

InterPARES Bibliography: Music Research Project
Version 2: July 21, 2000

1. Defining the Musical Work

- 1.1. Ingarden, Roman. *The Work of Music and the Problem of its Identity*. Translated by Adam Czerniawski. Berkeley: University of California Press, 1986. ML 3845 I5713 1986

A philosophical consideration of the ontology of the musical artwork, with particular attention to its relationship to its score. Argues that “it is much more difficult to solve the problem [of the identity of the musical work] here than in the case of a painting or work of architecture, since we do not have an ‘original’ object as we do when an artist completes a painting or builds a specific edifice.” (119).

- 1.2. Nattiez, Jean-Jacques. *Music and Discourse: Toward a Semiology of Music*. Translated by Carolyn Abbate. Princeton: Princeton University Press, 1990. ML 3797 N37 M813 1990

Chapter 3, “The Concept of the Musical Work,” develops Ingarden’s ideas in a semiological direction, according to the tripartite distinction between poietic (compositional and/or performative), esthetic (perceptual) and neutral (analytic) aspects of the work.

- 1.3. Thomas, David H. and Richard P. Smiraglia. “Beyond the Score.” *Notes (Quarterly Journal of the Music Library Association)* 54/3 (March, 1998): 649-666.

Discussion of the problems of cataloging music materials, and the frequent confusion of the musical work with its primary paper representation—the score. Theoretical discussion of the “relationship of a musical work to its physical instantiations” (650), with reference to Nattiez, Ingarden.

2. Authenticity and the Text

- 2.1. Donington, Robert. *The Interpretation of Early Music*. 1963. New revised edition. New York and London: W. W. Norton, 1989. ML 457 D64 1989

Classic text on authentic performance practice with respect to early music. Extended introduction deals with general issues of authenticity (definition, motivation, etc.).

- 2.2. Grier, James. *The Critical Editing of Music: History, Method, and Practice*. Cambridge: Cambridge University Press, 1996. ML 63 G745 C7 1996

Provides a theoretical framework for the appraisal and editing of texts. The work resides equally in the score and in the performing conventions that govern its interpretation at any given historical moment. The text is merely one state among many that a work may have. Problem of choosing the most authoritative of several texts. Discusses facsimile editions, possibilities of electronic text presentation.

- 2.3. Hambraeus, Bengt. *Aspects of Twentieth Century Performance Practice: Memories and Reflections*. Uppsala: Royal Swedish Academy of Music and Bengt Hambraeus, 1997. ML 457 H36 1997

Discussion of twentieth-century performance practice issues, introduced by technological innovations such as recording technology.

Discusses value of “documentary recordings,” such as those made by radio broadcasters of world premiere performances of new music. Can these be considered authentic versions of a work even if, as is typical, such first performances are often jeopardized by the performers’ unfamiliarity with possibly new, challenging sounds and techniques introduced by the composer? (109)

Music for the Stockholm Broadcasting House (1969): inspired by legal claims of members of Stockhausen’s “intuitive music” ensemble that they had rights as co-composers or arrangers. No score existed; designed in co-operation with legal experts of the Swedish Broadcasting Corporation and Swedish Composers Performance Rights’ Bureau. Hambraeus, all performers and technicians, agreed to share proceeds equally to avoid hierarchical complications; “legal” documentation exists in form of the 8-track tape held by the Broadcast archives. “Thus, the recorded improvisation became a legally documented work.” (178)

With regard to graphic scores: who is the composer, and what can be considered an “authentic” performance?

- 2.4. Kivy, Peter. *Authenticities: Philosophical Reflections on Musical Performance*. Ithaca and London: Cornell University Press, 1995. ML457 K58 A9 1995

Philosophical critique of the concept of historically authentic performance; commentary on Taruskin (see below); problem of intentionality, morality of authenticity; “sonic” and “sensible” authenticity. Final chapter deals with the relation of text, work, composer and performer.

- 2.5. Taruskin, Richard. *Text and Act: Essays on Music and Performance*. New York and Oxford: Oxford University Press, 1995. ML 457 T37 T4 1995

A collection of polemical articles on authenticity (e.g. “The Limits of Authenticity,” “What—or Where—Is the Original?”) inspired by the author’s skepticism about the historical authenticity movement.

3. Representation of Music (History and Problems of Notation)

- 3.1. Boretz, Benjamin and Edward T. Cone, eds. *Perspectives on Notation and Performance*. New York: Norton, 1976. ML 431 P47 1976

Collection of essays including Roman Haubenstock-Ramati, “Notation -- Material and Form,” Brian Fennelly, “A Descriptive Language for the Analysis of Electronic Music.”

- 3.2. Goodman, Nelson. *The Languages of Art*. Indianapolis and New York: Bobbs-Merrill, 1968. BH 301 S8 G6 1968

A discussion of notation in the arts. With respect to music, argues Goodman, the function of the score is “marking off the performances that belong to the work from those that do not.” (128) (This definition is applicable to aleatoric music as well as more highly determinate music.)

Discusses the question of authenticity with respect to the musical score. There can be no such thing as a *forgery* of a known work, although there may be false attributions. “Copies of the [autograph] score may vary in accuracy, but all accurate copies, even if forgeries of [the composer’s] manuscript, are equally genuine instances of the score. Performances may vary in correctness and quality and even in ‘authenticity’ of a more esoteric kind; but all correct performances are equally genuine instances of the work.” Distinguishes between two basic kinds of artwork, based on the relationship between an artwork and a copy or duplication of it: in autographic art forms, even the most exact copy of an artwork is not considered authentic, whereas in allographic forms such as music, there are many possible alternative versions or “copies” of a composition, all of which may be considered “authentic” performances despite the differences between them.

N.B. “A forgery of a work of art is an object falsely purporting to have the history of production requisite for the (or an) original of the work. Where there is a theoretically decisive test for determining that an object has all the constitutive properties of the work in question without determining how or by whom the object was produced, there is no requisite history of production and hence no forgery of any given work. Such a test is provided by a suitable notational system with an articulate set of characters and of

relative positions for them. . . Authority for a notation must be found in an antecedent classification of objects or events into works that cuts across . . . classification by history of production.” (122)

Cites scientific philosopher Sir George Thomson, on the impossibility of repeating an experiment exactly: “What it comes to when you say you repeat an experiment is that you repeat all the features of an experiment which a theory determines are relevant.” (177)

Distinguishes between “work-preservation,” as paramount, and “score-preservation,” as incidental. (178)

According to his definition of notation, the verbal language of tempos (allegro, andante, minuetto, etc.) does not qualify as notational and therefore not integral parts of a score, since departures from indicated tempo do not (in his opinion) disqualify a performance as an instance of the work as defined by the score. (185) Metronome markings do qualify as notational and thus truly “belong” to the score.

Another problem: is a brilliant performance with one wrong note still an instance of the work? Goodman concludes that, regrettably and contrary to common sense, it is not. Only performances that completely comply with the score are to be considered “authentic” instances of the work.

3.3. Karkoschka, Erhard. *Notation in New Music: A Critical Guide to Interpretation and Realisation*. Translated by Ruth Koenig. New York and Washington: Praeger Publishers, 1972. MT35 K185 S33 1972

Describes and categorizes twentieth-century developments in musical notation. Distinguishes four types of notational system: Precise Notation (every unit named), Range Notation (only limits of ranges are set), Suggestive Notation (relations of units or approximate limits of ranges specified), Musical Graphics. Discusses the notation of electronic music. Many examples from avant-garde musical scores by composers such as Berio, Cage, Ligeti, Stockhausen, Pousseur, Messiaen, Oliveros, etc.

3.4. Kurkela, Kari. *Note and Tone: A Semantic Analysis of Conventional Music Notation*. Helsinki: Suomen Musiikkitieteellinen Seura, Musicological Society of Finland, 1986. ML 431 K87 N6 1986

An attempt to formulate some general principles concerning the ways in which musical notation represents sound events. Discusses relation between musical notation and written language; the function of a score with respect to its performances; the identity of the musical work.

3.5. Lewin, David. “Music Theory, Phenomenology, and Modes of Perception.” *Music Perception* 3 (1986): 327-92.

A phenomenological model of music perception. Discussion of perception in relation to “productive modes of behaviour” i.e. composition and performance, as opposed to the modes of the analyst/listener. “Once the music *has been* composed, it becomes a wholly different phenomenon for the composer. It becomes a *trace* or *record* of past activities.” (376)

- 3.6. Rastall, Richard. *The Notation of Western Music: An Introduction*. London, Melbourne and Toronto: J. M. Dent & Sons, 1983. ML 431 R27 N6 1983

Defines musical notation as “the written symbols (which may include verbal instructions) by which musical ideas are represented and preserved for future performance or study.” (2). Discusses levels of notational specificity, and the types of information conveyed by notation; notation as a means for transmission of relevant information. Distinguishes between graphical scores that indicate the results wanted, and those which illustrate the mechanism by which these results are generated (265).

4. Representation of Music (Computer and Electroacoustic)

- 4.1. Assayag, Gerard, Camilo Rueda, Mikael Laurson, Carlos Agon, and Olivier Delerue. “Computer-Assisted Composition at IRCAM: From PatchWork to OpenMusic.” *Computer Music Journal* 23/3 (1999): 59-72.

An explanation of computer-assisted composition systems developed by IRCAM researchers, including architecture and features.

- 4.2. Assayag, Gerard, and Dan Timis. “Computer Printing, Storage, and Transfer of Musical Scores.” *Proceedings of the 1987 International Computer Music Conference*, 298-301. San Francisco: Computer Music Association, 1987.

An attempt 1) to identify the most important attributes of a musical score, and secondly, the relationship between the score and the musical structure; 2) to define the essential elements of a score for manipulation and storage on a computer and for communication between machines. Includes a model for coding musical scores.

- 4.3. Balaban, Mira. “The cross fertilization relationship between music and AI.” *Interface* 18 (1989): 89-115.

Discusses the CSM (Computer Study of Music) project building a common knowledge base for the common terminology of Western Tonal Music (WTM). Argues that CSM developments are driven by AI approach, while at the same time, AI developments are sometimes driven by CSM.

- 4.4. -----, "The Music Structures Approach to Knowledge Representation for Music Processing." *Computer Music Journal* 20/2 (Summer 1996): 96-111.

Describes the systematic development of the "music structures" approach to music representation, which consists of three levels: 1) the ontological level of structured and object-oriented music pieces, 2) the representation level of symbolic and visual music structures, and 3) the implementation level in the BOOMS system.

- 4.5. -----, "A Music-Workstation Based on Multiple Hierarchical Views of Music." *Proceedings of the 1988 International Computer Music Conference*, 56-65. San Francisco: Computer Music Association, 1988.

Discussion of problems caused by lack of standardization among computer music representation programs: users of different music processors cannot share files, music composed by composition program cannot be fed into analysis program, etc. Proposes solution in the "music structures" system.

- 4.6. -----, Kemal Ebcioglu, and Otto Laske, eds. *Understanding Music with AI: Perspectives on Music Cognition*. Cambridge, Mass.: MIT Press and Menlo Park, CA: AAAI Press, 1992. ML74 U528 1992

Collection of essays by various authors regarding applications of music AI to listening and perception, composition, analysis, performance, and learning.

- 4.7. Brinkman, Alexander R. "A Binomial Representation of Pitch for Computer Processing of Music Data." *Music Theory Spectrum* 8 (1986): 58-74.

Describes a representation for pitch structures that can be manipulated arithmetically, but which distinguishes between enharmonic notes and intervals while retaining octave and pitch class information.

- 4.8. -----, *Pascal Programming for Music Research*. Chicago: University of Chicago Press, 1990. ML 74 B74 P3 1990

Massive tome introducing the basics of computer science and Pascal programming in general, as well as issues specific to the encoding of musical data.

- 4.9. -----, "Representing Musical Scores for Computer Analysis." *Journal of Music Theory* 30 (1986): 225-75.

Describes development of a music analysis program that translates DARMS coding language into a format more accessible for the purposes of analysis.

- 4.10. Byrd, Donald. "Music Notation by Computer." Ph.D. diss., Indiana University, 1984. DA8506091. [not held by UBC]

Early dissertation on producing conventional music notation (CMN) on computer distinguishes four aspects of the "musicians' problem": sound input, sound output, CMN input and CMN output. The dissertation focuses on the problems of CMN output, arguing that "fully automated high-quality music notation is not merely nontrivial but in general impossible without human-level intelligence."

- 4.11. Cope, David. *Computers and Musical Style*. Computer Music and Digital Audio Series #6. Madison, Wisconsin: A-R Editions, 1991. MT723 C68 C6 1991

Introduction to EMI (Experiments in Musical Intelligence). Computer representation of musical style for purposes of replication. Involves the identification of specific, essential features of a given composer's musical "language." Could be relevant with respect to issues of authenticity and forgery.

- 4.12. ----- . *Experiments in Musical Intelligence*. Madison, Wisconsin: A-R Editions, 1996. MT56 C67 E9 1996

More detailed treatment of EMI. Explains details of analysis, pattern-matching and their applications to detecting compositional "signatures."

- 4.13. Dannenberg, Roger. "Extending Music Notation Through Programming." *Contemporary Music Review* 13 (1996): 63-76.

Discusses conventional music notation as "a force that ties contemporary music to tradition," (74) arguing that the system by which music is notated profoundly affects the nature of the music it is designed to express. Therefore, newly developed computer music programming languages offer new possibilities for musical expression. Any adequate music notation system must specify two parameters: sound material and control structure. Discusses polarity between notation and improvisation, and how computer music systems can employ aspects of both in interactive musical compositions. Describes a notation TPL (Temporal Programming Language) that can express both traditional, static musical structures and more flexible, improvisatory structures.

- 4.14. ----- . "Music Representation Issues, Techniques, and Systems." *Computer Music Journal* 17/3 (1993): 20-30.

An overview of theoretical and practical problems in computer music representation. Addresses specific parameters such as pitch, rhythm, timbre, notation. Identifies differences between continuous and discrete data, declarative and procedural

representations. Other topics include Resources, Instances, and Streams and Protocols and Coding. Includes good list of references.

- 4.15. ----- . "A Perspective on Computer Music." *Computer Music Journal* 20 (1996): 52-6.

A brief critical-historical overview of computer music from 1976-96, concluding with prognostications of future developments.

- . "The Resource-Instance Model of Musical Representation." *Proceedings of the 1991 International Computer Music Conference*, 428-32. Montreal: International Computer Music Association and McGill University, 1991.

Article defines and contrasts instance and resource models of music computation, and proposes a unified, general model for describing combinations of the two. In this hierarchical model, "resource-instances at one level generate output which is combined to form updates at the next level."

- 4.16. ----- . "A Structure for Representing, Displaying, and Editing Music." *Proceedings of the 1986 International Computer Music Conference*, 153-60. San Francisco: Computer Music Association, 1986.

A description of an extensible data structure ("Score") for the representation of music developed as part of the Musician's Workbench.

- 4.17. Davis, Deta S. *Computer Applications in Music: A Bibliography*. 2 vols. Madison, Wisconsin: A-R Editions, 1988, 1992 (Supplement). ML 128 C65 D4 1988

Bibliography covers literature on topics such as aesthetics, composition techniques, specific compositions, digital audio and signal processing, MIDI, programming languages, studios, microcomputers, music library and reference applications. Supplement (1992) has separate sections on individual computer systems (IBM, Macintosh, Apple, etc.).

- 4.18. DeFuria, Steve and Joe Scacciaferro. *The MIDI Resource Book*. Pompton Lakes, N.J.: Third Earth Publishing, 1987.

Technical manual for MIDI system. Companion volumes are *The MIDI Implementation Book* and *The MIDI System Exclusive Book*.

- 4.19. Dyer, Lounette M. "MUSE: An Integrated Software Environment for Computer Music Applications." *Proceedings of the 1986 International Computer Music Conference*, 167-72. San Francisco: Computer Music Association, 1986.

A description of the real-time interactive Musical Synthesis Environment (MUSE) software system, based on a "kernel" including both a semantic representation of music and low level operations for manipulating the representation, allowing for the transfer of a musical score between differing computer systems. Discussion placed in context of development of traditional Western musical notation.

- 4.20. Eaglestone, Barry M. and Albert Verschoor. "An Intelligent Music Repository." *Proceedings of the 1991 International Computer Music Conference*, 437-40. Montreal: International Computer Music Association and McGill University, 1991.

This article likens the computer music composer to an engineer, whose work towards a finished product proceeds through a number of stages: "like the engineer, the composer's life is complicated by various 'object management' and 'process management' tasks. He or she must: keep track of the different versions of a composition, of each of its parts, and of the relationships between them; assemble, maintain and utilize large archives of reusable material; develop, maintain and utilize a toolkit of programs and techniques for using them; create and maintain documentation, such as programme notes, performance instructions, annotation of the archived material for reuse, and user instruction for the various tools; and keep track of the composition process e.g. by planning and journaling." In the engineering field, the analogous tasks of a given project are managed with the assistance of IPSE (Integrated Project Support Environment) technology. The authors advocate transferral of the IPSE approach to the domain of computer music composition, and describe the architecture of a prototype using AI technology within the IPSE for intelligent sound archiving.

- 4.21. Eaglestone, Barry M., Tamas Ungvary and Geoff Davies. "A Musical Experiment with Next Generation Database Technology." *Proceedings of the 1992 International Computer Music Conference*, 376-7. San Jose, CA: International Computer Music Association, 1992.

An account of an experimental application of the concepts in the previously cited paper (4.20), to the composition of Tamas Ungvary's TEMA, a short piece for tape and dance. A system was designed based on an artist-oriented workspace, which includes a composer's archives for reusable materials, palettes for manipulating materials, and scores for assembling compositions. Compositional techniques developed by the composer during the composition process can be represented as objects and archived for future reuse. Research based at Bradford University in the UK.

- 4.22. Hamel, Keith. "A Design for Music Editing and Printing Software Based on Notational Syntax." *Perspectives of New Music* 27 (1989): 70-83.

Discussion of goals and problems in designing music notation software. Preference for graphics-based vs. syntax-based program explained. Discusses categories of notation, symbology, etc.

- 4.23. ----- . "Issues in the Design of Music Notation Systems." *Proceedings of the 1987 International Computer Music Conference*, 325-32. San Francisco: Computer Music Association, 1987.

A discussion of music notation as communication. Defines notion of *competent placement*, i.e. "the positioning of music objects so that they reinforce the essential music information," and discusses the challenges of integrating this ideal into a computer notation program.

- 4.24. ----- . "NoteAbility – A Comprehensive Music Notation Editor." *Proceedings of the 1998 International Computer Music Conference*, 506-9. San Francisco: International Computer Music Association and the University of Michigan, 1998.

A description of the NoteAbility music notation editor, developed (and currently in use) at the UBC School of Music.

- 4.25. ----- . "NoteAbility: A Music Notation System That Combines Musical Intelligence with Graphical Flexibility." *Proceedings of the 1994 International Computer Music Conference*, 303-6. Aarhus, Denmark: ICMC and the Danish Institute for Electroacoustic Music, 1994.

A description of the NoteAbility music notation system for NeXTStep computers, a system designed to combine high levels of both "notational intelligence" and formatting/editing capabilities within a "flexible graphical environment." Includes brief general discussion of problems of designing music notation systems.

- 4.26. Haus, Goffredo, Ed. *Music Processing*. Madison, Wisconsin: A-R Editions, 1992. ML 1093 M89 1992

Articles by Selfridge-Field, Pope, Laske, Dannenberg, Haus, and others on music composition and analysis by computer, representation of music (e.g. "symbolic and subsymbolic description," and a case study involving the modelling of Ravel's *Bolero* by Petri nets), artificial intelligence. Includes reports from 4 computer music laboratories (Carnegie Mellon, CCRMA, IRCAM, LIM in Milan).

- 4.27. Hewlett, Walter B. "The Representation of Musical Information in Machine-Readable Format." *Directory of Computer Assisted Research in Musicology 1987*. Menlo Park: Center for Computer Assisted Research in the Humanities, 1987. 1-22.

Results of a survey on methods of music representation conducted by CCARH (Center for Computer Assisted Research in the Humanities), Stanford University. Discussion of DARMS, SCORE, MUSTRAN.

- 4.28. ----- and Eleanor Selfridge-Field, Eds. *Computing in Musicology: An International Directory of Applications*. Vols. 1-9. ML 3797 H498 D57 1989-1993

Yearbook containing articles on the subjects of data, document delivery, music notation software, optical recognition, musicological and music theoretical research applications of computer technology.

- 4.29. Holland, Bill. "A Management/Preservation Scorecard." *Billboard – The International Newsweekly of Music, Video, and Home Entertainment* 111:45 (6 November, 1999): 92 ff. [not held by UBC; see Brent Lee]

One of a series of articles concerning the state of archival material in the possession of the five major record labels (Sony, BMG, UMG, Warner, and EMI), based on interviews by the author with representatives from each label. Only Sony has a digital archive in place, while the remaining companies were still considering their options.

Other articles address the industry-wide issues of tape deterioration, both analog and digital, and the specific problems of digital drop-out. One major concern for record labels is that the multitrack digital master tapes made in the '80s and '90s were not preserved, and that the stereo masters are fixed at 44.1 kHz sampling at 16-bit depth. As this system is gradually supplanted by newer recording technologies, the old digital masters cannot be upgraded.

- 4.30. Hoos, Holger H., Jürgen Kilian, and Thomas Helbich. "SALIERI – A General, Interactive Computer Music System." *Proceedings of the 1998 International Computer Music Conference*, 385-92. San Francisco: International Computer Music Association and the University of Michigan, 1998.

A description of the SALIERI interactive software system, based on the SALIERI music representation language and GUIDO Music Notation. Includes brief discussion of computer music representation, emphasizing how systems are generally designed to fulfill the requirements of a particular set of musical activities.

- 4.31. Hoos, Holger H., Keith A. Hamel, Kai Renz, and Jürgen Kilian. "The GUIDO Notation Format: A Novel Approach for Adequately Representing Score-Level Music." *Proceedings of the 1998 International Computer Music Conference*, 451-4. San Francisco: International Computer Music Association and the University of Michigan, 1998.

A description of the GUIDO Notation Format, including comparison with other computer music representation systems such as the MIDI file format, NIFF DARMS and CMN. This format is structured in three levels (Basic, Advanced and Extended) which allow musical concepts to be notated economically according to the design principle of *representational adequacy*: that is, simple concepts can be expressed in a simple way at the Basic level, while the system also provides for the expression of more complex musical ideas at the Advanced and Extended levels.

- 4.32. Howell, Peter, Robert West and Ian Cross. *Representing Musical Structure*. London and San Diego: Academic Press, 1991. ML 3838 R487 1991

A collection of essays with a largely cognitive focus. Chapter 1, by West, Howell and Cross, gives a general overview of the cognitive as well as practical problems of musical representation.

- 4.33. Huron, David. "Design Principles in Computer-Based Representation." *Computer Representation and Models in Music*. Edited by A. Marsden and A. Pople. London: Academic Press, 1992: 5-39. (not held by UBC)

- 4.34. ----- . *Music Research Using Humdrum: A User's Guide*. Stanford, CA: Center for Computer Assisted Research in the Humanities, 1999. (not held by UBC)

- 4.35. Laske, Otto. "Composition Theory: An Enrichment of Music Theory." *Interface* 18 (1989): 45-59.

A proposal for a new branch of music theory, in which the compositional process is modeled according to two paradigms (model-based and rule-based composition). Illustrated with reference to programs for computer-aided composition.

- 4.36. Manning, Peter. *Electronic and Computer Music*. Second Edition. Oxford: Clarendon Press, 1993. (ML 1092 M36 E4 1993)

A history of electronic and computer music in Europe and the United States.

- 4.37. Marsden, A. and A. Pople, eds. *Computer Representation and Models in Music*. London: Academic Press, 1992. [not held by UBC]
- 4.38. Moore, F. R. *Elements of Computer Music*. Englewood Cliffs, NJ: Prentice-Hall, 1990. MT723 M66 E4 1990

An introduction to the literature of computer music, addressed to readers who are musically-literate and experienced in computer programming. (xi) Notable diagram on p. 6 of composition process, including “musical data” (symbolic representation, temporal controls, source sounds, sound field, perception/cognition) and “processors”: composer, performer, listener (“musical’ knowledge base”, instrument, room (“physical’ knowledge base”). See also diagram on p. 24, a graphic representation of the disciplinary context of computer music. While there is a great deal of technical detail in the book, the author also attempts to put computer music into some kind of aesthetic context.

- 4.39. Pope, Stephen Travis. “The Development of an Intelligent Composer’s Assistant: Interactive Graphics Tools and Knowledge Representation for Music (or: Thoughts About Music Input Languages: Several Generations of MILs and Orchestra/Score Editors)”. *Proceedings of the 1986 International Computer Music Conference*, 131-44. San Francisco: Computer Music Association, 1986.

A general discussion of concepts surrounding the design of graphics- and AI-oriented music input languages, including music knowledge representation, elements of computer music composition tools, software ergonomics and extensibility. Part of a specification study for the design of DoubleTalk, a Smalltalk-80-based music system.

- 4.40. ----- . “Music Notations and the Representation of Musical Structure and Knowledge.” *Perspectives of New Music* 24 (1986): 156-89.

“A series of examples and evaluations of new notations for structuring processes of time for musical performance by computer” (156). Discusses general purposes of notation, specific musical software toolkit DoubleTalk. Use of timelines, and their structuring by sequences and trees, state machines and transition diagrams, control-flow models, Petri nets, predicate transition nets.

- 4.41. ----- . “The SmOKE Music Representation, Description Language, and Interchange Format.” *Proceedings of the 1992 International Computer Music Conference*, 106-9. San Jose, CA: International Computer Music Association, 1992.

A description of the SmOke (Smallmusic Object Kernel) object-oriented representation, description language and interchange format. Defines basic concepts and constructs for programmers and musicians working with digital technology-based multimedia tools.

- 4.42. Popovic, Igor. "The Analytical Object: Computer-Based Representation of Musical Scores and Analyses." *Computers in Music Research* 1 (1989): 103-16. ML73 C64 1989 [missing; being traced]

- 4.43. Renz, Kai and Holger H. Hoos. "A WEB-based Approach to Music Notation Using GUIDO." *Proceedings of the 1998 International Computer Music Conference*, 455-8. San Francisco: International Computer Music Association and the University of Michigan, 1998.

A discussion of the problems of representing common music notation on the Web, and the GUIDO NoteServer, a system designed by the authors as a solution to these problems.

- 4.44. Roads, Curtis. "An Overview of Music Representations." *Musical Grammars and Computer Analysis*. Edited by M. Baroni and L. Callegari. Firenze: Leo S. Olschki, 1984. 7-37.

Includes discussion of pre-computer formalisms such as predicate calculus, set theory, modal logic, semiotic representation, stochastic processes, systems theory.

- 4.45. -----, Stephen Travis Pope, Alco Piccialli, and Giovanni de Poli. *Musical Signal Processing*. Lisse, the Netherlands: Swets and Zeitlinger, 1997.

Series of articles discussing foundations and innovations in musical signal processing, musical sound modeling, fractals and chaos, musical object representation, composition.

- 4.46. Roeder, John. "A Declarative Model of Atonal Analysis." *Music Perception* 6/1 (Fall, 1988): 21-34.

A discussion of the procedural and declarative aspects of musical knowledge with respect to the analysis of atonal music. Argues that, for atonal music in particular, a declarative system models the structure of analytical understanding more appropriately than existing procedural systems. The article presents a functioning declarative system that not only identifies elementary musical relations but also infers complex musical structures on the basis of this data.

- 4.47. ----- . “Issues of Representation in the Analysis of Atonal Music.” *Proceedings of the First Workshop on Artificial Intelligence and Music*, 138-47. American Association for Artificial Intelligence, 1988. [property of John Roeder]

A discussion of analytic knowledge representation (AKR) for atonal music. Argues that “the identity and arrangements of the elements of a score signify clearly the theoretical concepts ... which influence their analytic representation.” Analytic knowledge representation is borne upon by musical information such as timbre and rubato, which are not represented in the traditional musical score.

- 4.48. ----- and Keith Hamel. “A General-Purpose Object-Oriented System for Musical Graphics.” *Proceedings of the 1989 International Computer Music Conference*, 260-7. San Francisco: Computer Music Association, 1989.

A report on the design and function of a graphics system for Macintosh systems that accommodates various kinds of music representations by incorporating two distinct systems of object classes: the *music-object system* and the *graphics-object system*.

- 4.49. Rumsey, Francis. *MIDI Systems and Control*. Second Edition. Oxford: Focal Press, 1994. MT723 R85 M5 1994

Includes introduction to computer systems and terminology, description of MIDI hardware and software, systems design, computer control, implementation in musical instruments, studio and lighting equipment, system synchronization.

- 4.50. Scaletti, Carla. “Composing Sound Objects in Kyma.” *Perspectives of New Music* 27 (1989): 42-69.

Defines and discusses the Kyma language for music composition. N.B.: “The structure of a composition in this language is the set of traces left by the compositional process, that is, each composition contains within it a record of how it was composed. This record serves as one of the many possible analyses of the composition.” (43)

- 4.51. Schaffer, John and Deron McGee. *Knowledge-Based Programming for Music Research*. Madison, Wisconsin: A-R Editions, 1997. ML 74 S33 1997

Focused on the declarative language Prolog rather than procedural languages such as Pascal and BASIC. Includes a review of literature on AI in general, knowledge-based systems and methods, and their applications in music. Reviews and evaluates programs developed by Winograd 1968, Ebcioğlu 1988, Smoliar 1980, Roeder 1988, and others.

- 4.52. Selfridge-Field, Eleanor, Ed. *Beyond MIDI: The Handbook of Musical Codes*.

Cambridge, Mass. and London: MIT Press, 1997. ML 74 B49 1997

Introduction and conclusion consider the nature of musical representation and musical information. Most of the book is devoted to an explanation of MIDI, but the authors also discuss other codes such as Csound, NeXT ScoreFile, DARMS, ASCII and graphical-object descriptions, Braille, Humdrum, Kern, MuseData, HyTime and SMDL.

- 4.53. ----- . "The *MuseData* Universe: A System of Musical Information." *Computing in Musicology: An International Directory of Applications*. Edited by Walter B. Hewlett and Eleanor Selfridge-Field. Menlo Park, CA: Center for Computer Assisted Research in the Humanities, 1994. 9-30. ML 3797 H498 D57 1993

A description of the *MuseData* system, developed at the Center for Computer Assisted Research in the Humanities (CCARH) based at Stanford University for the comprehensive encoding of musical scores. Many compositions in the standard repertoire of Western art music have been encoded in this system, which is adaptable for use with a variety of computer platforms, depending on a given researcher's focus: analysis, performance, etc.

- 4.54. Sloan, Donald. "Aspects of Music Representation in HyTime/SMDL." *Computer Music Journal* 17/4 (1993): 51-9.

An account of the development of the standard for the computer representation of musical information (HyTime/SMDL) by the American National Standards Institute (ANSI)'s working group X3V1.8M. Explains the rationale behind the standard, discusses technical and user requirements, high-level design issues. Provides a detailed discussion of a musical example coded in SMDL.

- 4.55. ----- . "Precis of the Standard Music Description Language." *Proceedings of the 1989 International Computer Music Conference*, 296-302. San Francisco: Computer Music Association, 1989.

An overview of the development of SMDL as of 1989. The representation of a "work" includes not only the complete musical composition, but also "any collection of data that is intended to be represented as a single unit." Includes bibliographic data, composer-written analyses. Work broken down into "work segments," e.g. movements, nonmusical data, etc. Each work segment divided into four domains: visual (score-related), gestural (a particular performance of a work rather than the work itself), bibliographic-analytic (information of various kinds about the work), and core ("domain of all things shared by the visual and gestural domains," or "that information which is necessary to distinguish one work from another").

- 4.56. Taube, Heinrich. "Stella: Persistent Score Representation in Common Music." *Proceedings of the 1992 International Computer Music Conference*, 101-5. San Jose, CA: International Computer Music Association, 1992.

Distinguishes between two modes of composition, the procedural/algorithmic, and the "literary." Describes the functions and structure of Stella, a superset of the Common Music score description language supporting both styles of composition, allowing the composer to shift between modes within the composition of a single work. Includes facilities for archiving of individual compositional elements and procedures.

- 4.57. Théberge, Paul. *Any Sound You Can Imagine: Making Music/Consuming Technology*. Hanover, NH and London: Wesleyan University Press, 1997. ML 1092 T38 1997

A sociological study of the effects of technological innovations on musical practice. Three major sections discuss issues of design and production, "mediation" (interaction between musicians through magazines, networks, user groups), and consumption. Relationship between music notation and sound reproduction as "reproductive technologies" first, and a vehicle for composition later. Sociological aspects of notation and music publishing. Effects of technology on concepts of music-making, authorship, originality, the musical work. Developed from the author's Canadian (Concordia University) Ph.D. dissertation.

- 4.58. Wick, Robert L. *Electronic and Computer Music: An Annotated Bibliography*. Westport, CT and London: Greenwood Press, 1997. ML 128 E4 W53 1997

Shorter but more up-to-date bibliography than Davis (4.17). Literature divided into subcategories of histories, electronic music synthesis, electronic music composition, MIDI, electronic and computer music education, conferences, dictionaries. Appendices cover theses and dissertations, system manuals, on-line sources, and electronic/computer music periodicals.

- 4.59. Wiggins, Geraint, Eduardo Miranda, Alan Smaill and Mitch Harris. "A Framework for the Evaluation of Music Representation Systems." *Computer Music Journal* 17/3 (1993): 31-42.

Three general purposes of music representation systems: recording, analysis, and composition. Evaluates music representation systems according to two main criteria: expressive completeness and structural generality. Systems evaluated include spectrum analysis, MIDI, DARMS, UPIC, programming languages (Music-N, Common Music, Stella), and other systems such as the Bol processor, Balaban's Music Structures, SmOke, CHARM.

- 4.60. Williams, David Brian and Peter Richard Webster. *Experiencing Music Technology: Software, Data and Hardware*. 2nd Edition. New York: Schirmer, 1999. ML 74 W55 1999

Designed as a post-secondary or self-study text introducing music technology: CAI, notation, sequencing and MIDI, digital audio; data structures; software development. User-friendly.

- 4.61. Winkler, Todd. *Composing Interactive Music: Techniques and Ideas Using Max*. Cambridge, Massachusetts and London: MIT Press, 1998. MT55 W55 C6 1998

Theoretical and practical guide to interactive computer music composition by MIT-based composer Winkler. Chapter 9 considers special nature of interactive computer music scores.

- 4.62. Wohrmann, Rolf and Guillaume Ballet. "Design and Architecture of Distributed Sound Processing and Database Systems for Web-Based Computer Music Applications." *Computer Music Journal* 23/3 (1999): 73-84.

A general overview of internet computer music applications, using IRCAM's Studio On-Line Project as a model.

5. Music and Library/Archival Science

- 5.1. Duranti, Luciana. *Diplomatics: New Uses for an Old Science*. Lanham, Md. and London: Scarecrow Press, 1998.

Introduction to the practice of diplomatics, originally devised as a method for the analysis and criticism of medieval documents. Definition, function, creation and formal structure of archival documents. History, purposes and methods of diplomatics.

- 5.2. Shepard, John. "Preservation." *Notes* 56/3 (March, 2000): 574-580.

A review of twentieth-century developments and problems in the preservation of music documents. Discussion of future possibilities, especially the advantages and disadvantages of preservation through digitization.

5.3. Shoaf, Wayne R. "Archives." *Notes* 56/3 (March 2000): 648-654.

Discussion of state of music archival practice, and the impact of digitization. Specifically addresses question of authenticity: "If an analog original no longer exists, can its digital surrogate still provide the same strength of evidence?" (652). N.B. Shoaf was archivist for the Arnold Schoenberg Institute for 11 years, and since 1998 has been team leader of Digital Resources Cataloging at the University of Southern California.

5.4. Smiraglia, Richard P. *Describing Music Materials: A Manual for Descriptive Cataloging of Printed and Recorded Music, Music Videos and Archival Music Collections*. 3rd Edition. Revised and Enlarged with Taras Pavlovsky. Lake Crystal, Minn.: Soldier Creek Press, 1997.

Includes section on general archival principles as applied to music materials, with examples.

5.5. Thomas, David H. *Archival Information Processing for Sound Recordings: The Design of a Database for the Rodgers and Hammerstein Archives of Recorded Sound. MLA Technical Reports #21*. Canton, MA: Music Library Association, 1992. ML 111.5 T5 1992

Special problems of archiving "noncommercial sound carriers" such as private recordings, demo records, unique reel-to-reel tapes, etc. Some noncommercial recordings function as documentation of activities of musicians as daily business carried out, e.g. rehearsal recordings of Toscanini. Case study of the R&H Noncommercial Sound Recordings Project. Issues of description and database design.

5.6. Vellucci, Sherry L. *Bibliographic Relationships in Music Catalogs*. Lanham, Md., and London: Scarecrow Press, 1997.

Useful for definition and discussion of "derivative" and "equivalence" relationships between music materials: performance materials one example of derivative relationships, e.g. between an original and a reproduction, between exact copies of the same manifestation of a work. Discusses reproduction as a mechanical rather than an intellectual process; preservation of intellectual content; microform reproduction, manuscript reproduction, photocopies, facsimiles, impressions, etc. ML 111 V46 1997

6. Music and Law

The literature on music and law generally falls into one of two categories: practical and theoretical. This section of the bibliography is similarly divided, in order to present as clearly as possible the relevance of each body of literature to the concerns of the InterPARES project.

6P. Practical: Case Law

The music branch of the InterPARES project seeks to find ways of ensuring the authenticity of electronic musical records. An essential part of this exercise is the establishment of definitions and limitations: what are the specific elements of an electronic musical record that must be preserved in any migration from one digital format to another, in order for authenticity to be guaranteed in the transference? In other words, in the process of translating a musical record into digital format, or the migration of a musical record from one digital format to another, the loss of which particular elements of form would damage or destroy the authenticity of the work?

Copyright law, although its goal is to protect the economic interests of the composer rather than the integrity of a particular document, provides many examples of attempts to define the particularity of musical works, in order to determine at what degree of similarity one work becomes a copy of another. Which particular elements of a given work are essential for its association with a particular creator (or act of composition), in order to guarantee the authenticity of the link between composer and composition? Legal professionals engaged in the administration of copyright infringement cases have long wrestled with the problems of defining this kind of authenticity. As more and more of these cases involve not only traditionally-notated music but also electronic musical records such as MIDI files and digital samples, the related legal literature increasingly features discussions of possible definitions, tests, and standards to establish the originality and authenticity of digital music.

6P.1. Badavas, Christos P. "MIDI Files: Copyright Protection for Computer-Generated Works." *William and Mary Law Review* 35 (September, 1994): 1135-75.

Does the copyright of a computer program protect the original work of authorship the program is designed to generate? This article examines the (U.S.) Copyright Act of 1976 (CA) and concludes that it does not, but that a copyright on a MIDI file itself protects the underlying musical composition (1138). Suggests amendment of CA to include computer-generated original works of authorship.

CA defines copyrightable work as an "original work of authorship fixed in a tangible medium of expression. . . A work is 'fixed' in a tangible medium of expression when its embodiment in a copy or phonorecord under the authority of the author, is sufficiently

permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration.”

MIDI file can be characterized in 3 ways, each with different legal consequences: 1) the set of instructions stored in object code could be considered a work in and of itself; 2) the set of instructions could be considered a copy of the musical work; 3) the MIDI file could be a copy of the musical work, and the musical work could also be a copy of the MIDI file.

Discusses legal cases involving video games, specifically the issue of whether screen displays are copyrightable as well as code; in these cases, copyright protection has been extended beyond the “literal” code to include “nonliteral” elements, providing the element in each individual case is part of the expression of the idea rather than the idea itself. (1162) “All copyrightable expression owned by the same claimant and embodied in a computer program, including computer screen displays, is considered a single work.”

“In no case does copyright protection for an original work of authorship extend to any *idea, procedure, process, system, method of operation, concept, principle, or discovery*. . . the *expression* adopted by the programmer is the copyrightable element in a computer program, and that the actual process or methods embodied in the program are not within the scope of the copyright law” (1163)

A work generated by a computer program is not legally considered part of that program under the CA, but the musical work generated by the MIDI file is considered an original work of authorship. Argues that “MIDI files present a situation in which a computer program is a copy of the result generated, in this case a musical composition. . . The musical work, however, is [also] a ‘copy’ of the MIDI file. Anyone who hears a piece of music can reproduce the MIDI file.”

6P.2. Berthiaume, Mike and Jim Keon. *The Mechanical Reproduction of Musical Works in Canada*. Ottawa: Minister of Supply and Services Canada, 1980. KN112.5 B478 1980

Reviews Canadian copyright law with respect to the definition of a musical work, recommends licensing strategies to reflect recording technology. Although dated, nevertheless provides a concise look at some of the history of Canadian music-copyright legislation as it relates to practices in other countries.

6P.3. Frith, Simon, ed. *Music and Copyright* (1993). KN 112.5 M874 1993

Collection of articles on issues of music and copyright, often with reference to problems introduced by digital storage of sounds. Of particular relevance is Paul Théberge, “Technology, Economy and Copyright Reform in Canada” (40-66), Steve Jones,

“Music and Copyright in the USA” (67-85), Jane M. Gaines, “Bette Midler and the Piracy of Identity” (86-98), Simon Frith, “Music and Morality” (1-21).

- 6P.4. Fulda, Joseph S. “Computer-Generated Art, Music and Literature: Philosophical Conundrums.” *Intellectual Property Journal* 7 (December, 1991): 81-84.

A brief commentary on the distinction between the concepts of procedural and declarative knowledge in computer science as it relates to Frege’s dichotomy of sense and reference with respect to artistic meaning. Describes a case of an AI painting program in which 42 rules were abstracted from a particular painter’s style and used to create new works, much as music AI programs produce “Chopin” nocturnes or “Bach” fugues. Who is the author of works generated by the expert system: the system’s programmers, or the painter from whose workmanship the rules of the system were abstracted? Could the designers of the expert system patent the “process,” i.e. the rules embedded in the style, in which case the original painter could no longer paint in his own style without infringing on the programmers’ patent? Argues that these questions arise because “procedural knowledge provides an effective means for capturing declarative knowledge, the very opposite of the case with the original concepts of sense and reference.” (84)

- 6P.5. Grinvalsky, Paul M. “Idea-Expression in Musical Analysis and the Role of the Intended Audience in Music Copyright Infringement.” *California Western Law Review* 28/2 (1991-92): 395-429.

The legal test of “substantial similarity” between two pieces of music in copyright infringement cases consists of two parts. One of these involves the musical expert witness, whose role is to help identify the essential “musical idea” and its historical significance; the other employs lay-observers to assess the general aural similarity between two pieces of music. This article discusses the problems of using the lay-observer test where computer software programs are involved because of the understanding of computer science necessary for adequate evaluation. Includes summary of entire history of Western classical and popular music. The section “Application of Music Analysis Techniques to Identify ‘Ideas’” (416 ff.) introduces basic concepts of analysis, particularly with regard to elaboration of “musical ideas” and levels of abstraction; cites Schenker. Pyramid model of levels of similarity: “fundamental,” “generic,” “ideational,” and, at the top – virtually identical works -- “substantial.”

- 6P.6. Kentridge, Catherine. “Cyber Music Produces Watershed Copyright Ruling.” *Law Times* 25 (July 1998): 18-19. [This issue missing from UBC’s collection].

- 6P.7. Keon, Jim. *A Performing Right for Sound Recordings: An Analysis*. Ottawa: Minister of Supply and Services Canada, 1980. KN112.5 K46 1980 [available in Music, Law, and Main Libraries]

A theoretical and practical examination of the feasibility of performing rights for copyright holders of sound recordings in Canada. Argues that embodied within the physical object, i.e., the sound recording, are two separate copyrightable works: the musical composition and the particular performance. Therefore there are two separate rights: that of the author/composer, and that of the performer responsible for the “fixation” of the work in recorded form.

- 6P.8. Jones, Stephanie J. “Music Copyright in Theory and Practice: An Improved Approach for Determining Substantial Similarity.” *Duquesne Law Review* 31/2 (Winter, 1993): 277-306.

This article discusses the problem of distinguishing between a musical “idea” and the expression of that idea, a significant factor in the determination of copyright infringement, since only the expression, and not the idea itself, is copyrightable. Argues that the legal literature fails to define adequately the musical “idea.” Cites D. Anthony Ricigliano, then chairman of the theory department at the Manhattan School of Music, who has assisted in many music copyright actions (presumably as an expert witness): “a musical idea is a musical thought which implies a self-contained entity; however, it generally represents only a portion or fragment of a musical work which usually contains multiple ideas.” (301) The lyrics of a song are irrelevant to identification of musical idea.

- 6P.9. Lee, Jeanette. “The Digital Shift: Canadian Copyright Protection for MIDI-Generated Works.” *Canadian Patent Reporter* 3rd Series (December, 1998): 18-48.

This Canadian analog to Badavas (6P.1) compares and contrasts Canadian and American copyright law with respect to digital musical works. Notes no existing Canadian case law involving MIDI files, at the time of writing. Because computer programs are classified as literary works for copyright purposes, a MIDI song file is classified as both a literary and a musical work, hence a “compilation”. Cites recommendations of Information Highway Advisory Council and its Copyright SubCommittee (26). Concludes that multimedia works are sufficiently protected as compilations under current Canadian legislation, since digital form only “constitutes the expression of copyright subject matter in a different format.” Cites definition of “fixation” from Canadian case law: “the work must be in material form, be capable of identification and have more or less permanent endurance.” (41) Good, largely Canadian bibliography of case law, MIDI-and-the-law literature, digital technology and copyright.

- 6P.10. May, David. "‘So Long as Time Is Music’: When Musical Compositions Are Substantially Similar." *Southern California Law Review* 60/3 (March, 1987): 785-813.

This article attempts to bring in the assessment of "musical value" to determinations of copyright infringement: extended discussion of Suzanne Langer, Marcuse, Jung and others with respect to measuring of aesthetic musical value. N.B.: No reference to the musicological literature.

- 6P.11. Miele, Anthony L. "Patenting Your Computer Music Algorithms in the U.S." *Proceedings of the 1991 International Computer Music Conference*, 491-4. Montreal: International Computer Music Association and McGill University, 1991.

Comparison of different options for the legal protection of computer music, i.e. copyright, trade secrets, and patents. Discusses criteria for algorithm patentability, and patent application procedure in the U.S.

- 6P.12. Mosher, Janet E. "20th Century Music: The Impoverishment in Copyright Law of a Strategy of Forms." *Intellectual Property Journal* 5 (August, 1989): 51-70.

Mosher argues that the Canadian Copyright Act definition of a musical work ("any combination of melody and harmony, or either of them, printed, reduced to writing or otherwise graphically produced or reproduced") is too restrictive to cover many 20th century compositions. Definition long ago taken from British law, which abandoned this definition in 1911 in favour of a non-specific definition: "a work consisting of music exclusive of any words or action intended to be sung, spoken or performed with the music." (69) Extended discussion of 20th century compositional techniques such as serialism, aleatoric music, use of nonspecific graphic notation that fixes neither melody nor harmony. Cites examples of music by Cage, Reich, Stockhausen. Why does "fixation" have to be graphic? What about electronic music, where notation is superfluous because the master tape *is* the composition? Rights of tape composers not comprehensively protected.

Recognizing inextricability of composition and performance, suggests that for some works an appropriate strategy might be to prohibit the unauthorized fixation of a given performance, whether by recording or by imitation.

- 6P.13. Quail, Mark G. "Digital Samplers: Can Copyright Protect Music From the Numbers Game?" *Intellectual Property Journal* 7 (December, 1991): 39-63.

Discusses provisions of Canadian Copyright Act (CCA) with respect to digital sampling. Act focuses on harmony and melody but not rhythm and timbre; author

suggests amendment of the Act to cover these elements. Cites from CCA on definition of musical work.

N.B.: Acknowledges assistance of (among others) Bruce Green of Barrigar and Oyen, Vancouver.

6P.14. Sanderson, Paul. *Musicians and the Law in Canada*. Toronto: Carswell, 2000. KN169 M8 S353 2000.

Includes a detailed explanation of Canadian copyright law as it applies to musical compositions. Specific discussion of computer music programs.

6P.15. Sookman, Barry B. "Computer-Assisted Creation of Works Protected by Copyright." *Intellectual Property Journal* 5 (January, 1990): 165-186.

A discussion of the authorship problem with respect to interactive computer artworks: who is the author: the programmer, data provider, user, or investor/owner?

6P.16. Spurgeon, C. Paul. "Digital Networks and Copyright: Licensing and Accounting for Use—the Role of Copyright Collectives." *Intellectual Property Journal* 12 (September, 1998): 225-260.

Spurgeon is general counsel for SOCAN (Society of Composers, Authors and Music Publishers of Canada). Argues that collective administration of copyright by organization even more relevant in digital economy. Deals primarily with performing rights. Includes a history of collective copyright administration in Canada. Discusses MusiCode, a "watermark" system for identifying recordings using very small samples; new opportunities for monitoring of performances of musical work; embedding of a code in actual music or soundtrack made prior to broadcast of recording (252). Outlines WorksNet, the core project of Common Information System (CIS) plan initiated by CISAC (Confederation internationale des societes des auteurs et compositeurs) involving the registration of musical works and the tracking of usage similar to the ISBN system for books. Examples of other initiatives include Liquid Audio, the development of secure online music delivery systems and other digital protection/accounting schemes. The program IVY (Canada) formed with the express purpose of creating a comprehensive intellectual property management system for digital content. Tested in wired Toronto homes as part of INTERCOM Ontario Project; involves SOCAN, CANCOPY, ACTRA, CBC, CRIA, etc. Combines components of enrollment system, accounting system for use, system linking rights holders to ensure distribution among multiple rights-holders. (255) Cites Hoffert, P., T. Jurenka, B. Silverman, P. Spurgeon, L. White, "Managing Intellectual Property in Digital Formats", Ivy/Intercom Ontario—Case Study 01/10/96.

6T. Theoretical: Music and Legal Theory

As Timothy S. Hall points out, in the early part of the twentieth century, legal scholar John Chipman Gray argued that legal texts—that is, the body of written statutes and laws of a state—did not in themselves constitute “law” (see Levinson and Balkin 1991). “The law” could be said to exist only insofar as it was first interpreted, and then enacted or “performed.” In 1947, Jerome Frank explicitly compared the judicial interpretation of a statute with the musician’s interpretation of a score, noting the common efforts by performing artists and the judiciary to determine what it means to faithfully enact a text. More recent legal writings have sought to develop Frank’s thesis, incorporating insights gained from observation of the relationship between text and “authentic” performance practice in various musical genres into theoretical stances towards the practice of law, which is, they argue, as aesthetic as it is empirical.

For the purposes of the InterPARES project, we have considered the ontology of the musical work and its often multiple representation(s) in the form of traditionally-notated scores, performances, recordings, and/or digital computer files. We consider the musical work to include a constellation of representations, both textual and performed. Similarly, in our society, legal judgments consider “the law” to include not only the written text, but all prior “performances” of that text, known in legal terminology as “precedent.”

This literature aims to elucidate not musical, but legal “performance practice,” and as such is perhaps less directly relevant to the InterPARES project than the strictly practical literature dealing with copyright case law and digital music. Nevertheless, its demonstration of the methodological commonalities between law and music with respect to the relation of text and performance may help us to articulate more clearly (particularly to non-musicians) the significance of the InterPARES music research in the broad, interdisciplinary context of the project as a whole.

6T.1. Balkin, J. M. and Sanford Levinson. “Interpreting Law and Music: Performance Notes on ‘The Banjo Serenader’ and ‘The Lying Crowd of Jews.’” *Cardozo Law Review* 20, 5/6 (May-July, 1999): 1513-72.

A discussion of the law as a performing art, whose professionals bear the responsibility of giving “authentic” readings of legal texts to the public. How is “authenticity” determined?

6T.2. Frank, Jerome. “Words and Music: Some Remarks on Statutory Interpretation.” *Columbia Law Review* 47 (1947): 1259-78.

One of the earliest modern writings that likens the interpretation of statutes by judges to the interpretation of musical compositions by performers. Author cites Ernst Krenek’s assertion that the ideal of “work-fidelity” is impossible to define, let alone achieve.

6T.3. Hall, Timothy S. “The Score as Contract: Private Law and the Historically Informed Performance Movement.” *Cardozo Law Review* 20/5-6 (May-July, 1999): 1589-1614.

This article refines the analogy of Frank and others between the interpretation of a musical score and the interpretation of law, preferring to compare musical performance to the fulfilling of a contract rather than obedience to a written document. Discusses examples of non-specificity in musical scores: basso continuo, ornamentation, cadenza, improvisation. Reviews Kivy, Taruskin.

Fidelity should be to a shared understanding (between performer and audience) of the original composer and performer, and one’s own judgment, rather than fidelity to marks on a page. Likewise, interpretation of law should take into account the original intent of legislators as well as letter of the law.

6T.4. Levinson, Sanford and Balkin, J. M. “Law, Music, and Other Performing Arts.” *University of Pennsylvania Law Review* 139/6 (June, 1991): 1597-1658.

Written in part as a response to Kenyon, *Authenticity and Early Music: A Symposium* (1988). Conceives of musical score as a kind of “command,” with degrees of specificity and imperative varying according to musical genre.

Argues that, while there are economic reasons why this subject should be of interest to the legal community – for example, the impact of the historical performance movement on employment in the classical music performance field – artistic interpretive choices made in a particular cultural or artistic event may have more far-reaching public consequences than a legal interpretation regarding, say, a routine fender-bender.

Section headings include “Legal Modernism and the Pursuit of ‘Authenticity,’” and “Problems for the Performing Artist: Beethoven’s F-Natural, Schubert’s Repeats, and the Federal Land Policy and Management Act of 1976.

Cites John Chipman Gray’s assertion in *The Nature and Sources of Law* (2nd ed., 1921) that texts in themselves are not law; rather, the law is not complete without its enactment by “performers,” i.e. legal professionals.

Argues that the historical performance movement “touches on central aspects of experience of modernity in Western culture as a whole, including . . . its legal aspects.” (1628)

- 6T.5. Manderson, Desmond and David Caudill. "Modes of Law: Music and Legal Theory – An Interdisciplinary Workshop Introduction." *Cardozo Law Review* 20, 5/6 (May-July, 1999): 1325-9.

Brief overview of the series of articles on music and law featured in this special issue of the *Cardozo Law Review* which includes Hall, above. Music and law described as "both text-bound and performative discourses." (1327)

7. Case Study-Related

- 7.1. Barriault, Jeannine and Stéphane Jean. *National Library of Canada: Catalogue of Archival Fonds and Collections of the Music Division*. Ottawa: Minister of Supply and Services Canada, 1994. ML 136 O8752 N27 1994

Describes NLC's holdings alphabetically according to provenance. Canadian composers, performers, music publishers and other organizations.

- 7.2. Bauman, Marcia L., Glendon R. Diener, Max V. Mathews. "The International Digital ElectroAcoustic Music Archive." *Proceedings of the 1991 International Computer Music Conference*, 501-4. Montreal: International Computer Music Association and McGill University, 1991.

Description of IDEAMA, founded in 1990 by Stanford University and the Zentrum für Kunst und Medientechnologie (ZKM) in Karlsruhe, Germany, to collect, digitally preserve and disseminate important works of electroacoustic music. Archive includes not only digital recordings of works, but related materials such as program notes, scores, and biographies, all in digital format. Article describes administration of project, details of storage media, cataloging procedures.

- 7.3. Bauman, Marcia L. "The International Digital ElectroAcoustic Music Archive." *Proceedings of the 1992 International Computer Music Conference*, 281-4. San Jose, CA: International Computer Music Association, 1992.

Essentially a rewording of Bauman et al 1991, but with additional details regarding the target collection. Notes inclusion of Canadian electroacoustic works by Hugh LeCaine, Istvan Anhalt.

- 7.4. ----- and Thomas Gerwin. "The International Digital ElectroAcoustic Music Archive." *Proceedings of the 1995 International Computer Music Conference*, 25-6. Banff, AB: International Computer Music Association, 1995.

Update on IDEAMA. Most significant addition to earlier reports is a discussion of the transferral of data from DAT cassettes to CD-ROMs, which include larger text files with additional information about the recorded music.

- 7.5. Bianchini, Riccardo and Alessandro Cipriani. "Three Levels of Education in Electroacoustic Music: The Virtual Sound Project." *Proceedings of the 1998 International Computer Music Conference*, 416-9. San Francisco: International Computer Music Association and the University of Michigan, 1998.

A description of the Computer Music Education project in Italy, which includes a preliminary text, *Il Suono Virtuale*, an additional series of printed textbooks, interactive Internet-based courses in electroacoustic composition and a series of CD-ROMs. Of particular relevance to the InterPARES project is the internet course: the printed textbooks (*Cinema per l'Orecchio*) are used as the basis of a series of lessons, each of which concludes with exercises and tests involving the modification of musical excerpts (e.g. error correction), completed by the student and submitted by e-mail; hence there is presumably a need for authentication standards for transmitted digital musical documents. Website is hosted by the Edison Studio in Rome (<http://www.axnet.it/edison>). An English version of *Il Suono Virtuale* was expected to be available at ICMC 99.

- 7.6. Bräuniger, Jürgen and Daniel Wyman. "Old World, New World, Third World Studios." *Proceedings of the 1992 International Computer Music Conference*, 289-91. San Jose, CA: International Computer Music Association, 1992.

A description of the work of the Gerald LaPierre Electro-Acoustic Music Studio at the University of Natal, Durban, South Africa. This studio, directed for a time by composer Kevin Volans, is engaged in many political-cultural endeavours along with the traditional activities of computer music studios. For example, the studio has been recording and documenting the "South African struggle [as] preserved and represented through its aural arts," by making sound recordings of the Mandela Peace Rally, Mandini Strikers, and Songs from Bambatha's Children: Sarmcol Workers' Co-operative, through recording. The studio has also conducted interactive studio-based improvisations involving groups of musicians from a variety of cultural backgrounds, as part of a mandate to develop a foundation for research into the "value of arts technology in developing multi-cultural societies."

- 7.7. Burroughs, Michael and David Fenske. "VARIATIONS: Hypermedia Project Providing Integrated Access to Music Information." *Proceedings of the 1990 International Computer Music Conference*, 221-4. Glasgow: Computer Music Association, 1990.

An overview of the database engine and hypermedia interface for the VARIATIONS project at Indiana University, Bloomington. For each “data object” in the system, there are five different types of information stored: text, graphics, scores, sound, and bibliographic references.

- 7.8. Century, Michael. “The Banff Centre Media Arts Program: Studio Report and Artistic Retrospective.” *Proceedings of the 1989 International Computer Music Conference*, 62-4. San Francisco: Computer Music Association, 1989.

An introduction to the Media Arts Program at the Banff Centre, which opened in 1988. Description of mandate, facilities, residencies, and three major projects, including the electronic opera LUDI by Renée Bourassa and Marcelle Deschenes, and the *Hypermedia Profile of Glenn Gould*. The latter involved the commission of two interactive essays on Gould by Anglophone and Francophone scholars English and French. One connected the text of an original Gould essay to a sound archives of Gould’s performances and further archives devoted to Gould’s cultural context.

- 7.9. Earnest, Jeffrey. “IDEAMA: International Digital ElectroAcoustic Music Archive.” *ARSC Journal* 23/2 (1992): 170-77.

Another account of IDEAMA, concurrent with item 7.3. Accessible in Music Library.

- 7.10. [National Library of Canada.] *Descriptive Catalogue of the Glenn Gould Papers*. 2 Vols. Ottawa: Minister of Supply and Services Canada, 1992. ML 136 O8752 G66 1992

Includes chronology of Gould’s life and work. “Papers” includes non-commercial sound recordings, video cassettes, personal records and scores.

- 7.11. Maloney, S. Timothy. “The Glenn Gould Archive on the World Wide Web.” *Canadian Association of Music Libraries (CAML) Newsletter* 26/2 (August, 1998): 18-24.

A description of the virtual Glenn Gould Archive maintained by the NLC.

- 7.12. Nencini, G., Grossi, P., Bertini, G., Camilleri C., Tarabella, L. Divisione Musicologica CNUCE/C.N.R. Pisa, Italy. "TELETAU: "A Computer Music Permanent Service." *Proceedings of the 1986 International Computer Music Conference*, 451-3. San Francisco: Computer Music Association, 1986.

Description of a system in use at the Cherubini Conservatory in Florence, which allows users remote access to a library of musical compositions for the purposes of analysis, elaboration, "automatic music generation," etc.

- 7.13. Pennycook, Bruce. "Computer Applications in Music at McGill University." *Proceedings of the 1989 International Computer Music Conference*, 238-41. San Francisco: Computer Music Association, 1989.

A summary of the state of computer music applications at McGill as of the summer of 1989.

- 7.14. ----- . "Music Library of the Future: A Pilot Project." *Proceedings of the 1995 International Computer Music Conference*, 195-8. Banff, AB: International Computer Music Association, 1995.

A description of the Music Library of the Future project based at McGill University, a virtual music library publicly accessible through the internet. Summarizes technical details, involvement of other agencies such as the Canadian Electroacoustic Community. Describes the Canadian Composers Portraits component, which includes scanned scores, audio clips, voice interviews, graphic material and analyses of Canadian compositions. Also notable is the McGill University Master Samples, used frequently by users in the film music business.

- 7.15. Truax, Barry. "Sound in Context: Soundscape Research and Composition at Simon Fraser University." *Proceedings of the 1995 International Computer Music Conference*, 1-4. Banff, AB: International Computer Music Association, 1995.

A summary of research activities at Simon Fraser University over the past 25 years in the areas of environmental/computer soundscape composition and granulation of sampled sound.

8. Relevant Websites

CCRMA
 CCARH
 IAML
 IRCAM
 McGill Music Library of the Future
 DIAMM

9. Journals

Brio. IAML Newsletter.

CAML Newsletter.

Fontes Artis Musicae. IAML Journal.

Interface (now Journal of New Music Research).

Notes (*Quarterly Journal of the Music Library Association*).

Computer Music Journal.

Camurri et al. "EyesWeb: Toward Gesture and Affect Recognition in Interactive Dance and Music Systems." *CMJ* 24/1 (Spring, 2000): 57-69.

Attali, Noise.; Foucault, Contemporary Music and the Public" (John Rahn, Perspectives on Musical Aesthetics), Roger Johnson "Technology, Commodity, Power" *CMJ* 18/3 (1994): 25-32.; Kahn, D and G. Whitehead, *Wireless Imagination*. MIT Press; McLuhan; Metzger, H. "Music in the entertained society; *Interface* 12/1: 65-73. Negroponte, N. *Being Digital*. New York: Vintage. <http://www.stemnet.nf.ca/~elmurphy/emurphy/ditial.html>.

Povall, R. "Speculative Sociological, Artistic, and Pedagogical Frameworks for the New Electronic Art." *CMJ* 21/1 (18-25).

6T.1 Alpern, Wayne. "Music Theory as a Mode of Law: The Case of Heinrich Schenker, Esq." *Cardozo Law Review* 20, 5/6 (May-July, 1999): 1459-1511.

Bosma, Hannah. "Male and Female Voices in Computer Music." *ICMC* 95 (Banff). 139-42.

- typically only male voices used for speaking; female more often melismatic, textless. See Kaja Silverman. *The Acoustic Mirror: The Female Voice in Psychoanalysis and Cinema*. 1988, Bloomington, IUP.

Cipriani, Alessandro. "Towards an Electroacoustic Tradition?" *ICMC* 95(Banff). 5-8. A comparison of the transition from written to electroacoustic musical culture to the earlier transition from oral to written musical culture in Western music history. Commentary on Treitler, Goody. African oral repetitions of long sagas: no concept of an "original" exists, because cannot set two versions of such long works side by side.

Goody, J. *The Interface Between the Written and the Oral*. Cambridge UP, 1987.

Treitler, Leo. "Homer and Gregory: The Transmission of Epic Poetry and Plainchant." *Musical Quarterly* 60 (1974): 333-72.

-----, "From Ritual Through Language to Music." *Schweizer Jahrbuch für Musikwissenschaft Neue Folge* 2 (1982): 109-23.

Sachs, Curt. *The Wellsprings of Music*. The Hague: Martinus Nijhoff, 1962.

Schafer, R. Murray. *The Tuning of the World*. Toronto: McClelland and Stewart, 1977.

Selfridge-Field, Eleanor. "Canzona and Sonata: Some Differences in Social Identity." *International Review of the Aesthetics and Sociology of Music* (1978): 111-19.

CREATE: Center for Research in Electronic Art Technology; University of California, Santa Barbara
<http://www.create.ucsb.edu/~stp>

6.1. -----, "Web.La.Radia: Social, Economic, and Political Aspects of Music and Digital Media." *Computer Music Journal* 23 (Spring, 1999): 49-56.

Although perhaps more directly related to category 6 of the bibliography (Music and Law) than to the issue of computer music representation, this article explores the sociological context of digital, Web-based musical art.

Chambers, Evan. "The Computer Music World View: Sketch of an Ethnomusicological and Aesthetic Approach." ICMC 94. Aarhus, Denmark: ICMC and the Danish Institute of Electroacoustic Music, 1994. 19-22. See F.R. Moore 90, Daniel Boorstin 83, Laurence Berman 93