

The Neuro-Biology of Physical Injury

Essentials for Rehabilitation Specialists

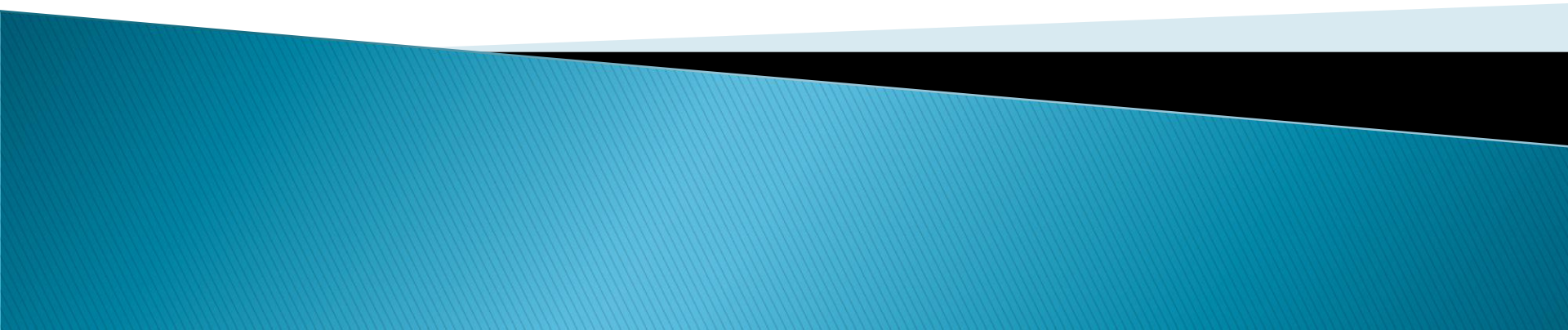
Assumptions

- ▶ When communities are damaged...people are traumatized.
- ▶ Human trauma affects outcome
- ▶ Times does not heal psychological wounds

Community Re-Builders Must...

- ▶ Understand Human Trauma
- ▶ Understand how to deal with mass trauma
- ▶ Understand how to minimize the long term impact

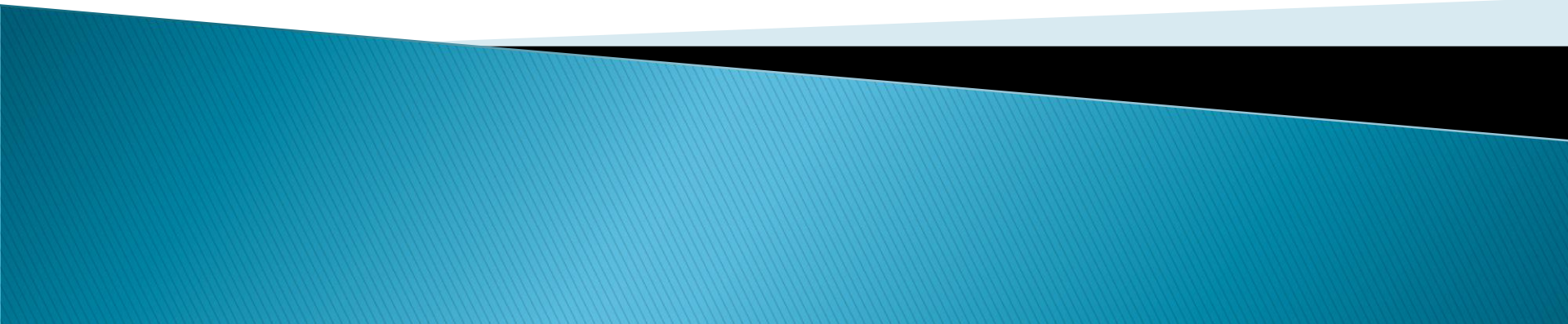
Understanding the Human Response to Trauma



Dealing With the Unknown...

- ▶ Experience
 - ▶ Emotion
 - ▶ Memory
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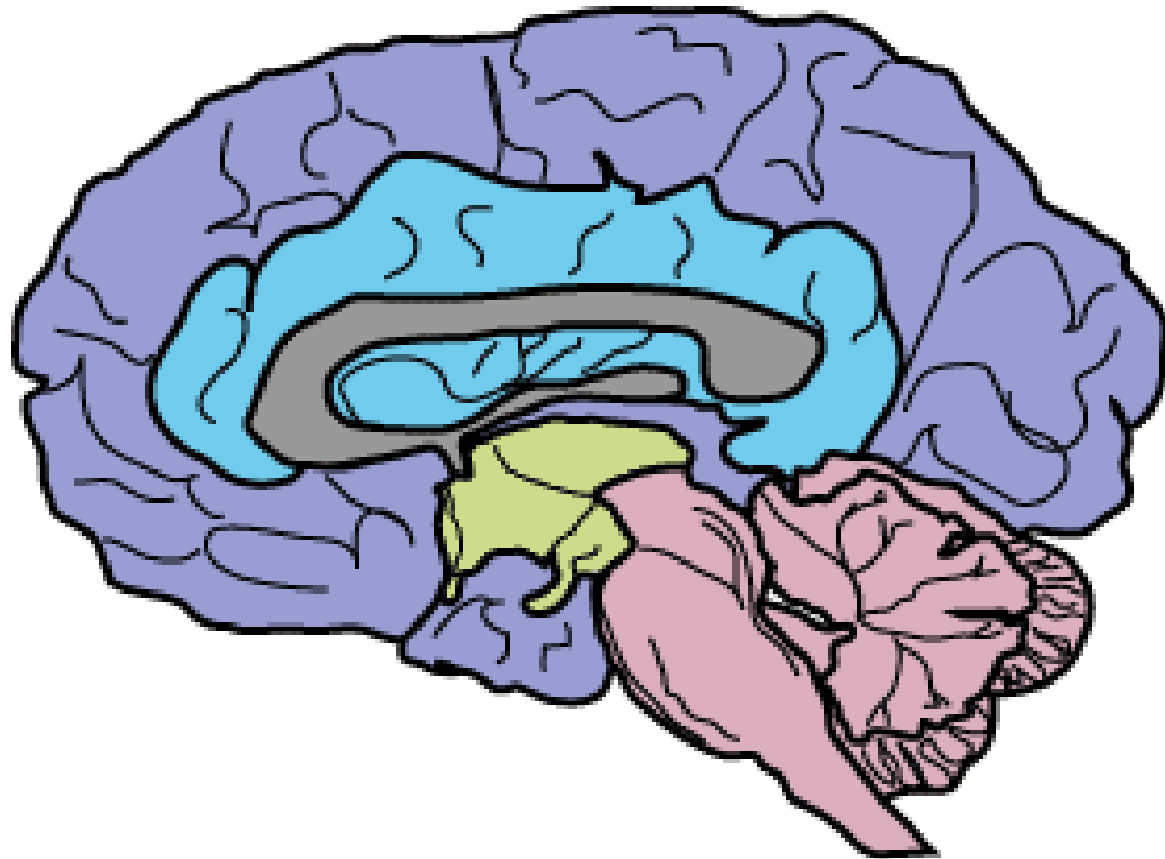
The Organization and Functioning of the Brain



The Amazing Human Brain

- ▶ 2 Common Assumptions
 - REALITY IS EXTERNAL AND MUST BE EXPERIENCED
 - THINGS WORK A CERTAIN WAY...WE NEED TO FIND THAT WAY AND WORK WITHIN THE RULES

The Human Brain



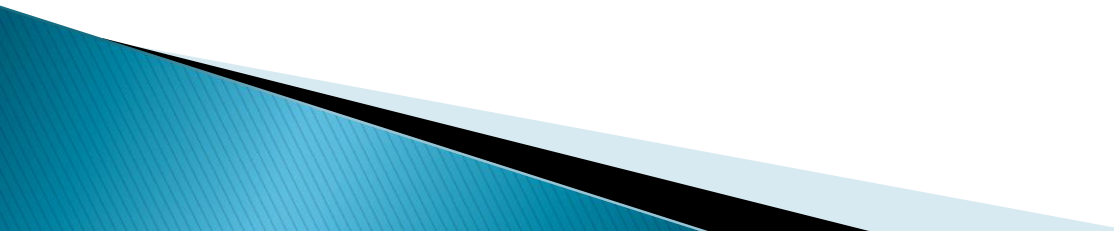
- Neocortex
- Limbic
- Diencephalon
- Brainstem

B. Perry, MD

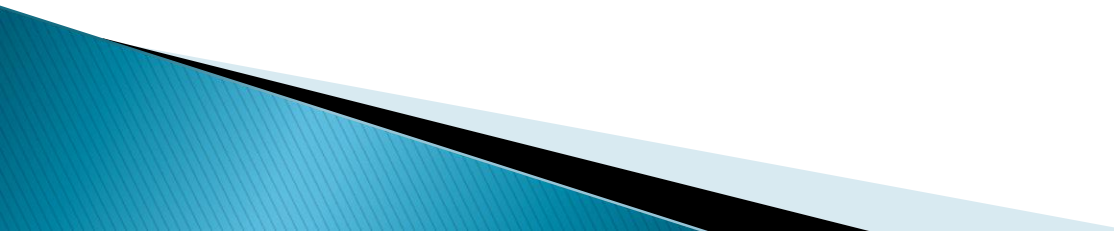
Cerebral Cortex

- ▶ Concious Thought
 - ▶ Abstractions
 - ▶ Integration
 - ▶ Love
 - ▶ Creativity
 - ▶ Meaning
 - ▶ Judgement
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Frontal Lobe

- ▶ Judgment
 - ▶ Insight
 - ▶ Emotional responding
 - ▶ Language
 - ▶ Meaning
 - ▶ Word Association
 - ▶ Habits
- 

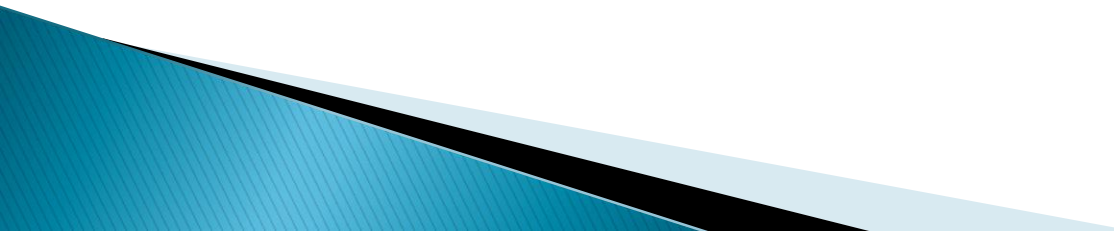
Parietal Lobe

- ▶ Back and Top of Head
 - ▶ Visual Integration
 - ▶ Touch
 - ▶ Voluntary Movement
 - ▶ Manipulation of Objects
 - ▶ Integration of Senses
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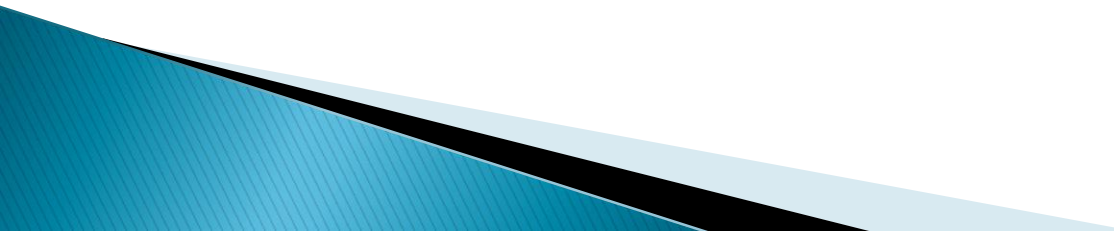
Occipital Lobe

- ▶ Back of Head
- ▶ Vision

Temporal Lobe

- ▶ Side above ears
 - ▶ Hearing
 - ▶ Categorizing Objects
 - ▶ Recognizing faces
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Limbic

- ▶ Orchestrates a response to threat or attraction
 - ▶ Brain's pleasure center
 - ▶ Transforms stimuli To memories and emotions
 - ▶ Creates emotional memories
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Diencephalon

▶ Thalamus

- All sensory information except olfactory passes through this clearing house between brain and spinal cord
- Pain, temperature, pressure, taste, sight, sound

▶ Hypothalamus

- Temperature regulation, hunger, thirst, tired, mad, sad

Brainstem

- ▶ Cerebellum, Pons, Medulla
 - Connected to Spinal Chord
 - Reflexes
 - Involuntary Actions and Movement
 - Sleeping
 - Balance

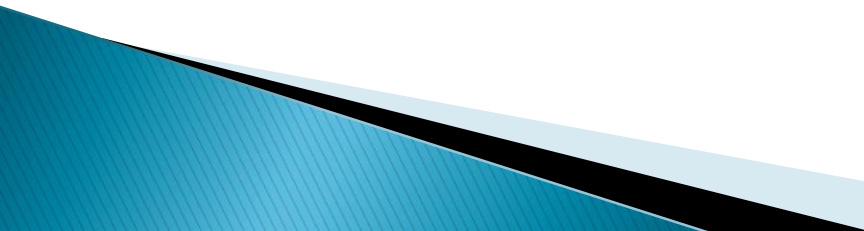
Transforming Stimuli Into Traumatic Emotions and Memories

- ▶ The Reticular Activation System
 - (Limbic System)

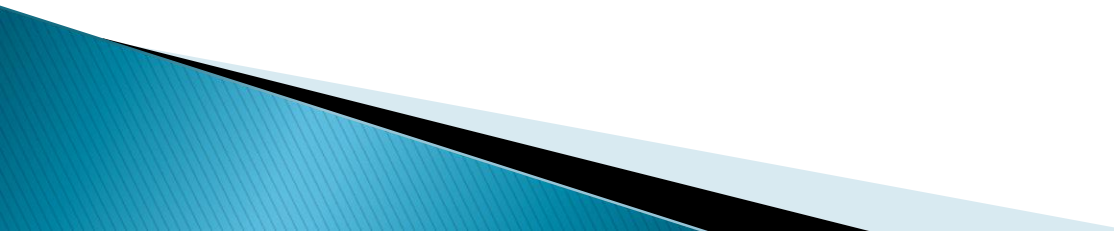
RESPONDING TO ALARM– THE FIGHT/FLIGHT RESPONSE

- ▶ Reticular Activating System
 - Interactive Bio–Chemical Activities
 - Autonomic Nervous System
 - Prepares body for fight/flight

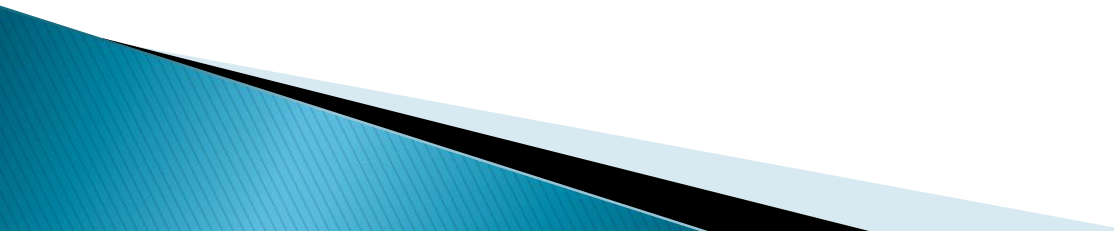
Locus Coeruleus (LC) and Ventral Tegmental Nucleus (VTN)

- ▶ Initiating maintaining and mobilizing the total body response
 - ▶ Sends chemical messages (instructions) to all major brain regions
 - ▶ Plays a major role in determining VALUE of incoming sensory data
 - ▶ Increases activity for novel or threatening information
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Hippocampus

- ▶ Interface between lower cephalic areas and cortex
 - ▶ Major role in memory
 - ▶ Major role in autonomic sequencing
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Amygdala

- ▶ Processing, interpreting, and integrating emotional functioning
 - ▶ Determines the emotional value of stimuli
 - ▶ Orchestrates the response by sending messages to various brain regions
 - ▶ Storage or imprint becomes an emotion and subsequently a memory
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Cortex

- ▶ Subjective interpretation
 - ▶ Cognitive sequencing
 - ▶ Connected to the Amygdala
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