Test. These improvements are not permanent however, since cholinergic medication serves to attenuate temporarily some of the symptoms of Alzheimer's Disease only in its early stages. Topographic mapping of surface ERPs in patients suffering from early Alzheimer's Disease and Vascular Dementia as compared to age-matched normal controls will also be presented. Due to their sensitivity to cognitive decline and their unique temporal resolution, surface ERPs to well-constructed memory workload paradigms, could be very valuable neurophysiological indicants for the diagnosis, treatment and clinical follow-up of patients with memory disorders triggered by neurodegenerative pathologies.

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MEMORY WORKLOAD PARADIGM, EVENT-RELATED BRAIN POTENTIALS, BILATERAL ELECTRODERMAL ACTIVITY AND MANGINA-TEST IN "PURE" LEARNING DISABILITIES AS COMPARED TO COMORBID PATHOLOGIES WITH ADHD AND AGE-MATCHED NORMAL CONTROLS

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Research with Event-Related Brain Potentials (ERPs) to a Memory Workload Paradigm with visually presented words has shown that enhanced pre-frontal and frontal N400 amplitudes to this paradigm differentiated normal subjects from Learning Disabled/ADHD pre-adolescents. Moreover, our research had shown that memory load effect was present for the P450 latency and amplitude in normal pre-adolescents and absent in age-matched Learning Disabled/ADHD children with concomitant behavioral disorders (Mangina et al., 2000).

The ERP differentiation however, between "pure" Learning Disability versus "pure" ADHD and Learning Disability with ADHD and ADHD with other comorbidities has not yet been elucidated. In this paper, we are presenting research data showing topographic ERP differences to memory workload in "pure" Learning Disability, in "pure" ADHDs and in Learning Disabled/ADHD and other comorbid pathologies as compared to age-matched normal controls. In addition to ERPs, Bilateral Electrodermal Activity and Mangina-Test performance provide a psychophysiological integration of central, autonomic and neuropsychometric variables which underpin brain/behavior relationships in normal and pathological conditions.

Results will be discussed within the theoretical model of cortico-limbic neuronal plasticity in memory, learning abilities and the psychophysiological treatment of learning disabilities (Mangina, 1998; Mangina and Beuzeron-Mangina, 1992, a, b; 1996; 2004; Mangina and Sokolov, 2006).

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PREPARATORY AND PRE-LEXICAL PERIODS IN DYSLEXIC CHILDREN: A READING-RELATED POTENTIAL STUDY

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Previous studies on developmental dyslexia have shown the involvement of visual and auditory perceptual processes during learning to read and write. This work investigates the reading related potentials of the preparatory and pre-lexical period recorded in different reading conditions from 61 normal children and 53 dyslexic children attending the elementary school (age between 8–10 years). All the children were tested with WISC-R, Mangina-Test and a Reading and Writing test (TDLS: Chiarenza and Bindelli, 2001). Reading-related potentials were recorded during externally- and self-paced reading conditions. Multiple linear regressions showed that dyslexic children had significantly lower reading age, reading quotient and Mangina-Test score and had significantly longer reading time. The most significant differences between normal and dyslexic children were present in N1 latency and amplitude and in P1 latency on left temporal regions and in P0 and P1 amplitude on left parietal regions. These results confirm that both linguistic and visual perceptual processes are involved in reading impairment of children with developmental dyslexia.

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ANALYTICAL-SPECIFIC VISUAL PERCEPTION IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER AND NORMAL CONTROLS: DIAGNOSTIC VALUE OF THE MANGINA-TEST

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Analytical-specific visual perception denotes the ability to identify simple stimuli inserted (masked) in increasingly more complex stimuli according to their exact direction, spatial orientation, size, dimension and shape in a limited span of time (Mangina, 1994, 1998). Impairments of short-term visual memory and working memory (visuospatial sketchpad) are among the symptoms of attention deficit hyperactivity disorder (ADHD). The aims of the present study were: 1) to compare the "analytical-specific perceptual performance" of Turkish children with ADHD to that of healthy children by means of the Mangina-Test (1994) and 2) to investigate whether subgroups of ADHD have different profiles

pair with a different frequency ratio. Moreover, a similar ratio-violation MMN was also found when the two tones were presented in parallel, i.e., as a complex tone. These data suggest the existence of neuronal populations capable of encoding frequency relations between two successive or parallel tones. Such neural populations might form the basis for the correct phoneme perception irrespective of the wide acoustic variation between the voices of different speakers and word context (allophonic variation).

It is of considerable interest that these cognitive processes occur, at least mainly, at the level of the auditory cortex (most likely in the secondary and association areas) where we can observe these manifestations of primitive sensory-level intelligence by recording MMN and its magnetic equivalent MMNm. Although we cannot definitely rule out the participation of suprasensory processes in the neural network involved, the role of the auditory cortex nevertheless seems to be predominant in realizing these cognitive operations which go much beyond the role traditionally given to the auditory cortex as the highest end station of auditory reception and perception.

HABITUATION IN IDENTIFIABLE SYNAPSES

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Introduction. Habituation is a form of negative learning. Behavioral and neuronal responses decrease the amplitudes under repeated stimulation. Can we say that the single synapses habituate too? The animals with "simple nervous systems" help to answer the question.

Results. The snails Helix have identifiable neurons and synapses. The sensory neurons presynaptically connected with the command neurons of snails' avoidance behavior have been identified using paired intracellular recording and staining. The presynaptic neurons had local receptive fields at viscera. Stimulation of viscera elicited burst of spikes in the sensory neuron. The command neuron respond to the same stimulus by compound excitatory postsynaptic potential (cEPSP). Repeated sensory stimulation resulted in decreasing of cEPSPs amplitudes. Habituation curve for the cEPSPs was the same as that for avoidance reaction.

Compound EPSPs were constituted by several presynaptic cells generating the bursts of spikes. Single presynaptic spikes elicited in the identified sensory neuron by short current injections evoked in the command neuron the unitary EPSPs (uEPSPs). Both high-frequency (2–10 Hz) and low-frequency (0.1–0.01 Hz) stimulation resulted in decreasing of uEPSPs amplitudes. The burst of presynaptic spikes recovered and potentiated amplitudes of following uEPSPs. Trains of the bursts evoked complex dynamics of uEPSPs and the bursts frequencies existed when the postsynaptic responses were stable.

Conclusions. Is habituation of cEPSPs similar to depression of uEPSPs? Under the same stimulation frequency the amplitudes of cEPSPs decreased slowly than that of uEPSPs. We suggest that the difference is a result of posttetanic potentiation evoked by the bursts of spikes generated in the presynaptic cells in response to sensory stimuli. Thus, there is no equality between habituation and synaptic depression. Habituation depends both on synaptic depression and potentiation.

SYMPOSIUM 17: Psychophysiology of social interactions
Symposium Chair: Pietro Pietrini

PHYSIOLOGICAL READING PROCESSES BY INTEGRATING ERP AND FMRI DATA

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This study investigates the neural correlates of reading by combining ERPs and fMRI.

Data were recorded in separate sessions from 8 healthy adults during the same event-related design with jittered inter-stimulus interval. Two passive tasks (*letter presentation* — LP and *symbol presentation* — SP) and a reading aloud task (*letter recognition* — LR) were implemented. Averaged ERPs were decomposed by Independent Component Analysis after data dimensionality reduction by Principal Component Analysis. The independent components (ICs) were associated to well-known physiological potentials: N2_P2b and P2a for all tasks and a late wide negativity (LNA) for LP and LR. Low Resolution Electromagnetic Tomography (LORETA) was applied to single ICs. fMRI data were analysed by multiple linear regression. ERPs-fMRI correspondence was described by the Euclidean distance between LORETA and fMRI local maxima.

fMRI results indicate that all tasks activated the left fusiform gyrus. Viewing letters specifically engaged the left inferior parietal and medial frontal regions; reading aloud additionally engaged the left middle frontal and superior temporal gyri. Bilateral middle–superior temporal gyri always participated in the generation of N2_P2b, P2a and LNA potentials. Considering N2_P2b, the cingulum and medial frontal gyrus were recruited by attention processes in LP and LR respectively. LNA was also generated by the right precuneus during LP and by the right cuenus and left cingulum during LR.

The activation of the medial frontal gyrus in both methodologies likely indicates the recruitment of attention resources and the preparation to verbal–motor output. Multimodal engagement of left middle–superior temporal gyrus suggests that it extensively participates in reading processes: its strategic location and interconnection with visual and auditory cortices may have supported its specialization for grapheme–phoneme matching.

SYMPOSIUM 18: Perspectives on the P3
Symposium Chair: Robert J. Barry

The late positive complex of the event-related potential, often referred to as "the P3", is found in many experimental paradigms and has been used to obtain insights into various aspects of perceptual and cognitive processing in a range of subject groups. Its ubiquity has resulted in proposals that it reflects various processes, some of which are clearly contradictory. While very-different perspectives might be expected to be experimentally resolved rather simply, others differ in a more subtle fashion and are difficult to resolve. This symposium explores the P3 in a range of paradigms, examining stimulus intensity and response requirement effects in the active vs. passive auditory oddball task (Rushby et al.), distraction effects in the Eriksen flanker task (Broyd et al.), context effects in the intermodal oddball task (Brown et al.), and trial and task effects in an equiprobable Go/NoGo task (Barry and Rushby). Within each paper, the participants will discuss how their data illuminates different perspectives on the functionality of the P3 complex. The panel discussion will attempt to reach some consensus on the applicability of different interpretations in different paradigms.

STIMULUS INTENSITY AND RESPONSE REQUIREMENT EFFECTS IN AN ACTIVE VS. PASSIVE AUDITORY ODDBALL TASK

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The oddball task has been utilised extensively to examine the late positive complex (LPC) of the ERP. A recent resurgence in the use of decomposition techniques, such as PCA, shows that two sub-components, the P3b and the P3a, are elicited to rare/deviant stimuli in the oddball task. The P3b component is maximal for active tasks and the P3a for passive tasks. An additional sub-component, the slow-wave (SW) is also elicited for some active conditions. The aim of this study was to examine the effects of stimulus intensity and response requirement on the separate components of