

# THE HUMAN MIND

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## INTRODUCTION

The eBook THE HUMAN MIND, designed for Microsoft Windows®, is the 3rd book of the trilogy SPELLBOUND. The work is written in English and is only available in the USA. The eBook has 132,700 words, 68 figures, and 1,900 references. Author: Martin Dak. THE HUMAN MIND offers a unique combination of clinical psychology and cognitive neuroscience, and presents comprehensive theory of the function and cognitive architecture of the human brain.

## HARDWARE AND SOFTWARE

The eBook THE HUMAN MIND 6th edition is available on compact disc (CD) delivered by mail. The CD is of standard size and is compatible with virtually all CD readers running on Microsoft Windows®, starting with Windows 98. THE CD DOES NOT WORK ON NON-WINDOWS SYSTEMS.

The eBook THE HUMAN MIND is a portable document file (THM6v3.pdf). Bookmarks and Search allow easy navigation. The eBook is protected by a permanent password. The size of the pdf file is about 2.6 MB. PRINTING, EDITING, AND ANNOTATIONS ARE NOT SUPPORTED. Acrobat® Reader 4.0 or a higher version is needed to read the eBook. A free copy of the Acrobat® Reader can be downloaded from <http://www.adobe.com>.

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Some terminology in the TOC has been altered to protect proprietary information. The word count is approximate.

***EBOOK THE HUMAN MIND*** ***132,720 WORDS and 68 FIGURES***

**INTRODUCTION** **10,660 words, 11 figures**

Central Nervous System  
Brain Organization  
Brain Operation  
Memory Classes

**NEURAL CONCEPTS** **15,120 words, 27 figures**

Brain Stem  
Basal Forebrain  
Limbic System  
Cortex

**GLOBAL CONCEPTS** **5,450 words, 11 figures**

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Hierarchical Control  
Functional Interactions  
Connectivity and Lateralization

**NEURAL INTERACTIONS****26,160 words, 10 figures**

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Thalamic Nuclei  
Eye Saccades  
Motor Functions  
Priming  
Event-Related Potentials  
Special Aspects of Control

**MENTAL STATES****31,040 words, 3 figures**

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Cognitive Drives  
Dreams  
Consciousness  
Constructs of Reality  
Hypnosis  
Hallucination  
The Split Brain  
Confabulation  
Anosognosia

**MEMORY****18,800 words, 6 figures**

Episodic Memory  
Semantic Memory  
Memory Interactions  
Personalities  
Memory Consolidation  
EMDR

**MIND AT WORK****11,080 words**

Intelligence and Stupidity  
Psychopathology  
Crime and Punishment  
Beauty  
Wit and Laughter  
Stress and Depression

**BRAIN DAMAGE****14,420 words**

Cerebellar Damage  
Complex Dissociation  
Alien Hand Syndrome  
Parkinson's Disease  
Huntington's Disease  
Autism  
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Schizophrenia  
Brain Death

## **DETAILED TABLE OF CONTENTS**

### **INTRODUCTION**

|                                |  |
|--------------------------------|--|
| <b>Central Nervous System:</b> | Introduction to the cognitive core of the human brain.                 |
| <b>Brain Organization:</b>     | Introduction to the overall cognitive architecture of the human brain. |
| <b>Brain Operation:</b>        | Purpose and functions of the hemispheres and major cognitive systems.  |
| <b>Memory Classes:</b>         | Classification and functions of memory                                 |

### **NEURAL CONCEPTS**

|                       |   |
|-----------------------|---|
| <b>Brain Stem:</b>    | Major nuclei, structures, and functions of the medulla, pons, and midbrain    |
| <b>Limbic System:</b> | Anatomy and function of the thalamus, amygdala, striatum, and basal forebrain |
| <b>Cortex:</b>        | Connectivity and function of major Broadman's areas                           |

### **GLOBAL CONCEPTS**

|                                |   |
|--------------------------------|---|
| <b>Motor System:</b>           | Key components of the motor system                              |
| <b>Visual System</b>           | Key components of the visual system                             |
| <b>Auditory System</b>         | Key components of the auditory system                           |
| <b>Memory System</b>           | Key components of the memory system                             |
| <b>Hierarchical Control</b>    | Mechanisms supporting hierarchical control in the human brain   |
| <b>Functional Interactions</b> | Arousal, awareness, and consciousness; dorsal & ventral streams |

**Connectivity and Lateralization** Major trends in neural connectivity; bilateral, ipsilateral, and contralateral activations; differential responses to mild and painful stimuli; functional relationships between the dominant and nondominant hemispheres; masked and consciously experienced stimuli; hemispheric specialization in language, emotion, attention, and cognition.

### **NEURAL INTERACTIONS**

#### **Cerebellum**

Cerebellar anatomy, zones, connections, and involvement in cognitive and executive functions. Microanatomy, Purkinje and granule cells, mossy and climbing fibers, microzones, and function and purpose of the deep cerebellar nuclei. Physiology of the cerebellum in sensory, motor, memory, and cognitive functions. Physiology of the vestibular system, effects of vestibular caloric irrigation, relationships between the cerebellum and the vestibular system.

#### **Vision**

Organization, functions, and abilities of vision; visual centers; striate and extrastriate cortices, and superior colliculus. Retinal structure, projections, and functions of rods and cones. Color, night, peripheral, and foveal vision. Involvement of the pulvinar and lateral geniculate nuclei in higher visual functions. Function of area MT, magnocellular and parvocellular division, and functional specialization. Physiology of fast foveal and slow peripheral reading.

#### **Thalamic Nuclei**

Connectivity and division of brain functions; purpose and physiology of the anterior, ventral anterior, mediodorsal, centromedial, intralaminar, pulvinar, and lateral geniculate nuclei.

#### **Eye Saccades**

Eye control during smooth pursuit and saccades (express, slow, very slow, reflexive, conditioned, spontaneously triggered, visually guided, memory guided, antisaccades, and microsaccades). Function of major saccadic structures, physiology of one-way peeks and gaze return, cognitive control of eye saccades, physiology of saccade latency (reaction time), curving and guiding of saccades, time gap effects, fixation point, influence of attention, variable timing of popping up targets, influence of flicker lights, interactions between targets and distractors, target shifts after saccade onset, modulation of saccades by internal and external factors, contribution of the supplementary frontal eye fields to demanding saccades, contribution of the superior parietal lobule to vision and physiology of the visual startle response.

## **Motor Functions**

Anatomy of the pyramidal and extrapyramidal motor systems; explanation of grasping, mirror movements, unimanual performance, and bimanual coordination. Physiology of fast and slow manual responses, ipsilateral and contralateral limb control, age-related manual performance, pre-movement potentials, and precision grip versus power grip. Section explains the contributions of the supplementary motor area (SMA) and pre-SMA to movement, effects of muscimol on manual performance, movement deficits after brain injury, involuntary muscle control, and body language. Physiology of phantom limbs, presence of supernumerary limbs, phantom pain, interactions of phantoms with conscious perception, unconsciously experienced pain, reactivation of old dormant phantoms, deafferentation in amputees, and remapping of somatosensory pathways in the brain and in the stub of the telescoping amputated limb.

## **Priming**

Characteristics, timing, and mechanisms of behavioral priming (initiation of action) and repetitive priming (reactions to known stimuli). Physiology of attended and unattended stimuli, unilateral and bilateral priming, effects of visual hemineglect on cognition, priming of familiar and unfamiliar stimuli, negative priming, and second language priming.

## **Event Related Potentials**

Physiology of ERP's; influence of anticipation; prolonged duration of potentials; ERP's of unilateral and bilateral pain; and ERP's of innocuous and painful stimuli. ERP's of language: high probability words, incongruous endings, expectation, oddball tasks, novel and familiar stimuli, and relationship between ERP's and conscious awareness. Analysis of P50, P100, N100, N170, N200, N300, N400, and their association with the function of the brain in pre-pulse inhibition, eye saccades, pain, fear, or language.

## **Special Aspects of Control**

Interactions between neural structures in special sensory and executive functions, physiology of transitive inference problems, impact of ventromedial PFC and dorsolateral PFC damage on classical Pavlovian conditioning, pre-conscious decision making and responses, executive sequences, sequential processing of information, frontal lobe syndrome, perseveration, attentional blink, and loss of skills after brain lesions.

## **MENTAL STATES**

### **The Birth of Cognition**

Origins of cognitive processes and contributions of the ANS and the brain stem to volition and conscious experience.

### **Cognitive Drives**

#### *Emotion*

Physiology, interface to somatic and cognitive aspects of awareness, coding of pain, inherited and acquired emotional responses, gender differences in perception and processing of emotional stimuli.

#### *Attention*

Types and physiology of attention, reflexive orienting attention, processing of masked stimuli, engagement of the cognitive mind and the conscious Self, physiology of sustained attention, and deficits caused by lapses of attention.

#### *Curiosity*

Explanation of the nature of curiosity, the participating neural structures, and their roles in creation, perception, and modulation of curiosity.

#### *Motivation*

Explanation of the forces behind motivation, and identification of the related neural circuits.

### **Dreams**

#### *Characteristics of Dreams*

Themes, frequency, characteristic attributes, visual aspects, spatial and temporal characteristics, image quality, cognitive effort and clarity, and triggers of dreams.

#### *The Ultimate Dream*

The ultimate dream offers valuable insight into the cognitive processes in the mind.

### *Lucidity*

Detailed explanation of lucid dreams as states of altered consciousness. The discussion analyzes the physiology, attributes, levels, participating neural substrates, cognitive abilities, physiological indicators, and subjective perception of transitions between lucid dreams, regular dreams, and consciousness.

### *Dreams and Well-being*

Influence of dreams on mental health, and effective ways of dealing with nightmares.

### *Physiology of Dreams*

Neural activations in dreams, REM and NREM sleep, forces behind the production of dreams, dream control, ANS dysregulation, physiology of the H-reflex in lucid dreams, pontine activations, involvement of neurotransmitters in dreams, and perception of dreams by the Self. Degree of dream recall after awakening, importance of short-term memory, meaning of dream imagery, mentation during dreams, emotional experience in dreams, cognitive reactivity, pathways of dreams, lesion studies, and cessation of dreams.

### *Special Dream Phenomena*

Physiology of backward dreams, hypnagogic dreams, parasomnias, night terrors, sleepwalking, REM sleep behavior disorder (RBD), out of body experience (OOBE), UFO themes, sleep paralysis, lucid nightmares, daydreaming, and other related phenomena.

### **Consciousness**

Physiology, characteristics, levels, and subjective experiences of consciousness. Gradual loss of consciousness and loss of skills and will.

### **Constructs of Reality**

Explanation of mental and sensory aspects of the Self; visual, somatic, and egocentric perception of space; interactions between personal, peripersonal, and extrapersonal space; effects of spatial neglect on brain functioning; disorientation and orientation bias; spacing out; diagonal neglect; contribution of retinal quadrants to perception of space; neglect in blindsight, and types of neglect after cerebral lesions. Allocentric and egocentric perception of space in dreams and wakefulness, optic ataxia, and neglect in perception of subjective spatial boundaries. Physiology, cognitive distortions, and reduced ability to check reality in the out-of-body experience, Frégoli syndrome, Capgras delusion, and related phenomena.

### **Hypnosis**

Phenomenology and physiology of hypnosis, neural correlates, puzzling occurrences, interactions with the hypnotized Self, and relationship between hypnosis and full consciousness. Explanation of neuropsychological aspects of memory processing under hypnosis, the nature of passive self-awareness, cognitive abilities and volition under hypnosis, neuropsychological differences between light and deep hypnosis, hemispheric effects, interactions with the hidden observer, and neuropsychological differences between lucid dreams and hypnosis.

### **Hallucination**

Global view of the physiology, causes, manifestations, neural and logical correlates, and suggestions for treatment.

### **The Split Brain**

Correct explanation of the split-brain physiology, effects of dissociation and preexisting neural damage on split-brain functions; perseveration phenomenon; disruptive, confrontational, and hostile interhemispheric acts; physiology of the left hand apraxia, and overall biological, neural, and psychological impact of callosotomy.

### **Confabulation**

Spontaneous confabulation, its origin, physiology, and the neural substrates involved.

### **Anosognosia**

Phenomenology and physiology of anosognosia, effects of vestibular caloric stimulation on cognition, and the related neural interactions. Conditions causing anosognosia, denial of illness in real time, disregard of sensory reality, and different verbal responses of patients before, during, and after vestibular irrigation. Physiology of spontaneous and evoked confabulation.

## MEMORY

### Episodic Memory

Clinical examples of episodic memory impairment in anterograde and retrograde amnesia, and the functional differences between memory storage and recall.

### Semantic Memory

Functional organization of the semantic memory. Comprehensive explanation of the physiology of semantic dementia, causes of mild impairment of episodic recall, the 1-2 years temporal gradient in memory recall, poor grammar and verb regularization, advantage for irregular verbs and pseudowords, language acquisition milestones, and physiology of surface dyslexia.

### Memory Interactions

Interactions between various episodic and semantic memory functions during acquisition and recall of new, recent, and remote memories. Analysis of interhemispheric interactions, contribution of the basal forebrain to episodic memory, specific deficits after hippocampal lesions, purpose and function of the hippocampus, and involvement of the hippocampus in contextual associations, comparison, and recognition.

### Personalities

*Makeup of Personalities:* Neural and psychological components of multiple personalities

*Characteristics of Personalities:* Aging, information sensitivity, skill transfer, personality disintegration, differences between personalities, confabulation in multiples, personality switching, physiology of the ISH.

### Memory Consolidation

Physiology of memory acquisition, formation, aging, targeted retrieval, spontaneous recall, and consolidation mechanisms of long-term memory that depends on the hippocampus. Purpose and goals of memory consolidation; stages of memory consolidation; mechanisms of memory storage and retrieval; organization, location, and structure of episodic memory; synaptic plasticity and interactions of memory structures; manifestation of unconsolidated memories after TBI; effects of memory consolidation on cognitive performance; variable time of consolidation of different skills; consolidation of memories of multiple personalities; role of REM and NREM sleep in memory consolidation; consequences of failed consolidation; shrinkage of amnesia; amnesia in anosognosia; hemispheric attributes of memory consolidation; memory consolidation in a split brain, and the Wada test physiology.

### Eye Movement Desensitization and Reprocessing

Physiology of EMDR, additional ways of achieving the same effect, suggestions for enhancement of the therapeutic results, and application of EMDR in other fields of clinical psychology.

## MIND AT WORK

### Intelligence and Stupidity

Physiology, IQ, EQ, stupidity, and artificial intelligence

### Psychopathology

Neural correlates, prevalence, and social impact of psychopathology.

### Crime and Punishment

Issues of mental illness, brain function, proof, and punishment

### Beauty

Physiology and clinical manifestations

### Fun

Physiology and clinical manifestations

### Wit and Laughter

Physiology and clinical manifestations

### Stress and Depression

Physiology and clinical manifestations

## BRAIN DAMAGE

### Cerebellar Damage

Physiology of cognitive disorders caused by cerebellar malfunction

### Complex Dissociation

Symptoms and physiology of complex dissociative disorders

### Alien Hand Syndrome

Physiology and clinical manifestations

### Parkinson's Disease

Physiology and clinical manifestations

### Huntington's Disease

Physiology and clinical manifestations

### Autism

Physiology and clinical manifestations

### Alzheimer's disease

Physiology and clinical manifestations

### Schizophrenia

Physiology and clinical manifestations

### Brain Death

Clinical examples of neurodegenerative illnesses (FTD, CBD, PSP)

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