analysis is to discover variables that reliably influence behavior to predict behavior or promote behavior change.
- There are three variables that must be considered:
  - The Individual
  - The Target Behavior
  - The Environment

The Individual

- Cognitive and physical impact of brain injury, stages of recovery and other factors such as pain or physical impairment greatly influence how the individual can interact with the environment.

The Environment

- Environmental factors include what has occurred and/or is currently occurring around the individual, both before and after the behavior of interest is displayed.

   - This can include:
     - Light
     - Noise
     - Temperature
     - Smell
     - Who is in the room
     - Activities occurring

The Target Behavior

- Must be defined in objective and measurable terms so that it can be examined in a consistent and systematic manner.

Understanding the function of a behavior means to understand the purpose that the behavior serves for the individual in a particular situation.
Behavior Program Elements

- In order to implement a behavior change procedure, it is critical to identify the behavior that is targeted for change.
- In order to appropriately measure a behavior, it must be operationally defined.
- The behavior must be:
  - Observable
  - Measurable
  - Specific enough such that multiple observers would agree on what would count as an occurrence

- Topography and intensity are two dimensions of a behavior that will be important to take into account when creating an operational definition.
- Topography is what the behavior looks like physically.
- Intensity is a description or measure of force.

Functional Assessment

The behavior must be:
- Specific enough such that multiple observers would agree on what would count as an occurrence.
- Measureable
- Observable

- In order to appropriately measure a behavior, it must be operationally defined.

- Functional Analysis

- Define Target Behavior
- Collect Data
- Assess Behavior
- Change Behavior

Behavior Program Elements

- Define Target Behavior
- Collect Data
- Assess Behavior
- Change Behavior

Four Term Contingency

- Establishing Operation:
  - Any variable that temporarily alters the effectiveness of some stimulus or event as a reinforcer.

- Discriminative Stimulus:
  - Any event or stimulus that precedes a response and sets the stimulus or event as a reinforcer.

- Response/Behavior:
  - Anything that can be done and measured.

- Consequence:
  - Any variable that temporarily alters the effectiveness of some stimulus.

Four Term Contingency Examples

- Example 1
  - Establishing Operation:
    - Mary was told she has a physical therapy session which alleviates significant orthopedic pain.
  - Discriminative Stimulus:
    - At 9:45, she is told she has a physical therapy session.
  - Response/Behavior:
    - Mary yells at staff.
  - Consequence:
    - Staff removes her from the center, and she misses her physical therapy session.

- Example 2
  - Establishing Operation:
    - Mary was given her 9am pain medication which alleviates significant orthopedic pain.
  - Discriminative Stimulus:
    - Mary was not given her 9am pain medication.
  - Response/Behavior:
    - Mary is told she has a physical therapy session.
  - Consequence:
    - Mary attends her physical therapy session.

Behavior Program Elements

Assessment Methods

- Functional Assessment
  - The goal is to understand the function of the behavior for the individual in a situation.
  - Identifying the function of a particular behavior within a specific situation is essential to the development and implementation of an effective behavior change procedure.
  - A good assessment should include a list of behaviors that will be targeted for decrease and increase.

Behavior Program Elements

- Frequency
  - Count how many times a specific behavior occurs
  - Frequency counts are often used for behaviors which have a clear start and end (e.g., number of times someone rings a call bell, whereas other events, or events that do not have a specific start and end (e.g., yelling). In these cases, duration may be a more accurate measure.

- Rate
  - Count per unit of time.
  - Frequency alone can be misleading. For example, the statement ‘John spits on the floor twice’ does not tell us enough information. Was it twice within the last hour, within the last day, or within the last four years? Measures of rate can help bring perspective to frequency counts.

- Duration
  - How long the behavior lasts from start to end.
  - Sometimes behaviors can be hard to count. Such assessment behaviors do not have a specific start and end (e.g., yelling). In these cases, duration may be a more accurate measure.

- Latency
  - Establishing latency becomes important when the time between stimulus and response is an element of interest (e.g., prolonged hand washing).

- Correct
  - The number of correct responses out of the total possible number of responses.
  - This measure is crucial when teaching new skills. Examples can include the number of times a task is performed correctly by completing a sequence task out of the number of times that the task is presented.

Behavior Program Elements

- Operational Definition
  - Determine Data to Collect
  - There are indirect (interview of family, checks by others) and direct methods for behavioral assessment.
  - Direct methods are more reliable.
  - Functional assessments use direct methods.

Behavior Program Elements

Data

- Frequency
  - Count how many times a specific behavior occurs.
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Behavior Program Elements

- Proactive approaches to behavior change
  - Establishing operations and antecedents precede the behavior
  - They contribute to or influence the occurrences of the behavior
  - Consequences follow the behavior
  - They alter the likelihood of the behavior occurring in the future

With proactive approaches, interventions are set up to reduce the likelihood of the behavior occurring. This is done by addressing the establishing operations and antecedents.

In the example in the previous slide, ensuring Mary had her pain medications was a proactive approach to decrease the likelihood of the target behavior (outburst in the lobby).

Proactive approaches to behavior change:
- Establishing operations and antecedents precede the behavior.
- They contribute to or influence the occurrences of the behavior.
- Consequences follow the behavior.
- They alter the likelihood of the behavior occurring in the future.

Consequence Based Intervention

- Punishment: any process that decreases the likelihood that a particular response will occur again in the future.
  - Negative Punishment: There is the removal of a stimulus. This decreases the likelihood that the response will occur again.
  - Positive Punishment: There is the addition of a stimulus. This decreases the likelihood that the response will occur again.

- Reinforcement: any process that increases the likelihood that a particular response will occur again in the future.
  - Negative Reinforcement: There is the removal of a stimulus. This increases the likelihood that the response will occur again.
  - Positive Reinforcement: There is the addition of a stimulus. This increases the likelihood that the response will occur again.

Schedules of Reinforcement

- Extinction: A particular response never produces a reinforcer.
- The disappearance of a previously learned behavior when the behavior is no longer reinforced.
- Behavior almost always increases before it goes away.

- Intermittent Reinforcement: A particular response sometimes produces a reinforcer.
- Continuous Reinforcement: A particular response always produces a reinforcer.
Continuous Reinforcement
- Produces less variability in topography of behavior
- Utilized to promote acquisition of behavior
- Behavior is highly sensitive to extinction
- Think piece work and soda machines

Intermittent Reinforcement
- Produces greater variability in topography of behavior
- Utilized to promote generalization and maintenance of behavior
- Behavior is highly resistant to extinction
- Think hourly pay and slot machines

Task Analysis
A task analysis is a list of very specific steps involved in completing a task.
This can be used to break down larger tasks into smaller component steps.

Prompting & Cueing
A process by which an individual is supported to display a correct response.

Shaping
A technique in which successively closer approximations to the target response are reinforced until the target response occurs.

Fading
Fading is the process by which one learns to produce the same response under gradually changing conditions, in a manner implied by the same name of the procedure.
Fading involves providing gradually less support either from the environment or from another individual to display the target behavior.

Teaching a child to read the word "Apple".
1. Pair the word "Apple" with the red apple picture.
2. When the child can correctly name "Apple", then prompt with the black & white apple.
3. When the child can correctly name "Apple", then prompt with the outlined apple.
4. When the child can correctly name "Apple", fade out the apple picture altogether and leave just the word.

Stand  |  Sit  |  Lay Down  |  Roll  |  Roll Over
**Generalization**

- When an organism responds similarly to different/un-trained stimuli or situations

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**Discrimination:**

When an organism responds differently to similar stimuli

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**Other Communication Considerations**

- Personal space
- Body posture and motion
- Facial expression and gaze
- Tone, volume, and cadence of speech

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**Crisis Intervention**

- **Expectations**
  - All staff should be trained in de-escalation skills and crisis intervention
  - This should include guidelines for effective and supportive non-verbal and para-verbal behavior

- **De-escalation Techniques**
  - Active Listening
  - Orientation
  - Redirection
  - Setting Limits
  - Withdrawing Attention
  - Contracting

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**When De-escalation Techniques Fail...**

- CBS staff are sometimes required to take physical action to keep individuals with brain injuries and themselves safe
- A situation is considered a crisis when immediate risk is posed to the individual or other persons
- There are many legal and ethical considerations that must be accounted for when individuals and facilities decide to employ physical intervention techniques including restraint and seclusion

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**Restraint & Seclusion**

- They are interventions of last resort
- Used when less restricted measures are exhausted
- Only when individual or others are in imminent danger
- Highly regulated
- Poses risks to individuals and staff
- Those implementing these techniques can be held personally accountable
- Always followed by medical attention for the individual, debriefing, and formal documentation
CBIS Considerations

- Remain objective and neutral in the face of problem behaviors
- Avoid labeling individuals and their behaviors
- Behaviors are related to brain injury factors (e.g., communication difficulties, lack of awareness, pain, etc.); they are not personal
- Daily activities of the CBIS involve:
  - Observation & reporting
  - Data collection
  - Implementation of strategies and approaches

Learning Objectives

- Be able to distinguish between restorative and compensatory approaches to cognitive treatment
- Be able to summarize the contributions of Gall and Spurzheim in the development of modern neuropsychology
- Be able to discuss the concept of the functional systems model
- Be able to identify the four components of cognitive rehabilitation

General History

- There is a long history of interest in brain behavior relationships
  - Trepanning: dates back to the Mesolithic period, similar to the modern practices of creating burr holes in the skull to relieve intracranial pressure
  - Phrenology: Developed by Gall and Spurzheim; it was believed that different parts of the human cortex controlled different mental functions

Neuropsychology

- Alexander Luria proposed that localization of functions cannot solely explain behavior
  - He proposed the Functional Systems Model
  - Behaviors consist of a number of simple mental operations that are located to a specific part of the brain
  - Thoughts, movements, sensations, and emotions are dependent on the collaboration of the local brain sites that control the mental operations comprising it

What is Neuropsychology?

- Neuropsychology is the science of brain-behavior relationships

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology</td>
<td>Focuses on understanding behavior without always considering the role of the nervous system</td>
</tr>
<tr>
<td>Neurology</td>
<td>Focuses on the functioning of the nervous system without always considering its effect on behavior</td>
</tr>
<tr>
<td>Neuropsychology</td>
<td>Focuses on how the two interact</td>
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</tbody>
</table>
**Functional Systems**

Brain activity is the result of a system of activity.

- Local areas are specialized for processing.
- These areas processes work together.
- Assemblies of smaller units of processing make up larger units and networks.
- In this way multiple inputs can be processed into a set of complex behaviors.

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**Clinical vs. Experimental Neuropsychology: Differences in approaches**

<table>
<thead>
<tr>
<th>Experimental</th>
<th>Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intact Brains</td>
<td>Testing is used to study healthy brains throughout the lifespan.</td>
</tr>
<tr>
<td>Brains with Lesions</td>
<td>Testing is used to relate behavior changes to lesion sites.</td>
</tr>
</tbody>
</table>

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**Neuropsychology Assessment Purpose**

Results of a neuropsychological evaluation provide a detailed description of the individual's abilities, strengths, and weaknesses in various areas of functioning.

- Determine the nature and extent of cognitive deficits, including patterns of functioning in developmental and many psychiatric disorders.
- Determine the presence of a neurologically based disorder.
- Understand how specific cognitive deficits may contribute to problems in daily life.
- Establish a baseline and document skills at a specific point in time, to compare to future assessments.
- Determine the nature and degree of change in cognitive performance on re-assessment.
- Assist in treatment planning.
- Determine the appropriateness of a surgical intervention.
- Make recommendations for modifications or accommodations in the community.

**Scope of a Neuropsychology Assessment**

Comprehensive assessments assess multiple cognitive domains, and the scope of evaluations can vary depending on need:

- Premorbid functioning – used to compare a person's current and expected level of performance.
- Attention and concentration.
- Sensory perception and psychomotor functioning.
- Information processing speed.
- Language and communication skills.
- Visuospatial and constructional skills.
- Intelligence (intellectual achievement).
- Executive functions.
- Additional factors that can affect cognitive functioning, including mood, anxiety, personality, behavior, medications, effort and motivation.

**Assessment Instruments**

- There are standard protocols for the administration of each assessment.
- They are completed in a standardized fashion, involving two key principles.
- Manually procedures:
  - There are standard protocols for the administration of each assessment.
  - This increases the chance that a score is representative of the individual's ability, and not the impact of other factors.
- Normative Data:
  - When assessments are complete, the individual's scores are referenced against normative data.
  - Norms represent a range of typical performance in a population of healthy individuals.

**The Assessment Process**

- Assessment begins with a Record Review.
- Sometimes this involves a great deal of useful information:
  - Past medical record.
  - Results of prior assessments.
  - Imaging.
- Specific details regarding behavioral and functional impairments.
The Assessment Process

- The Clinical Interview typically covers:
  - Referral information
  - Presenting complaints
  - Developmental history
  - Educational and vocational background
  - Psychosocial history
  - Medical history
  - Family history
  - Substance use and current medications
  - Current level of functioning

- Standardized Testing has two general approaches - fixed battery and flexible battery:
  - The fixed battery approach involves an exhaustive battery of standardized, co-normed tests to thoroughly cover every functional domain.
  - The flexible battery is a patient-tailored hypothesis-testing approach, and involves selection of assessment instruments based on careful consideration of the referral question and impressions from the initial interview.

The Assessment Process

- Background information gathered from the referral source, medical records, and interview:
  - Behavioral observations (appearance, speech, gait, mood, affect, thought processes)
  - Factors relevant to test validity (awareness, effort, motivation, comprehension of test instructions, mood disturbance, gross motor skills)
  - List of administered tests
  - Description and interpretation of the patient’s performance on tasks within each cognitive domain assessed
  - Summary, including the patient’s cognitive strengths and weaknesses, clinical impression, potential neuropsychological involvement, functional implications, and diagnosis, conclusions
  - Recommendations for treatment and further assessment

The Assessment Process

Cognitive Rehabilitation

- Cognitive Education focuses on developing a patient’s awareness of cognitive and functional deficits through education on weaknesses and strengths.
- Cognitive Training focuses on resolving the cognitive and functional deficits through the application of restorative approaches.
- Strategy Training focuses on the application of compensatory approaches to address residual deficits not amenable to natural recovery and cognitive training.
- Functional Training focuses on real-world improvements in daily functioning.

Cognitive Rehabilitation

- Neuroplasticity - The ability of the nervous system to change in response to experience or injury, allowing for functional recovery.
- Adaptability - The individual’s capacity to change behaviors in order to adapt to changes in their internal or external environment.
- Restorative - Aims to re-establish lost functions or the use of new functions.
- Compensatory - Designed to maximize the level of performance or to recover a degree of function.
- Treatment - Repetitive, targeted, consistently challenging programs to motivate and facilitate recovery of targeted neurocognitive functions.
  - Development of internal and external environment strategies that make use of residual intact abilities and enhance strengths.