

# The Neurology Of Eye Movements

Movements of the Eyes Eye Movements The Oxford Handbook of Eye Movements Eye Movement Research The Control of Eye Movements Looking and Acting Neuropsychology of Eye Movement Physiological and Pathological Aspects of Eye Movements The Moving Tablet of the Eye Models of Horizontal Eye Movements The Mind's Eye Eye Movement Disorders Eye Movements and Their Role in Visual and Cognitive Processes Eye Movements and Vision Eye Movement Research Neuropsychology of Eye Movements Eye Movements and the Higher Psychological Functions Eye Guidance in Reading and Scene Perception Eye Movements The Brain and Regulation of Eye Movement Roger H. S. Carpenter Roger PG van Gompel Simon Liversedge J.M. Findlay Paul Bach-y-Rita Michael Land Cris W. Johnston A. Roucoux Nicholas Wade John D. Enderle Ralph Radach E.A.C.M. Sanders Eileen Kowler A. L. Yarbus Christoph Klein Cris W. Johnston John W. Senders G. Underwood Dennis F. Fisher A. Shakhnovich

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the analysis of the neural control systems that govern the movements of the eyes has been one of the major successes of neurophysiology in recent years this book presents an integrated account of the anatomy and physiology of eye movements this second edition has been substantially revised and enlarged and contains a new section on plasticity

eye movement recording has become the method of choice in a wide variety of disciplines investigating how the mind and brain work this volume brings together recent high quality eye movement research from many different disciplines and in doing so presents a comprehensive overview of the state of the art in eye movement research sections include the history of eye movement research physiological and clinical studies of eye movements transsaccadic integration computational modelling of eye movements reading spoken language processing attention and scene perception and eye movements in natural environments includes recent research from a variety of disciplines divided into sections based on topic areas with an overview chapter beginning each section through the study of eye movements we can learn about the human mind and eye movement recording has become the method of choice in many disciplines

in the past few years there has been an explosion of eye movement research in cognitive science and neuroscience the oxford handbook of eye movements provides the first comprehensive review of the entire field of eye movement research this book is the definitive reference work in this field

this volume contains selected and edited papers from the 7th european conference on eye movements ecem 7 held in durham uk on august 31 september 3 1993 the volume is organized as follows invited lectures pursuit and coordination saccade and fixation control oculomotor physiology clinical and medical aspects of eye movements eye movements and cognition eye movements and language and finally displays and applications

the control of eye movements presents the proceedings of the symposium on the control of eye movements organized by the smith kettwell institute of visual sciences of the pacific medical center and the department of visual sciences of the university of the pacific graduate school of medical sciences san francisco california november 10 11 1969 the book is organized into two parts part i is devoted to presentations of anatomical physiological pharmacological psychological and clinical aspects of eye movements the material presented should provide a valuable reference source as well as increase awareness of the need for further investigation of many aspects of the basic physiology of eye movements part ii presents a series of papers dealing with models of various parts of the oculomotor system the modeling approach to control of eye movements is still in its infancy and the present work presents the first comprehensive survey of biophysical mathematical and engineering aspects of eye movement control

the human visual system is amazing in its ability to guide us in a diverse range of everyday tasks driving preparing food reading in addition to leisurely pursuits such as ball games or reading music somehow without conscious effort our eyes find the information we need to negotiate the world around us only recently however has it become possible to explore just how it is that our eyes can supply the brain systems controlling our limbs with the information they need to carry out these tasks thanks to the development of head mounted eye trackers we can now explore the strategies that the eye movement system uses in the initiation and guidance of action looking and acting explores a wide variety of visually guided activities from sedentary activities such as reading music or drawing to dynamic behaviours such as driving or playing cricket it proposes that the eye movement system has its own store of knowledge about where to find the most appropriate information for guiding action information not often available to conscious scrutiny thus every action has its own specific repertoire of linked eye movements the book starts with a brief background of eye movement studies part two reviews observations and analyses of different activities finally the book looks at visual representations the neurophysiology of the brain systems involved and the roles of attention and learning opening up a whole new field in eye movement research the fascinating new book will be of great interest to all vision scientists psychologists physiologists ophthalmologists whether at professional graduate or advanced undergraduate levels

first published in 1988 the idea for this book arose from a desire to bring together relevant information from the fields of vision research neuropsychology neurology and psychiatry the selection of topics covered by neuropsychology of eye movements conforms to the primary areas of inquiry that currently exist unlike the majority of other books on eye movements which represent proceedings of meetings this volume is comprised of a number of critical reviews of the research literature

this volume contains the proceedings of a work shop entitled physiological and pathological aspects of eye movements held at the pont d'oye castle habay la neuve belgium march 27-30 1982 the meeting was sponsored by the european communities it brought together specialists of oculomotricity mainly from europe but also from north america with such actions the communities want to encourage international and multidisciplinary contacts between researchers of a particular field oculomotor neuroscientists for quite a long time have developed such contacts this cooperation this is not so common in biological research embodies various approaches from basic mechanisms to

behavioral studies but also this applied science that medicine is or should be many basic discoveries about eye movement mechanisms made with the help of human or animal subjects have found rapid medical applications in neurology neuro ophthalmology or otolaryngology this is illustrated in this book by the fact that results obtained on rats or cats are interspersed with reports of clinical investigations the workshop was mainly focused onto three themes a eye and head movements in man b visuo vestibular interaction and c eye head coordination in each theme one or more review papers were included in addition most of the oral presentations or posters on display mainly contained unpublished material

eye movements are a vital part of our interaction with the world they play a pivotal role in perception cognition and education research in this field is now proceeding at a considerable pace and casting new light on how the eyes move and what information we can derive during the frequent and brief periods of fixation however the origins of this work are less well known even though much of our knowledge was derived from this research with far more primitive equipment this book is unique in tracing the history of eye movement research it shows how great strides were made in this area before modern recording devices were available especially in the measurement of nystagmus when photographic techniques were adapted to measure discontinuous eye movements from about 1900 many of the issues that are now basic to modern research were then investigated one of the earliest cognitive tasks examined was reading and it remains in the vanguard of contemporary research modern researchers in this field will be astonished at the subtleties of these early experimental studies and the ingenuity of interpretations that were advanced one and even two centuries ago though physicians often carried out the original eye movement research later on it was pursued by psychologists it is within contemporary neuroscience that we find these two strands reunited anyone interested in the origins of psychology and neuroscience will find much to stimulate and surprise them in this valuable new work

there are five different types of eye movements saccades smooth pursuit vestibular ocular eye movements optokinetic eye movements and vergence eye movements the purpose of this book is focused primarily on mathematical models of the horizontal saccadic eye movement system and the smooth pursuit system rather than on how visual information is processed a saccade is a fast eye movement used to acquire a target by placing the image of the target on the fovea smooth pursuit is a slow eye movement used to track a target as it moves by keeping the target on the fovea the

vestibular ocular movement is used to keep the eyes on a target during brief head movements the optokinetic eye movement is a combination of saccadic and slow eye movements that keeps a full field image stable on the retina during sustained head rotation each of these movements is a conjugate eye movement that is movements of both eyes together driven by a common neural source a vergence movement is a non conjugate eye movement allowing the eyes to track targets as they come closer or farther away in this book early models of saccades and smooth pursuit are presented the smooth pursuit system allows tracking of a slow moving target to maintain its position on the fovea models of the smooth pursuit have been developed using systems control theory all involving a negative feedback control system that includes a time delay controller and plant in the forward loop with unity feedback the oculomotor plant and saccade generator are the basic elements of the saccadic system the oculomotor plant consists of three muscle pairs and the eyeball a number of oculomotor plant models are described here beginning with the westheimer model published in 1954 and up through our 1995 model involving a 4th order oculomotor plant model the work presented here is not an exhaustive coverage of the field but focused on the interests of the author in part ii a state of art model of the saccade system is presented including a neural network that controls the system table of contents introduction smooth pursuit models early models of the horizontal saccadic eye movement system velocity and acceleration estimation 1995 linear homeomorphic saccadic eye movement model

the book provides a comprehensive state of the art overview of current research on cognitive and applied aspects of eye movements the contents include peer reviewed chapters based on a selection of papers presented at the 11th european conference on eye movements turku finland 2001 supplemented by invited contributions the ecem conference series brings together researchers from various disciplines with an interest to use eye tracking to study perceptual and higher order cognitive functions the contents of the book faithfully reflect the scope and diversity of interest in eye tracking as a fruitful tool both in basic and applied research it consists of five sections visual information processing and saccadic eye movements empirical studies of reading and language production computational models of eye movements in reading eye tracking as a tool to study human computer interaction and eye movement applications in media and communication research each section is concluded by a commentary chapter by one of the leading authorities in the field these commentaries discuss and integrate the contributions in the section and provide an expert view on the most significant present and future developments in the respective areas the book is a reference volume including a large body of new empirical work but also principal theoretical

viewpoints of leading research groups in the field

there is perhaps no area of neuro ophthalmology that is advancing more rapidly with respect to an understanding of its anatomy and physiology than the ocular motor system for this reason it is difficult not only to keep up with the latest information concerning the basic mechanisms involved in the control of eye movements but also to remain up to date regarding the pathophysiology of specific disorders of eye movement the material in this book is derived from a two day course on eye movements held in the netherlands in 1986 the course was designed as an introduction to the normal ocular motor system and to disorders of eye movements and was aimed toward orthoptists ophthalmologists optometrists neurologists and neurosurgeons the chapters in this book were compiled by a trio of experts in the field of eye movements and contain discussions of anatomy and physiology of the ocular motor system techniques of examination of patients with diplopia and pathophysiology of specific disorders of ocular motility many of the authors of these chapters are among the most active investigators of eye movements in the world today and their comments thus reflect the latest information in the field this text is both basic and comprehensive and thus has something for everyone from the student just beginning a study of the ocular motor system to the seasoned veteran who wishes to know the latest information regarding central ocular motor control mechanisms neil r

this is the first book to deal exclusively with oculomotor performance in a series that up to this point has been devoted largely to reviews of research on oculomotor anatomy and physiology the publication of this volume signifies the recognition of the fact that a genuine understanding of eye movement will not come about through the study of neurons alone we need to know about the capacity to make different kinds of eye movement and about how such oculomotor capacity is used to accomplish different sorts of visual and cognitive tasks i e how the eye can move and why it moves in particular ways research on respective topics was critically evaluated by the contributing authors resulting in a controversial and up to date appraisal of this subject

this edited volume presents fundamentals as well as applications of oculomotor methods in industrial and clinical settings the topical spectrum covers 1 basics and background material 2 methods such as recording techniques markov models lévy flights pupillometry and many more as well as 3 a broad range of applications in clinical and industrial settings the target audience primarily comprises research experts and practitioners but the book may also

be beneficial for graduate students

first published in 1988 routledge is an imprint of taylor francis an informa company

originally published in 1978 this volume reflects the proceedings of a conference held in february 1977 in california and is a natural successor to the earlier volume eye movements and psychological processes monty senders 1976 the second conference was aimed at providing a greater opportunity for discussing the higher mental processes touched on in the first volume part 1 is devoted to an intensive review of the underlying processes and psychological functions of eye movements it includes discussions of the relationships of cortical and subcortical visual areas to eye movements and visual processing associated with them information about the position of the eye in the head and the perception of visual space saccades and visual functioning and masking in further parts it goes on to look at methodology and models cognitive processes reading processes looking at static and dynamic display and finally chapters on problems and applications

the distinguished contributors to this volume have been set the problem of describing how we know where to move our eyes there is a great deal of current interest in the use of eye movement recordings to investigate various mental processes the common theme is that variations in eye movements indicate variations in the processing of what is being perceived whether in reading driving or scene perception however a number of problems of interpretation are now emerging and this edited volume sets out to address these problems the book investigates controversies concerning the variations in eye movements associated with reading ability concerning the extent to which text is used by the guidance mechanism while reading concerning the relationship between eye movements and the control of other body movements the relationship between what is inspected and what is perceived and concerning the role of visual control attention in the acquisition of complex perceptual motor skills in addition to the nature of the guidance mechanism itself the origins of the volume are in discussions held at a meeting of the european society for cognitive psychology escop that was held in wurzburg in september 1996 the discussions concerned the landing effect in reading an effect that if substantiated would provide evidence of the use of parafoveal information in eye guidance and these discussions were explored in more detail at a small meeting in chamonix in february 1997 many of the contributors to this volume were present at the meeting but the arguments were not resolved in chamonix

either other leaders in the field were invited to contribute to the discussion and this volume is the product the argument remains unresolved but the problem is certainly clearer

originally published in 1981 this volume represents the edited proceedings of the third symposium on eye movements and behaviour sponsored by the us army human engineering laboratory the conference titled the last whole earth eye movement conference was held in florida in february 1980 as the conference approached seizure of the american hostages by the iranian militants the russian invasion of afghanistan and the uncertain economic outlook around the world made it appear as though the title was a self fulfilling prophecy but the meeting proved highly successful and people throughout the world seemed to be adapting to the stresses of international tension making the possibility of subsequent meetings more likely the present volume is intended to serve as a complementary text to the earlier texts eye movements and psychological processes monty senders 1976 and eye movements and the higher psychological functions senders fisher monty 1978 rather than a revision and update of them

dr shakhnovich brought out the original russian edition of this work in 1974 fully half of that book was concerned with his own studies of eye movements these included observations on patients with neuromuscular disorders that produced unique oculomotor deficits other anomalies of eye motility resulted from local changes in cerebral and cerebellar blood flow and the effects of surgical intervention for aneurisms and brain tumors supplementary experiments included the probing of single units in the motor and visual brain areas of rabbits still other studies were done on normal human eye movements with the aid of the yabus cap attachment to the cornea of the eye a major aim of the original book was to show that eye movements provide a relatively simple illustration of goal directed behavior this traditional russian theme developed by sechenov pavlov and bemshtein was put forth as a unifying concept to explain the author s findings consideration was also given to western ideas and problems that dominated the research of the 1950 s and 1960 s among these as summarized by dr shakhnovich were perceptual constancy corollary discharge saccadic suppression and the effects of image stabilization

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