This book builds on and in many ways completes the project of Fred Lerdahl and Ray Jackendoff's influential A Generative Theory of Tonal Music. Like the earlier volume, this book is both a music-theoretic treatise and a contribution to the cognitive science of music. After presenting some modifications to Lerdahl and Jackendoff's original framework, the book develops a quantitative model of listeners' intuitions of the relative distances of pitches, chords, and regions from a given tonic. The model is used to derive prolongational structure, trace paths through pitch space at multiple prolongational levels, and compute patterns of tonal tension and attraction as musical events unfold. The consideration of pitch-space paths illuminates issues of musical narrative, and the treatment of tonal tension and attraction provides a technical basis for studies of musical expectation and expression. These investigations lead to a fresh theory of tonal function and reveal an underlying parallel between tonal and metrical structures. Later portions of the book apply these ideas to highly chromatic tonal as well as atonal music. In response to stylistic differences, the shape of pitch space changes and psychoacoustic features become increasingly important, while underlying features of the theory remain constant, reflecting unvarying features of the musical mind. The theory is illustrated throughout by analyses of music from Bach to Schoenberg, and frequent connections are made to the music-theoretic and psychological literature.
This book is about the nature of expression in speech. It is a comprehensive exploration of how such expression is produced and understood, and of how the emotional content of spoken words may be analysed, modelled, tested, and synthesized. Listeners can interpret tone-of-voice, assess emotional pitch, and effortlessly detect the finest modulations of speaker attitude; yet these processes present almost intractable difficulties to the researchers seeking to identify and understand them. In seeking to explain the production and perception of emotive content, the book reviews the potential of biological and cognitive models. It examines how the features that make up the speech production and perception systems have been studied by biologists, psychologists, and linguists, and assesses how far biological, behavioural, and linguistic models generate hypotheses that provide insights into the nature of expressive speech.

Generalized Musical Intervals and Transformations
David Lewin

This book is recognized as the seminal work paving the way for current studies in mathematical and systematic approaches to music analysis. The author, one of the 20th century’s most prominent figures in music theory, pushes the boundaries of the study of pitch-structure beyond its conception as a static system for classifying and inter-relating chords and sets. Known by most music theorists as “GMIT”, the book is by far the most significant contribution to the field of systematic music theory in the last half-century, generating the framework for the “transformational theory” movement. Appearing almost twenty years after GMIT’s initial publication, this Oxford University Press edition features a previously unpublished preface by the author, as well as a foreword by Edward Gollin contextualizing the work’s significance for the current field of music theory.

Balance on the Lute: The Role of the Strings
MIMMO PERUFFO

in The Music Room in Early Modern France and Italy: Sound, Space and Object

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The lute was the instrument on which the luthiers and string-makers of the past expended the greatest effort in order to achieve the best possible acoustic balance between the instrument and its strings. Formidable skills in the design and making of instruments were necessitated by the low tension of the strings, the sound produced simply by plucking with the fingers (rather than stroking with the bow) and the huge difference in frequency between the highest and lowest strings (especially in the versions with ten or eleven strings on the same fingerboard). The lute-makers of the Renaissance designed their instruments starting from the mechanical and acoustic properties of the strings, rather from the characteristics of existing instruments. It can thus be asserted that the lute guaranteed its success thanks to the best possible reconciliation of certain variables, in order to achieve the optimum balance between the rules of statics and acoustics.

Geoffrey Hill: A ‘Question of Value’
David-Antoine Williams

in Defending Poetry: Art and Ethics in Joseph Brodsky, Seamus Heaney, and Geoffrey Hill

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Item type: chapter

This chapter investigates Geoffrey Hill's abiding concern with the equation of semantic and ethical recognition, his experience of language as an arena in which our ethical being is both menaced and succoured, though perhaps not secured. Hill's cogitations on this problem accompany a career-long exploration of the question of intrinsic value, a concept which he admits has gone out of fashion but which he nonetheless attempts to rescue for his theory of language. Hill's ethics of responsibility requires that literature memorialize and memorize the dead, but his scepticism about the ability of language to do justice to its subjects forces him into a paradoxical contemplation of silence as the only responsible speech. Even so, the question of value has increasingly been posed by Hill in its public dimension, as embodying the union of civic (including political), theological (including metaphysical), and grammatical (including etymological) thought. One way Hill thinks the writer can realize intrinsic value is in the assiduous plying of words, the working in poetry of their etymology, grammar, and syntax into a high semantic pitch; this chapter pays special attention to the words that have meant the most to Hill: ‘value’, ‘atonement’, ‘endurance’, ‘patience’, ‘attention’, ‘justice’, ‘grace’, ‘pitch’, ‘common’, and ‘alienation’.
Vowels are an important feature of the world's languages. Languages, however, differ in the number and the acoustic properties of their vowels. The two main problems of vowel perception needing explanation are vowel categorization (identification) and vowel constancy. Categorization concerns how listeners know which of the different vowels of their language has been spoken. Constancy concerns how listeners do this despite wide variations in the realization of any particular vowel. This book opens with a brief consideration of the articulation and acoustics of vowels. It shows how differences in vowels arise across languages. Succeeding chapters cover auditory processing of vowels, concentrating on perceptual determination of formant peaks. Auditory processing includes identification and discrimination, normalization across speakers, and compensating perceptually for coarticulation and effects of rate and stress. The extensive literature on these topics is reviewed and integrated. A theory of vowel perception is proposed, based on fundamental psychoacoustic results and covering a wide variety of experimental findings on vowel identification and discrimination. The theory includes a pitch transform, spectral integration and suppression effects, specification of peaks in a phonetic loudness density function, and a nearest neighbour decision procedure. The theory tries to explain both vowel categorization and vowel constancy. The book ends with a general consideration of modern theories of vowel perception.

Epilogue

Elliott Antokoletz

in Musical Symbolism in the Operas of Debussy and Bartok

The new musical language that emerged in the early 20th century seems to have been motivated, at least in part, by the need to reflect — even express — the new literary, psychological, and philosophical principles that surfaced in the new art-form of these symbolist operas. The transformation of the more linear, defined quality of the traditional major/minor scales into the more diffuse, static effects created by the
use of modality, polymodality, and symmetrical pitch-set interactions resonated with the modernistic conception of the human being, who is perennially divided and threatened by the split between the conscious and the unconscious mind. The symbolic connotation of symmetrical pitch relations has similarities with Matte Blanco's concept of “the unconscious as infinite sets”. Also discussed is the creative process and social context, in which the text narratives are impacted by the ideological trends of the time, not only in what they say, but also in what they omit. Both operas have meanings that must be decoded. Analysis of these works stems from the point of view of dynamic psychology. The chapter touches on various psychological and social (gender) issues as addressed by György Lukacs and Béla Balázs.

Pitch perception and frequency discrimination in normally hearing and hearing-impaired people

Brian C. J. Moore

in Perceptual Consequences of Cochlear Damage

Published in print: 1995 Published Online: January 2008
Publisher: Oxford University Press
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Item type: chapter

Pitch is important for conveying the intonation of speech sounds and for the perception of music. The ability to hear changes in pitch (frequency discrimination) is adversely affected by cochlear hearing loss. This chapter describes frequency discrimination and pitch perception in normal and impaired hearing. Topics include experimental data on frequency discrimination for pure tones and for complex tones; analysis of the results in terms of pitch theories; implications for the basic understanding of mechanisms of pitch perception; and perceptual consequences of abnormal pitch perception.

Syntax, information structure, embedded prosodic phrasing, and the relational scaling of pitch accents *

Caroline Féry

in The Sound Patterns of Syntax

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DOI: 10.1093/acprof:oso/9780199556861.003.0013
Item type: chapter

This paper proposes on the basis of experimental material that pitch scaling in an intonation language such as German is relational rather
than absolute. In other words, the height of a pitch accent depends on the presence of other pitch accents in the same prosodic domain. A further point made in the paper is that the raising of lowering of pitch accents because of information structure does not necessarily affect prosodic phrasing, which is primarily mapped to syntax.

Diatonic Space
Fred Lerdahl

in Tonal Pitch Space

This chapter introduces and develops the concept of pitch space, beginning with a distinction between tonal and event hierarchies. After a consideration of previous approaches, the fundamental construct of the basic space is proposed. From this construct an algebraic and geometrical model is developed that calculates the cognitive distance in diatonic space of any pitch, chord, or region (key) to any other pitch, chord, or region. The principle of the shortest path is introduced as a means for deriving time-span and prolongational structures. Empirical issues are engaged, including details of quantification, experimental support for the computed distances, connections of the model to psychoacoustics, related problems in neo-Riemannian theory, and the representation of these structures in the brain.

Paths in Pitch Space
Fred Lerdahl

in Tonal Pitch Space

Using geometrical projections from the distance algorithms in the previous chapter, this chapter develops the notion of pitch-space paths in sequences of events at multiple prolongational levels. Pitch-space paths are traced in two Chopin preludes through contrasting spatial representations, including regional, chordal/regional, scale-degree, and pitch-class/chordal spaces. The exposition moves to the treatment of regional prolongations and to parallel mixture, the latter causing a collapse in regional space, with examples taken from Schubert and
Wagner. An extended discussion ensues of narrative paths in Wagner's Parsifal. The chapter concludes with historical references to pitch-space paths in the music of Schubert and Schumann, and to an analogy to semantic paths in linguistic theory.

Tonal Tension and Attraction
Fred Lerdahl

in Tonal Pitch Space

This chapter applies the pitch-space model to sequences and hierarchies of events to reveal patterns of tonal tension and attraction. Intuitions of tonal tension and relaxation correspond to distances in relation to a given reference point (the tonic). Computational methods for both sequential and hierarchical tension are developed and illustrated in a Mozart sonata. These considerations lead to a reformulation of the interaction principle. The factor of surface dissonance is incorporated into the model. Intuitions of melodic anchoring motivate the complementary theory of melodic (or voice-leading) attractions. The crucial factors in the melodic attraction rule are proximity and stability. Attractions between reciprocal pitches and chords are asymmetrical, and attractions are provisionally equated with expectancies. The melodic attraction model is extended to harmonic attraction. The relationship between tonal tension and attraction is discussed, as are connections to other theories.

The State of the Art
Mark Tatham and Katherine Morton

in Expression in Speech: Analysis and Synthesis

This chapter discusses the transfer of the parameters of natural expression to synthesis systems following current inadequate descriptions of natural speech, which highlights problems in deriving adequate descriptions of expression and emotion. Voice quality, timing, and pitch contour all contribute — but quantifying these observations is currently incomplete and open to further research. Defining emotion in terms of acoustic correlates is discussed along
with the variability in speech to which emotive content contributes. The non-uniqueness of acoustic correlates is emphasized, and the need for differentiating between high-level and low-level synthesis in the theoretical underpinning is discussed.

Accentuation in Practice
Clive Brown

in Classical and Romantic Performing Practice 1750-1900

Published in print: 1999 Published Online: May 2008
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Item type: chapter

This chapter investigates the relationship between theory and practice in accentuation. It deals with the ways in which notation may imply accentuation where it is not explicitly indicated, for instance, in relation to slurs, dissonant or chromatic notes, high or low pitch, long notes, syncopation, beaming, final notes, and other factors, such as varying accentuation on the repetition of a figure. It also considers different types of accent and the ways in which they were executed. Agogic accent and related issues of ‘inequality’ are discussed with reference to the writings of Quantz, Mozart, Koch, Löhlein, Corri, Crelle, Spohr, García, Dommer, and Riemann. Charles de Bériot's instructions for different degrees of percussive accent are discussed.

Sounds and Sweet Airs
Murray Campbell, Clive Greated, and Arnold Myers

in Musical Instruments: History, Technology, and Performance of Instruments of Western Music

Published in print: 2004 Published Online: May 2008
Publisher: Oxford University Press
Item type: chapter

This introductory chapter discusses how sound waves are generated by musical instruments, travel to the ear of a listener, and there evoke the sensation of music. Using the example of an orchestral score, the musical descriptors pitch, loudness, and timbre are related to scientifically measurable features of the sound waves, including frequency, amplitude, waveform, and spectrum. The distinction between travelling and standing waves is explained. The roles of the outer, middle, and inner ears in hearing musical sounds are briefly described. The importance of harmonic frequency spectra in pitch perception is emphasized,
and a discussion of pitch intervals includes an introduction to musical temperaments. The relationship between decibel measurements of sound intensity and musical dynamic markings is discussed, and attempts to provide quantitative descriptions of timbre are reviewed.

Percussion Instruments
Murray Campbell, Clive Greated, and Arnold Myers

in Musical Instruments: History, Technology, and Performance of Instruments of Western Music

Published in print: 2004 Published Online: May 2008
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Item type: chapter

This chapter describes the basic acoustical characteristics of unpitched and pitched percussion instruments, including the functions of beaters (hammers). The history and development of percussion instruments commonly scored for is summarized, considering the xylophone, glockenspiel, triangle, cymbals, bells, gongs, and drums, including side or snare drums, bass drum, kettledrums (timpani), and tambourine. The contemporary use of percussion, including the drum kit, is outlined. Methods of tuning glockenspiel and xylophone bars are described, and brief descriptions of traditional bellfounding and drumhead preparation are given as examples of the varied techniques involved in making percussion instruments. Playing techniques are explored, including the choice of beaters, stick technique, and timpani tuning.

Plucked and Hammered Stringed Instruments
Murray Campbell, Clive Greated, and Arnold Myers

in Musical Instruments: History, Technology, and Performance of Instruments of Western Music

Published in print: 2004 Published Online: May 2008
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Item type: chapter

This chapter discusses the acoustical principles underlying the behaviour of plucked and hammered stringed instruments, including the effects of the point of attack and the nature of the plectrum or hammer on the frequency spectrum and timbre of the sound. The significance of the feel of a string and the technique of pitch bending are explained. A survey of the historical development of plucked and hammered stringed instruments includes descriptions of lyre, psaltery, cittern, dulcimer,
and cimbalom; and discussions of the evolution of harps, lute, and
guitars. The construction and functioning of the modern lute and guitar
are described, and current methods of performance on harp, lute, and
classical guitar are outlined.

Introduction
B. S. Rosner and J. B. Pickering

in Vowel Perception and Production

Vowel categorization and vowel constancy are offered as the central
topics of vowel perception. The source-filter theory of vowel production
and the physical representation of vowels are introduced. Various
auditory transforms on frequency are reviewed. The plan of the book is
outlined.

Revisions
Donald Maurice

in Bartók's Viola Concerto: The Remarkable Story of His Swansong

This chapter examines in depth the revisions of Atar Arad, Csaba
Erd'lyi, Peter Bartók, and Donald Maurice with reference to the overall
chronology of the revisions, the degree of revision, and cross-influence
between revisionists. The revisions are systematically compared with
Tibor Serly's version and also with each other, under categories of
structure, orchestration, tempo, phrasing, and pitches in the viola
part. Mention is made of the cultural and musical background of the
revisionists and to what degree those factors influenced musical
decisions. While for the most part the comparisons are objective
observations, some judgments on the relative success of decisions taken
by the revisionists are made, including retrospective reservations about
some decisions in the author's own unpublished revision.
This chapter focuses on those aspects of the work that a revisionist must consider when transforming the manuscript into a performable work. Under the subheadings of structure, melody, pitch organization, rhythm and orchestration, and texture, examples are identified where analysis of similar occurrences in other works may offer solutions to ambiguities in the Viola Concerto. These other works include the Fourth String Quartet, Music for Strings, Percussion and Celeste, Second Piano Concerto, Second Violin Concerto, and Fifth String Quartet. An extended contribution from Elliott Antokoletz provides much insight into the aspect of tonality and on note selection in the heavily ornamented section in the last movement, centred on the use of the octatonic scale and polymodal chromaticism. A consideration of Bartók's practices in other works under the abovementioned subheadings is illuminating.