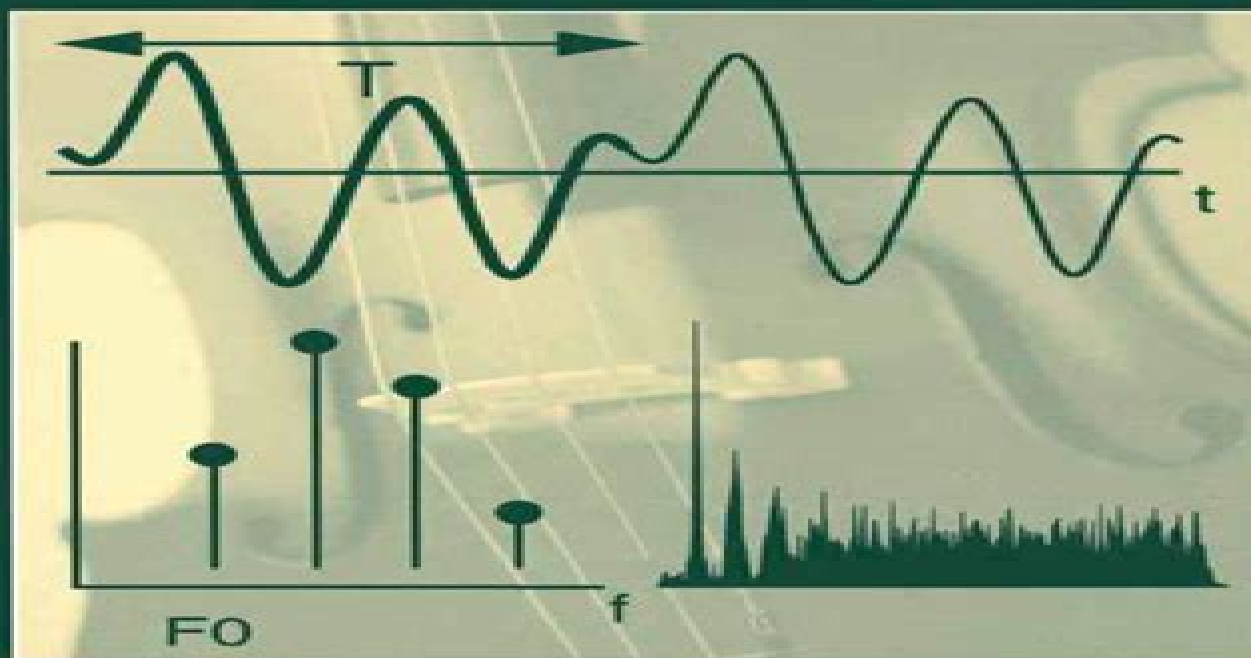


**Christopher J. Plack**  
**Andrew J. Oxenham**  
**Richard R. Fay**  
**Arthur N. Popper** Editors

# Pitch

## Neural Coding and Perception



# Pitch Neural Coding And Perception

**Christopher J. Plack, Andrew J.  
Oxenham, Richard R. Fay**



## **Pitch Neural Coding And Perception:**

*Pitch* Christopher J. Plack, Andrew J. Oxenham, Richard R. Fay, 2006-04-20 Although pitch has been considered an important area of auditory research since the birth of modern acoustics in the 19th century some of the most significant developments in our understanding of this phenomenon have occurred comparatively recently In auditory physiology researchers are now identifying cells in the brainstem and cortex that may be involved in the derivation of pitch In auditory psychophysics dramatic developments over the last few years have changed our understanding of temporal pitch mechanisms and of the roles of resolved and unresolved harmonics Computational modeling has provided new insights into the biological algorithms that may underlie pitch perception Modern brain imaging techniques have suggested possible cortical locations for pitch mechanisms This timely volume brings together the more recent findings while emphasizing their relation to the discoveries of the past It brings together insights from several different methodological areas physiology psychophysics comparative imaging etc in addressing a single scientific problem Pitch perception can be regarded as one of the main problems of hearing and the multidisciplinary approach of the book provides a valuable reference source for graduate students and academics

*Pitch* Christopher J. Plack, 2005 Although pitch has been considered an important area of auditory research since the birth of modern acoustics in the 19th century some of the most significant developments in our understanding of this phenomenon have occurred comparatively recently In auditory physiology researchers are now identifying cells in the brainstem and cortex that may be involved in the derivation of pitch In auditory psychophysics dramatic developments over the last few years have changed our understanding of temporal pitch mechanisms and of the roles of resolved and unresolved harmonics Computational modeling has provided new insights into the biological algorithms that may underlie pitch perception Modern brain imaging techniques have suggested possible cortical locations for pitch mechanisms This timely volume brings together the more recent findings while emphasizing their relation to the discoveries of the past It brings together insights from several different methodological areas physiology psychophysics comparative imaging etc in addressing a single scientific problem Pitch perception can be regarded as one of the main problems of hearing and the multidisciplinary approach of the book provides a valuable reference source for graduate students and academics

## **Neural Coding and Perception of Pitch in the Normal and Impaired Human Auditory System**

Sébastien Santurette, Danmarks Tekniske Universitet. Centre for Applied Hearing Research, 2011

[Translational Perspectives in Auditory Neuroscience](#) Kelly L. Tremblay, Robert F. Burkhard, 2012-06-29 *The Oxford Handbook of Auditory Science: The Auditory Brain* David R. Moore, Paul Albert Fuchs, Adrian Rees, Alan Palmer, Christopher J.

Plack, 2010-01-21 Volume 1 The Ear edited by Paul Fuchs Volume 2 The Auditory Brain edited by Alan Palmer and Adrian Rees Volume 3 Hearing edited by Chris Plack Auditory science is one of the fastest growing areas of biomedical research

There are now around 10 000 researchers in auditory science and ten times that number working in allied professions This

growth is attributable to several major developments Research on the inner ear has shown that elaborate systems of mechanical transduction and neural processes serve to improve sensitivity sharpen frequency tuning and modulate response of the ear to sound Most recently the molecular machinery underlying these phenomena has been explored and described in detail The development maintenance and repair of the ear are also subjects of contemporary interest at the molecular level as is the genetics of hearing disorders due to cochlear malfunctions

*Foundations in Music Psychology* Peter Jason Rentfrow, Daniel J. Levitin, 2019-03-12 A state of the art overview of the latest theory and research in music psychology written by leaders in the field This authoritative landmark volume offers a comprehensive state of the art overview of the latest theory and research in music perception and cognition Eminent scholars from a range of disciplines employing a variety of methodologies describe important findings from core areas of the field including music cognition the neuroscience of music musical performance and music therapy The book can be used as a textbook for courses in music cognition auditory perception science of music psychology of music philosophy of music and music therapy and as a reference for researchers teachers and musicians The book s sections cover music perception music cognition music neurobiology and evolution musical training ability and performance and musical experience in everyday life Chapters treat such topics as pitch rhythm and timbre musical expectancy musicality musical disorders and absolute pitch brain processes involved in music perception cross species studies of music cognition and music across cultures improvisation the assessment of musical ability and singing and music and emotions musical preferences and music therapy Contributors Fleur Bouwer Peter Cariani Laura K Cirelli Annabel J Cohen Lola L Cuddy Shannon de L Etoile Jessica A Grahm David M Greenberg Bruno Gingras Henkjan Honing Lorna S Jakobson Ji Chul Kim Stefan Koelsch Edward W Large Miriam Lense Daniel Levitin Charles J Limb Psyche Loui Stephen McAdams Lucy M McGarry Malinda J McPherson Andrew J Oxenham Caroline Palmer Aniruddh Patel Eve Marie Quintin Peter Jason Rentfrow Edward Roth Frank A Russo Rebecca Scheurich Kai Siedenburg Avital Sternin Yanan Sun William F Thompson Renee Timmers Mark Jude Tramo Sandra E Trehub Michael W Weiss Marcel Zentner

**Insights in auditory cognitive neuroscience: 2021** Claude Alain, Marc Schönwiesner, 2023-05-04

*The Human Auditory Cortex* David Poeppel, Tobias Overath, Arthur Popper, Richard R. Fay, 2012-04-12 We live in a complex and dynamically changing acoustic environment To this end the auditory cortex of humans has developed the ability to process a remarkable amount of diverse acoustic information with apparent ease In fact a phylogenetic comparison of auditory systems reveals that human auditory association cortex in particular has undergone extensive changes relative to that of other species although our knowledge of this remains incomplete In contrast to other senses human auditory cortex receives input that is highly pre processed in a number of sub cortical structures this suggests that even primary auditory cortex already performs quite complex analyses At the same time much of the functional role of the various sub areas in human auditory cortex is still relatively unknown and a more sophisticated understanding is only now emerging through the use of contemporary

electrophysiological and neuroimaging techniques The integration of results across the various techniques signify a new era in our knowledge of how human auditory cortex forms basis for auditory experience This volume on human auditory cortex will have two major parts In Part A the principal methodologies currently used to investigate human auditory cortex will be discussed Each chapter will first outline how the methodology is used in auditory neuroscience highlighting the challenges of obtaining data from human auditory cortex second each methods chapter will provide two or at most three brief examples of how it has been used to generate a major result about auditory processing In Part B the central questions for auditory processing in human auditory cortex are covered Each chapter can draw on all the methods introduced in Part A but will focus on a major computational challenge the system has to solve This volume will constitute an important contemporary reference work on human auditory cortex Arguably this will be the first and most focused book on this critical neurological structure The combination of different methodological and experimental approaches as well as a diverse range of aspects of human auditory perception ensures that this volume will inspire novel insights and spurn future research

*Music in the Social and Behavioral Sciences* William Forde Thompson, 2014-07-18 This first definitive reference resource to take a broad interdisciplinary approach to the nexus between music and the social and behavioral sciences examines how music affects human beings and their interactions in and with the world The interdisciplinary nature of the work provides a starting place for students to situate the status of music within the social sciences in fields such as anthropology communications psychology linguistics sociology sports political science and economics as well as biology and the health sciences Features Approximately 450 articles arranged in A to Z fashion and richly illustrated with photographs provide the social and behavioral context for examining the importance of music in society Entries are authored and signed by experts in the field and conclude with references and further readings as well as cross references to related entries A Reader's Guide groups related entries by broad topic areas and themes making it easy for readers to quickly identify related entries A Chronology of Music places material into historical context a Glossary defines key terms from the field and a Resource Guide provides lists of books academic journals websites and cross references The multimedia digital edition is enhanced with video and audio clips and features strong search and browse capabilities through the electronic Reader's Guide detailed index and cross references Music in the Social and Behavioral Sciences available in both multimedia digital and print formats is a must have reference for music and social science library collections

*The Sense of Hearing* Christopher J. Plack, 2013-11-12 The Sense of Hearing is a truly accessible introduction to auditory perception that is intended for students approaching the subject for the first time and as a foundation for more advanced study The second edition has been thoroughly revised throughout and included new chapters on music hearing impairment and a new appendix describing research methodologies In clear and authoritative prose the fundamental aspects of hearing are addressed The reader is introduced to the nature of sound and the spectrum and the anatomy and physiology of the auditory system Basic auditory processes including frequency

selectivity loudness and pitch perception temporal resolution and sound localization are explained The reader is led to an understanding of the remarkable abilities of the auditory system in a systematic and coherent way In subsequent chapters it is shown how complex processes such as perceptual organization speech perception and music perception are dependent on the initial analysis that occurs when sounds enter the ear Finally a chapter on hearing impairment provides an introduction to disorders of the auditory system The text benefits from 162 original illustrations including uncluttered diagrams that illuminate auditory mechanisms An extensive glossary provides definitions of technical terms The emphasis is on explanation and clarity of style throughout making *The Sense of Hearing* an essential resource for students and educators involved in this sometimes challenging field

*13th International Conference on Biomedical Engineering* Chwee Teck Lim, James Goh Cho Hong, 2009-03-15  
On behalf of the organizing committee of the 13 International Conference on Biomedical Engineering I extend our warmest welcome to you This series of conference began in 1983 and is jointly organized by the YLL School of Medicine and Faculty of Engineering of the National University of Singapore and the Biomedical Engineering Society Singapore First of all I want to thank Mr Lim Chuan Poh Chairman A STAR who kindly agreed to be our Guest of Honour to give the Opening Address amidst his busy schedule I am delighted to report that the 13 ICBME has more than 600 participants from 40 countries We have received very high quality papers and inevitably we had to turn down some papers We have invited very prominent speakers and each one is an authority in their field of expertise I am grateful to each one of them for setting aside their valuable time to participate in this conference For the first time the Biomedical Engineering Society USA will be sponsoring two symposia i.e. Drug Delivery Systems and Systems Biology and Computational Bioengineering I am thankful to Prof Tom Skalak for his leadership in this initiative I would also like to acknowledge the contribution of Prof Takami Yamaguchi for organizing the NUS Tohoku's Global COE workshop within this conference Thanks also to Prof Fritz Bodem for organizing the symposium Space Flight Bioengineering This year's conference proceedings will be published by Springer as an IFMBE Proceedings Series

**The Routledge Companion to Interdisciplinary Studies in Singing, Volume I: Development** Frank A. Russo, Beatriz Ilari, Annabel J. Cohen, 2020-05-19  
The Routledge Companion to Interdisciplinary Studies in Singing Volume I: Development introduces the many voices necessary to better understand the act of singing a complex human behaviour that emerges without deliberate training Presenting research from the social sciences and humanities alongside that of the natural sciences and medicine alike this companion explores the relationship between hearing sensitivity and vocal production in turn identifying how singing is integrated with sensory and cognitive systems while investigating the ways we test and measure singing ability and development Contributors consider the development of singing within the context of the entire lifespan focusing on its cognitive social and emotional significance in four parts Musical historical and scientific foundations Perception and production Multimodality Assessment In 2009 the Social Sciences and Humanities Research Council of Canada funded a seven year major collaborative research initiative

known as Advancing Interdisciplinary Research in Singing AIRS Together global researchers from a broad range of disciplines addressed three challenging questions How does singing develop in every human being How should singing be taught and used to teach How does singing impact wellbeing Across three volumes The Routledge Companion to Interdisciplinary Studies in Singing consolidates the findings of each of these three questions defining the current state of theory and research in the field Volume I Development tackles the first of these three questions tracking development from infancy through childhood to adult years Computational Models of the Auditory System Ray Meddis, Enrique Lopez-Poveda, Richard R. Fay, Arthur N. Popper, 2010-06-16 The Springer Handbook of Auditory Research presents a series of comprehensive and synthetic reviews of the fundamental topics in modern auditory research The volumes are aimed at all individuals with interests in hearing research including advanced graduate students post doctoral researchers and clinical investigators The volumes are intended to introduce new investigators to important aspects of hearing science and to help established investigators to better understand the fundamental theories and data in fields of hearing that they may not normally follow closely Each volume presents a particular topic comprehensively and each serves as a synthetic overview and guide to the literature As such the chapters present neither exhaustive data reviews nor original research that has not yet appeared in peer reviewed journals The volumes focus on topics that have developed a solid data and conceptual foundation rather than on those for which a literature is only beginning to develop New research areas will be covered on a timely basis in the series as they begin to mature *The Oxford Handbook of Auditory Science: Hearing* David R. Moore, Paul Albert Fuchs, Adrian Rees, Alan R. Palmer, Christopher J. Plack, 2010 Volume 1 The Ear edited by Paul Fuchs Volume 2 The Auditory Brain edited by Alan Palmer and Adrian Rees Volume 3 Hearing edited by Chris Plack Auditory science is one of the fastest growing areas of biomedical research There are now around 10 000 researchers in auditory science and ten times that number working in allied professions This growth is attributable to several major developments Research on the inner ear has shown that elaborate systems of mechanical transduction and neural processes serve to improve sensitivity sharpen frequency tuning and modulate response of the ear to sound Most recently the molecular machinery underlying these phenomena has been explored and described in detail The development maintenance and repair of the ear are also subjects of contemporary interest at the molecular level as is the genetics of hearing disorders due to cochlear malfunctions **The Common Marmoset in Captivity and Biomedical Research** Robert P. Marini, Lynn M. Wachtman, Suzette D. Tardif, Keith Mansfield, James G. Fox, 2018-11-19 The Common Marmoset in Captivity and Biomedical Research is the first text dedicated exclusively to this species filling an urgent need for an encyclopedic compilation of the existing information Sponsored by the American College of Laboratory Animal Medicine as part of its authoritative Blue Book series the book covers the biology management diseases and clinical and research applications of this important species The common marmoset *Callithrix jacchus* has come of age in the scientific community as a behaviorally complex cognitively advanced small prolific and easily

maintained nonhuman primate with many of the advantages of larger animals such as macaques but without the attendant physical and zoonotic risks. Marmosets are currently being used in diverse areas of inquiry including vision and auditory research, infectious disease, cognitive neuroscience, behavior, reproductive biology, toxicology, and drug development and aging. The marmoset genome has been sequenced and there is currently an intensive effort to apply gene editing technologies to the species. The creation of transgenic marmosets will provide researchers with a small nonhuman primate model to study a number of poorly understood disorders like autism. Presents a complete view of the marmoset covering their biology and management, diseases and clinical applications, and research applications. Includes contributions from renowned and international authors and editors. Provides the first authoritative and comprehensive treatment of marmosets in biomedical research as part of the ACLAM Series.

Communication Acoustics Ville Pulkki, Matti Karjalainen, 2015-04-30 In communication acoustics the communication channel consists of a sound source, a channel, acoustic and/or electric, and finally the receiver, the human auditory system, a complex and intricate system that shapes the way sound is heard. Thus, when developing techniques in communication acoustics such as in speech audio and aided hearing, it is important to understand the time-frequency space resolution of hearing. This book facilitates the reader's understanding and development of speech and audio techniques based on our knowledge of the auditory perceptual mechanisms by introducing the physical signal processing and psychophysical background to communication acoustics. It then provides a detailed explanation of sound technologies where a human listener is involved, including audio and speech techniques, sound quality measurement, hearing aids, and audiology. Key features: Explains perceptually based audio; the authors take a detailed but accessible engineering perspective on sound and hearing with a focus on the human place in the audio communications signal chain from psychoacoustics and audiology to optimizing digital signal processing for human listening. Presents a wide overview of speech from the human production of speech sounds and basics of phonetics to major speech technologies, recognition and synthesis of speech, and methods for speech quality evaluation. Includes MATLAB examples that serve as an excellent basis for the reader's own investigations into communication acoustics interaction schemes which intuitively combine touch, vision, and voice for lifelike interactions.

**The Oxford Handbook of Cognitive Neuroscience, Volume 1** Kevin Ochsner, Stephen M. Kosslyn, 2013-12 A rich source of authoritative information that supports reading and study in the field of cognitive neuroscience, this two-volume handbook reviews the current state of the science in all major areas of the field.

The Origins of Musicality Henkjan Honing, 2019-08-20 Interdisciplinary perspectives on the capacity to perceive, appreciate, and make music. Research shows that all humans have a predisposition for music just as they do for language. All of us can perceive and enjoy music even if we can't carry a tune and consider ourselves unmusical. This volume offers interdisciplinary perspectives on the capacity to perceive, appreciate, and make music. Scholars from biology, musicology, neurology, genetics, computer science, anthropology, psychology, and other fields consider what music is for and why every human culture has it, whether



musicality is a uniquely human capacity and what biological and cognitive mechanisms underlie it Contributors outline a research program in musicality and discuss issues in studying the evolution of music consider principles constraints and theories of origins review musicality from cross cultural cross species and cross domain perspectives discuss the computational modeling of animal song and creativity and offer a historical context for the study of musicality The volume aims to identify the basic neurocognitive mechanisms that constitute musicality and effective ways to study these in human and nonhuman animals and to develop a method for analyzing musical phenotypes that point to the biological basis of musicality Contributors Jorge L Armony Judith Becker Simon E Fisher W Tecumseh Fitch Bruno Gingras Jessica Grahn Yuko Hattori Marisa Hoeschele Henkjan Honing David Huron Dieuwke Hupkes Yukiko Kikuchi Julia Kursell Marie laine Lagrois Hugo Merchant Bj rn Merker Iain Morley Aniruddh D Patel Isabelle Peretz Martin Rohrmeier Constance Scharff Carel ten Cate Laurel J Trainor Sandra E Trehub Peter Tyack Dominique Vuvan Geraint Wiggins Willem Zuidema     **The Oxford Handbook of Computer Music** R. T. Dean, 2009-09-16 This handbook provides a cross section of the most field defining topics and debates in the field of computer music today From music cognition to pedagogy it situates computer music in the broad context of its creation and performance across the full range of issues that crop up in discourse in the field

**Fundamentals of Hearing: An Introduction** William Yost, 2021-11-15 The fifth edition of this successful introductory text on hearing sciences includes auditory anatomy physiology psychoacoustics and perception content Fundamentals of Hearing is one of only a few textbooks that covers all of hearing at an introductory level A meaningful introduction to hearing for students and a wealth of data and facts related to hearing for the professional It is heavily illustrated with over 200 figures Each chapter concludes with a Supplement section with additional resources about topics covered Appendices provide background information to enable full comprehension of content It contains a complete Glossary of terms from the American Standards Institute a combined subject author index and a comprehensive bibliography

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