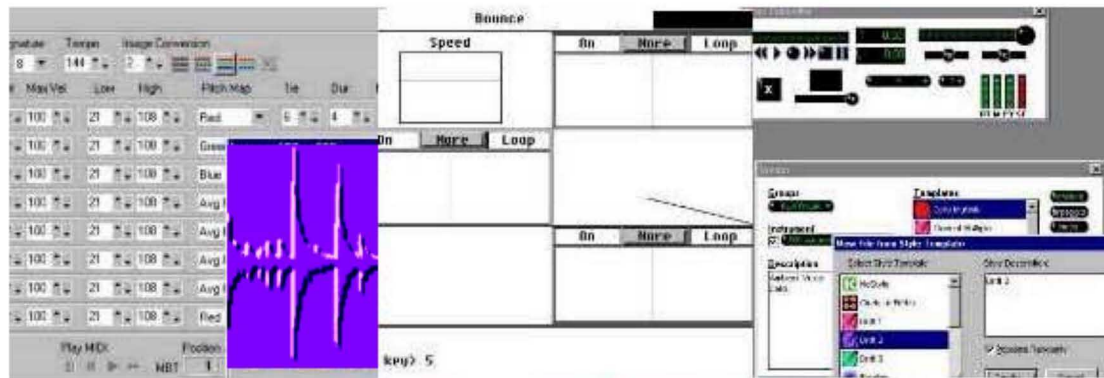
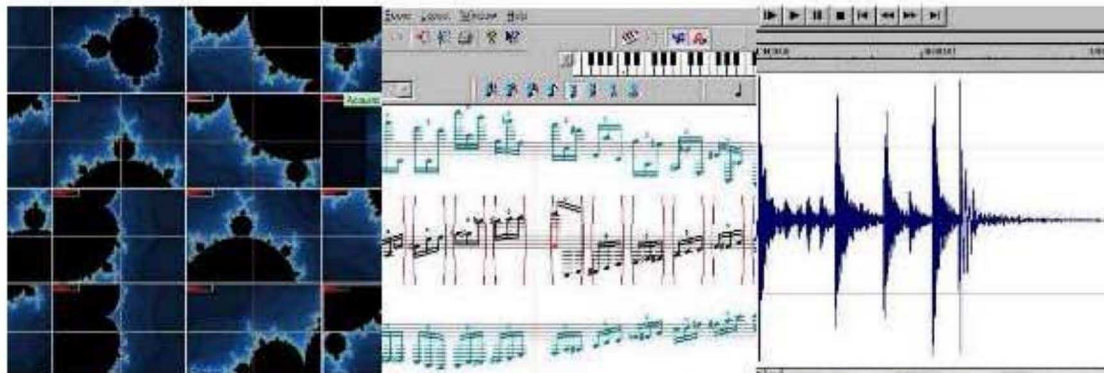


# SERBAN NICHIFOR LIANA ALEXANDRA



## INTRODUCERE IN COMPUTER MUSIC *Compendiu*



*Thank you so much for sending me your updated Introduction to Computer Music. It is a great achievement, and will be of much use to your students and people working in the field. Congratulations.*

**BARRY SCHRADER**

Professor - CALARTS: California Arts School of Music

*Dear Serban,*

*Thank you very much for sending your book. I appreciate it very much.*

**BEN BIERMAN**

Professor - Center for Computer Music at Brooklyn College

**Editura Stephanus  
2009**

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**LIANA ALEXANDRA**

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## INTRODUCERE IN COMPUTER MUSIC

### *Compendium*

#### INTRODUCERE

Adresat în principal studenților Universității Naționale de Muzică din București, dar și tuturor celor interesați în investigarea complexului fenomen „COMPUTER MUSIC“, acest *compendium* încearcă să surprindă, într-o imagine eminentă sintetică, coordonatele unui nou gen muzical aflat în plină evoluție - cu consecințe majore în prezentul, dar mai ales viitorul artei sunetelor. Născut, ca și jazz-ul, în atât de fecundul spațiu cultural nord-american (ponderea muzicienilor din U.S.A fiind de peste 90 % !), genul „Computer Music“ reprezintă acum o dimensiune unanim recunoscută – dinamica dezvoltării sale fiind impresionantă, mai ales printr-o perpetua expansiune în cele mai inedite domenii ale cunoașterii, determinând și elaborarea unor proiecte inter-disciplinare – în planurile creației, interpretării și cercetării - imposibil de realizat cu mijloacele tradiționale. De aceea, prezentul compendiu nu poate avea un caracter exhaustiv – el reflectând în mod pragmatic, din perspectiva practicii muzicale, doar trei elemente constitutive, ce sunt structurate în capitolele: (A) „Evoluția mijloacelor de prelucrare a informației, cu aplicatie la arta sunetelor“, (B) „Elaborarea audio-numerică“ și (C) „Muzica de camera asistată de calculator“. Având o configurație interactivă (determinată și de evoluția extraordinară de rapidă a genului, în multiplele lui ipostaze), compendium-ul evidențiază în acest sens și o serie de legături („links“-uri) cu unele dintre cele mai documentate surse de informare accesibile prin Internet. Dedic această lucrare soției mele, distinsei compozitoare și profesoare Liana ALEXANDRA (<http://www.romania-on-line.net/whoswho/AlexandraLiana.htm> ).

#### - Capitolul A -

#### EVOLUTIA MIJLOACELOR DE PRELUCRARE A INFORMATIEI, CU APLICATIE IN ARTA SUNETELOR

- I.)- a.) Mijloace manuale în sistem zecimal: 1.) Abacul (inventat în China antică și preluat de cultura greco-romană); 2.) Instrumentele de navigație;- b.) Mijloace mecanice în sistem zecimal: 1.) Rigla de calcul (1620, William Oughtred, logaritmi); 2.) Mașina de calcul inventată de Leonardo da Vinci (sec.XV, operațională cu numere până la 13 cifre); 3.) „*Arca Musarithmica*“-*sintetizorul pneumatic (cu partitura montată pe un tambur-program) imaginat în 1640 de Athanasius Kircher (teoretician al manieristilor și autor al primei enciclopedii) în „Musurgia Universalis“*; 4.) Mașina de calcul inventată de Blaise Pascal (1642 – bazată pe adunare și scădere); 5.) Aritmometrul inventat de Gottfried von Leibnitz (1671 – cu cele 4 operații aritmetice) și perfecționat de Xavier Thomas (1820) și Charles Babbage (1822 – „*Analytical Engine*“ - *mașina diferențială cu cartele perforate, operațională până la 8 secimale și capabilă să genereze structuri muzicale, așa cum remarcă în 1847 Lady Ada Lovelace*) - evoluând până la diferitele mașini de calcul mecanice și electromecanice utilizate inclusiv în a doua jumătate a sec. XX (bazate pe principiul roților Odhner și pe stocarea informației pe bandă de hartie perforată); 6.) „*Würfelspiel*“ („*Joc de zaruri*“) de Wolfgang Amadeus Mozart (1756-1791) – *primul experiment de aleatorism controlat în muzică (Appendix 3)*; 7.) Sisteme mecanice cu program: a.) Razboiul de țesut cu cartele perforate (1802, Joseph Jacquard); b.) Echipamentul mecanografic cu cartele

perforate inventat de americanul Herman Hollerith si folosit in 1890 la prelucrarea datelor referitoare la recensamanatul populatiei din S.U.A.;

- II.) Calculatoarele din generatia 0 (1931-1944), cu program si in sistem zecimal: 1.) calculatoarele electromecanice Z1 – Z3 (1931-1941, Konrad Zuse); 2.) calculatorul Colossus (cu 2000 de tuburi electronice, realizat in 1943 la British Intelligence Establishment si utilizat in descifrarea codului secret german “Enigma”); 3.) calculatorul cu relee electromagnetice si cartele perforate ASCC (Automatic Sequence Controller Computer) realizat in 1937, la Universitatea Harvard, de Howard Aitken si perfectionat cu sprijinul IBM in 1944, prin calculatorul “Mark 1 Harvard” (primul calculator electromecanic complet automatizat si dirijat prin program – operational pana in 1949).

- III.) Calculatoare electronice in sistem binar:

- 1.) Calculatoarele electronice din generatia 1 (1946-1958), bazate pe o arhitectura sintetizata de americanul John von Neumann (in sistem binar si logica booreana): 1.) ENIAC/Electronic Numerical Integrator and Calculator (1946, U.S.A., John V. Manchly, J. Presper Eckert, John von Neumann – Universitatea Pennsylvania – operational pana in 1955); in anul 1957 Departamentul Apararii din S.U.A. organizeaza initiaza proiectul ARPA, reprezentand prima retea cibernetica de comunicatii; 2.) UNIVAC-1/Universal Automatic Computer (1950, U.S.A. – primul calculator electronic comercializat); 3.) MANCHESTER MARK 1 (1948, Marea Britanie – cu program memorat); 4.) EDSAC/Electronic Digital Sequential Automatic Computer (1949, Universitatea din Cambridge – folosind efectiv primul sistem de operare); 5.) *apar primele studiouri de computer music – in 1957 la Bell Laboratories din Murray Hill (New Jersey), iar in 1958 la Illinois University, unde este elaborata prima compozitie muzicala pe computer – “Illiac Suite” for string quartet (1956) de Lejaren Hiller si Leonard Isaacson; apar primele programe din seria “MUSIC” realizate de Max Matthews la Bell Labs;* 6.) in Romania – CIFA/Calculatorul Institutului de Fizica Atomica, 1957), MECIPT (Institutul Politehnic din Timisoara) si DACICC 1 (Institutul de Calcul din Cluj);

- 2.) Calculatoarele electronice din generatia a II-a (1959-1963) - bazate pe tranzistori (in locul tuburilor electronice) si pe limbajele de nivel inalt COBOL si FORTRAN – au fost realizate de companiile americane Honeywell, IBM, Burroughs si Univac; in 1962, US Air Force realizeaza prima retea decentralizata (prin fragmentarea informatiilor trimise, ce sunt reasamblate, in ordine, la receptor) ; in 1959 sunt infiintate “The Columbia-Princeton Electronic Music Center”(dotat cu un RCA Mark II Synthesizer si coordonat de Vladimir Ussachevsky, Otto Luening si Milton Babitt) si “The San FranciscoTape Music Center” (fondat de Morton Subotnick, Ramon Sender, Pauline Oliveros si Terry Riley – studioul fiind echipat cu sistemul electronic “100-series” proiectat de Donald Buchla); experimentele sonore realizate de Max Mathews la Bell Labs (cu RCA Mark II si IBM 7090) sunt gravate pe discul “Music from Mathematics” (Decca DL 79103); apar noi compozitii generate pe calculator - “Stochastic Quartet” de James Tenney (1963, Bell Labs) si “Computer Cantata” de Lejaren Hiller si Robert Baker (1963, Illinois University); in Romania apar computerele MECIPT II (Institutul Politehnic Timisoara), CET 500 SLP.A. Bucuresti) si DACICC 200 (Institutul de Calcul din Cluj);

- 3.) Calculatoarele electronice din generatia a III-a (1964-1970) – bazate pe circuite integrate, pe limbajele de nivel foarte inalt PASCAL, LISP si pe limbajele cu interfata grafica – au fost produse in S.U.A. de firmele IBM (International Business Machines) si DEC (Digital Equipment Corporation); la Princeton Studio apare “Quartets in Pairs” (1964) de J.K. Randall – o lucrare muzicala ce trateaza computerul ca instrument in timp real; la Bells Lab este elaborata – in baza programului “MUSIC V” – lucrarea “Mutations I” (1969) de Jean-Claude Risset (relationand frecventa si timbrul sonor), iar la “San FranciscoTape Music Center” sunt realizate 3 piese antologice semnate de Morton Subotnick: “Silver Apples if the Moon” (1966), “The Wild Bull” (1967) si “Touch” (1968) – toate beneficiind de oportunitatile echipamentului Buchla; programul “MUSIC 360”, creat de Barry Vercoe la Princeton Studio, va determina si aparitia unor noi si importante compozitii – “Synthesism” de Barry Vercoe (1969) si “Earth’s Magnetic Field” de Charles Dodge (1970 – lucrare bazata pe “diagrama Bartels”, ce ilustreaza schimbarile activitatii magnetice a Pamantului); in aceasta perioada apar si sintetizatoarele analogice concepute de Paolo Ketoff (“Syn-Ket” – utilizat de John Eaton) si Robert A. Moog (introdus de Walter/Wendy Carlos in muzica populara) – sistemele acestora fiind ulterior comercializate pe scara larga de firmele ARP, Korg/Unicord, Oberheim,Roland si EML; in 1969 UCLA organizeaza reseaua ARPANET (precursora INTERNET-ului), la care se conecteaza principalele universitati americane; este infiintat – in cadrul Stanford University – renumitul Center for Computer Research in Music and Acoustics, sub coordonarea lui John Chowning (compozitor si inovator in domeniile modulatiei de

frecvența și spațializării); în cadrul cercetărilor efectuate la acest prestigios centru, compozitorul Prof. Emeritus Leland Smith creează "SCORE", primul program de redactare a partiturilor muzicale, ce este utilizat și astăzi la cele mai importante edituri din lume; în Franța se înființează în anul 1970, sub coordonarea compozitorilor Françoise BARRIERE și Christian CLOZIER, celebrul "Groupe de Musique Expérimentale de Bourges" (GMEB), devenit mai târziu "Institut International de Musique Electroacoustique de Bourges" (IMEB), cu o prodigioasă activitate în difuzarea muzicii electronice (festivaluri, concursuri, concerte, cursuri de specializare, editare de discuri, etc.); în România au apărut calculatoare foarte performante, precum FELIX C-256 (1971, realizat, după licența franceză IRIS-50, la Fabrica de Calculatoare Electronice Felix din București), CORAL- 4011 (minicalculator după licența americană DEC, realizat de F.C.E. Felix-București) și INDEPENDENT-I-100 (minicalculator proiectat integral la Institutul de Tehnică de Calcul din București și realizat de F.C.E. Felix-București); în domeniul interferențelor informaticii cu arta, se remarcă contribuțiile extrem de prețioase datorate matematicienilor români Grigore C. Moisil și Solomon Marcus, ce au colaborat în această direcție și cu importanți compozitori, precum Anatol Vieru și Aurel Stroe;

- 4.) **Calculatoarele electronice din generația a IV-a (1971-prezent)** – bazate pe microprocesoare (procesoare integrate într-un circuit integrat – CIP, inventat în 1971 de americanul Marcian Ted Hoff și realizat de firma INTEL) – se numesc microcalculatoare, utilizând memoriile cu bule magnetice, discurile optice, programe de tip ADA și programe orientate pe obiecte; în 1971, la Bell Labs se experimentează sinteza digitală a vocii umane – printr-o tehnică originală aplicată pentru prima dată în compoziția "Speech Songs" de Charles Dodge; în 1972, compozitorul Jon APPLETON împreună cu inginerii Sydney ALONSO și Cameron JONES construiesc primul sintetizor digital – DDS (Dartmouth Digital Synthesizer) – perfecționat în 1976 prin seria "Synclavier", dezvoltată în paralel cu "Con Brio ADS 200", "Fairlight Computer Music Instrument", "Crumar General Development System" și "Alpha Syntauri" – toate aceste instrumente oferind importante facilități în travaliul componistic, dar și în domeniul performanței în timp real ("live/electronic music"); la Paris este înființat – după renumitul model oferit de către Stanford-CCRMA ([www-ccrma.stanford.edu/planetccrma/](http://www-ccrma.stanford.edu/planetccrma/)) – mult apreciatul IRCAM (Institut de Recherche et Coordination Acoustique/Musique – [www.ircam.fr](http://www.ircam.fr)) condus, sub patronaj american, de compozitorul francez Pierre BOULEZ; deosebit de active sunt și instituțiile similare din Belgia (renumitul Instituut voor Psychoacustica en Elektronische Muziek-IPEM din Gent, precum și nu mai puțin notoriul Institut « Musiques & Recherches » din Bruxelles - [www.musiques-recherches.org](http://www.musiques-recherches.org)), Olanda (Institute of Sonology din Utrecht), Anglia (BBC Studio), Italia (RAI Studio), Polonia (Studio of Polish Radio), Ungaria (Studio of Radio Budapest), Germania (NWDR Studio din Köln) și Japonia (NHK Studio) – ce au urmat cu consecvență modelul american, ilustrând adevărata avangardă și în acest domeniu; în perioada 1972-1979, "Working Group" din S.U.A. (coordonat de Vinton Cerf) sintetizează fundamentele protocoalelor TCP (Transmission Control Protocol) și IP (Internet Protocol) referitoare la transferurile de fișiere între grupurile de dialog ("newsgroups") și la posta electronică; din 1983 ARPANET-ul (la care s-au conectat instituțiile guvernamentale, universitățile, bibliotecile și muzeele americane) rămâne o rețea exclusiv civilă - Pentagonul utilizând propria rețea MILNET; în perioada 1987-1993, INTERNET-ul (coordonat de MICHIGAN UNIVERSITY, de IBM și de MCI) se extinde către Europa și apoi în întreaga lume – prin apariția WORLD WIDE WEB (www), ca sistem unanim recunoscut de navigare cu ajutorul unor programe speciale (MOZAIC, NETSCAPE, INTERNET EXPLORER); tot în S.U.A. se dezvoltă principalele sisteme de operare pentru supercalculatoare (UNIX, cu extensiile Berkeley-1986 și cu programul derivat LINUX; realizat în 1991 de studentul Linus Torvalds), pentru mainframe-uri (IBM OS/400), pentru minicalculatoare (RSX11M, cu versiunea românească MIX), pentru microcalculatoare IBM-PC (MICROSOFT-DISC OPERATING SYSTEM/MS-DOS, din care a derivat seria WINDOWS) și Apple MacIntosh (Mac OS) și pentru calculatoarele portabile miniaturizate (WINDOWS CE); apar în U.S.A. două lucrări teoretice de referință în domeniul muzicii electro-acustice: "Electronic Music. Systems, Techniques, and Controls" de Allen STRANGE și "Introduction To Electro-Acoustic Music" de Barry SCHRADER; în U.S.A., disciplina "Computer Music" este inclusă în programele curente de studiu ale celor mai importante universități și colegii, precum:

- Stanford University-CCRMA [www-ccrma.stanford.edu/planetccrma/](http://www-ccrma.stanford.edu/planetccrma/);
- MIT Media Lab <http://sound.media.mit.edu> ;
- Brooklyn College Center for Computer Music [www.brooklyn.cuny.edu](http://www.brooklyn.cuny.edu) ;
- Columbia-Princeton Electronic Music Center <http://www.columbia.edu> ;
- Cal State Univ/Northridge Music [http://www.csun.edu/~dwh50750/tech\\_classes/MUS191/](http://www.csun.edu/~dwh50750/tech_classes/MUS191/);
- Northwestern University <http://faculty-web.at.nwu.edu/music/webster/D34/>;



- Rutgers University <http://mmlweb.rutgers.edu/imtmw.html>;
- Furman University <http://www.furman.edu/~dkoppelm/Tech/17/mus17.html>;
- Dartmouth College - Bregman Electronic Music Studio <http://music.dartmouth.edu> ;
- University of Northern Colorado <http://arts.unco.edu/musictech/mus209/index.html>;
- SUNY Plattsburgh [http://faculty.plattsburgh.edu/richard.davies/courses/mus\\_305syl.htm](http://faculty.plattsburgh.edu/richard.davies/courses/mus_305syl.htm);
- Univ of Southern Cal [http://www-rcf.usc.edu/~kds/courses/mued\\_452.pdf](http://www-rcf.usc.edu/~kds/courses/mued_452.pdf);
- Southwest Texas State <http://147.26.106.74/tech/MusTechsyllabus.html>;
- Lebanon Valley College <http://csunix1.lvc.edu/~snyder/mme803/mtfesyl.htm>;
- Louisiana Tech Univ. <http://performingarts.latech.edu/music/MusicTechnology/TechnologySyllabusLankford.html>;
- Metropolitan State College of Denver <http://clem.msdc.edu/~worster/mtech1/1900syl.html>;
- University of Washington <http://depts.washington.edu/smcweb/courses/400/syl.html>;
- Kennesaw State University <http://ksuemail.kennesaw.edu/~lsherr/2100syllabus.html>;
- Palomar College <http://www.palomar.edu/performingarts/midilab/music180.html>;
- University of Illinois, Champaign-Urbana <http://www-camil.music.uiuc.edu/classes/210/syllabus/syllabus.html>;
- Brown University <http://www.brown.edu/Departments/Music/Music11/syllabus.html>;
- University of Texas at San Antonio <http://music.utsa.edu/technology/mat/>;
- University of South Carolina <http://www.music.sc.edu/ea/mued/mued554/syllabus.html>;
- University of Wisconsin at Whitewater <http://facstaff.uww.edu/craggsj/techsyl.html>;
- Northern State University (Aberdeen, SD) <http://lupus.northern.edu:90/wieland/mus321.htm>;
- Eastern Kentucky University <http://www.music.eku.edu/faculty/davis/Mus584Syllabus.html>;
- Cal State, Chico <http://www.csuchico.edu/~seppanen/103/syllabus103.pdf>;
- Auburn University <http://www.auburn.edu/~wallski/CTM650/CTM650syllabus.html>;
- Radford University <http://www.runet.edu/~rscohen/Music127/syllabus.htm>;
- McMurray <http://cs1.mcm.edu/~dshea/comped.html>;
- Case Western Reserve University <http://www-midischool.cwru.edu/MUSC308/syllabus.html>;
- Dordt College (IA) <http://homepages.dordt.edu/~hduitman/musicstudent/musictechnology.html>;
- Alma College <http://www.alma.edu/academics/music/mus215/syllabus.htm>;
- Youngstown State University <http://www.fpa.ysu.edu/music/crist/came.pdf>;
- Georgia State University <http://www.trombonelessons.com/syllabus.html>;
- East Carolina State <http://www.music.ecu.edu/courses/6300/6300syllabus.html>;
- University of North Carolina, Greensboro <http://www.uncg.edu/~vltrolli/courses.html>;
- Elmhurst College (IL) <http://www.elmhurst.edu/~markh/musicedtech/>;
- Central Michigan State [http://blackboard.cmich.edu:80/bin/common/course.pl?course\\_id=391&frame=:](http://blackboard.cmich.edu:80/bin/common/course.pl?course_id=391&frame=:);
- University of Delaware <http://amy.music.udel.edu/faculty/mmorgan/index.html>;
- Berklee School of Music <http://classes.berklee.edu/mbiervlo/mtec111.html>;
- Florida State University <http://otto.cmr.fsu.edu/%7Emus2360/Schedules/Syllabus.html>;
- James Madison University <http://www.lib.jmu.edu/users/cockbuba/mus150/>;
- Peabody <http://mambo.peabody.jhu.edu/%7Emdboom/ite/>;
- University of Montevallo <http://www.cfa.montevallo.edu/mtech/Su2000/mu676/syllabus.htm>;
- SUNY at Stonybrook <http://www.sinc.sunysb.edu/Class/Ita208/syllabus.html>;
- University of California at Irvine [http://www.arts.uci.edu/music/mzed/Music\\_51/M51\\_syllabus.html](http://www.arts.uci.edu/music/mzed/Music_51/M51_syllabus.html);
- University of Central Florida <http://pegasus.cc.ucf.edu/~jgardner/m&t.html>;
- University of Michigan <http://www-personal.umich.edu/~msimoni/Sp98PAT201.html>;
- Alma College <http://academics.alma.edu/music/mus214/syllabus.html>;
- Penn State University Music [http://www.courses.psu.edu/courseweb/courses/index.cgi?course=music497d\\_meb26;](http://www.courses.psu.edu/courseweb/courses/index.cgi?course=music497d_meb26;)
- University of Hawaii at Manoa <http://www.outreach.hawaii.edu/programs/2001/EVENT-L04269.htm>;
- Dakota State University [http://www.homepages.dsu.edu/mortensd/MUS\\_600/MUS600syl.htm](http://www.homepages.dsu.edu/mortensd/MUS_600/MUS600syl.htm);
- St. Cloud State <http://www.stcloudstate.edu/~slmiller/101syllabus.htm>;
- St. Olaf College <http://www.stolaf.edu/people/hamlin/elmus/em99/syllabus.htm>;
- Univ. of Texas San Antonio <http://multimedia.utsa.edu/index-mp.html>;
- New York University <http://www.nyu.edu/classes/gilbert/cai/> ;
- University of Michigan <http://www-personal.umich.edu/~msimoni/F97PAT441.html>;
- UC Berkeley <http://media2.bmrc.berkeley.edu/classes/m198/>;
- Northwestern <http://www.northwestern.edu/musicschool/classes/webAuthoring/>;
- University of Utah <http://www.finearts.utah.edu/artstech/FA3000/index.html>;
- Loyola New Orleans <http://music.loyno.edu/cd/mugnm450.pdf>;
- University of Houston <http://www.uh.edu/~tkoozin/techseminar.html>;

*compozitorul Dwight WINENGER înființează în U.S.A renumita “LIVING MUSIC FOUNDATION” (<http://www.e-universe.com/lmfhome/>) - unul dintre cele mai importante centre internaționale de promovare a muzicii noi (inclusiv în genul “Computer Music”), ce este coordonat actualmente de către compozitorul și profesorul Charles Norman MASON; dintre membrii L.M.F. menționăm pe Liana ALEXANDRA, Charles ARGERSINGER, Christy BANKS, Rusty BANKS, Heskell BRISMAN, Madeline BYRNE, Barry L. COHEN, Dinos CONSTANTINIDES, George CRUMB, Greg D’ALESSIO, David DEL TREDICI, Aurelio DE LA VEGA, Carlos DELGADO, Emma Lou DIEMER, Violeta DINESCU, Donna Kelly EASTMAN, Grant FLETCHER, Lukas FOSS, Orlando GARCIA, David McGUIRE, Dorothy HINDMAN, Craig HULTGREN, Ladislav KUBIK, Dennis KAM, Hye Kyung LEE, David LIPTAK, Tom LOPEZ, Serban NICHIFOR, Rodney OAKES, Pauline OLIVEROS, Aaron J. RABUSHKA, Bruce REIPRICH, Wieslaw RENTOWSKI, Andrew RINDLFLEISCH, Elliott SCHWARTZ, Nicolas SLONIMSKY, Gregg SMITH, Erich H. STEM, Augusta READ THOMAS, Catherine TOWBIN, Mary Jeanne VAN APPELDORN, David*

VAYO, Rob VOISEY, Olly WILSON, Paul WITNEY, Scott WYATT; in anul 1984 se înființează mai puțin celebra SOCIETATEA DE MUZICA ELECTRO-ACUSTICA DIN STATELE UNITE/THE SOCIETY FOR ELECTRO-ACOUSTIC MUSIC IN THE UNITED STATES-SEAMUS (<http://seamus.lsu.edu>), având ca președinte fondator pe compozitorul Barry SCHRADER, profesor la California Institute of the Arts; sunt dezvoltate noi programe speciale de redactare a partiturilor (CAKEWALK, ENCORE, FINALE, NOTE WORTHY, MUSIC WRITE, MUSIC PUBLISHER și INTELLISCORE – printre altele - în S.U.A.; MOZART și SIBELIUS în Anglia; PIZZICATO în Belgia), precum și numeroase programe de editare muzicală, în baza sistemelor de operare WINDOWS (ca de pildă bogată serie de aplicații elaborate de firmele americane SONIC FOUNDRY, REAL, DIGIDESIGN și ADOBE, precum și de firma germană MUSICMATCH) și APPLE (în această direcție recentul program american “MetaSynth” ilustrând noi modalități de convertire a imaginii în sunet); în Noiembrie 2003 se desfășoară în România primul festival de COMPUTER MUSIC, coordonat de compozitorii Liana ALEXANDRA și Serban NICHIFOR în cadrul Universității Naționale de Muzică din București, sub genericul “NUOVA MUSICA CONSONANTE-LIVING MUSIC FOUNDATION” – fiind prezentate lucrări aparținând unor compozitori din U.S.A. (Ben BIERMAN, George BRUNNER, Madelyne BYRNE, Chris CHAFE, Douglas COHEN, Bob FANELLI, Matthew HAY, John J.A. JANNONE, Peter KIRN, Tom LOPEZ, Miguel MACIAS, Charles Norman MASON, David McGUIRE, Rodney OAKES, Marco OPPEDISANO, Udi PLADOTT, Mark PRIEST, Patricia REPAR, Barry SCHRADER, Martin SIMON, Dirk Johan STROMBERG, Robert VOISEY, Dwight WINENGER, Amnon WOLMAN), Belgia (Kris DE BAEDERMACKER, Joris DE LAET, Raoul DE SMET, Todor TODOROFF, Dick VEVLEMANS, Wilfried WESTERLINCK), Anglia (David WEBBER), Italia (Gianluca CANGEMI) și România (Liana ALEXANDRA, Octavian NEMESCU, Serban NICHIFOR, Livia TEODORESCU, Sever TIPEI, Dan VOICULESCU); apare pe Internet primul curs interactiv în domeniul “MUSIC AND COMPUTERS”, conceput la Dartmouth College (U.S.A.) – sub coordonarea compozitorului și profesorului Jon APPLETON – de către Phil BURK, Larry POLANSKY, Douglas REPETTO, Mary ROBERTS și Dan ROCKMORE. (<http://eamusic.dartmouth.edu/~book/MATCpages/tableofcontents.html>); Facultatea de Interpretare Muzicală din cadrul Universității Naționale de Muzică din București inițiază, în anul universitar 2003-2004, primul curs de Computer Music din România;

- 5.) Calculatoarele electronice din generația a V-a se bazează pe dezvoltarea începând din 1981, în S.U.A. și în Japonia - a inteligenței artificiale după modelul uman (interfața vocală, sensibilitate vizuală, auditivă, tactilă) - ele fiind încă în fază experimentală. O altă dimensiune este determinată de perspectivele fascinante ale INTERNET-ului. În prezent, redutabilul compozitor și profesor Chris CHAFE – director al Stanford-CCRMA – a inițiat impresionantul experiment SoundWIRE, utilizând o serie de aplicații originale ale sistemului LINUX în realizarea pe INTERNET a unor legături audio complexe (permițând, de pildă, interpretilor să cânte împreună în timp real, de la mari distanțe, în condiții acustice ideale – realizându-se astfel un proces de audio-teleportare!). În acest context, aplicându-se standardul ping (ca metodă de testare a conectivității computerelor, ce constă în măsurarea RTT=round trip time), s-a observat că rețeaua (respectiv, INTERNET-ul) reacționează la fluxul (traficul) variabil de mesaje ca o coardă muzicală (având lungimea direct proporțională cu distanța dintre cele două computere conectate) – această coardă virtuală producând (la excitarea ei prin mijloace specifice tehnicii SoundWIRE) diferite sunete (waves) în funcție de “modul de atac” prin ping-uri în real-time. Înălțimea (decibel frecvență=f) acestor sunete este invers proporțională cu RTT-ul ping-ului:

$$f = 1/sR', \text{ unde } s = \{1 : R \leq 5\text{ms} \quad k : R > 5\text{ms}\} \quad k = 0,025.$$

(cf. Chris CHAFE and Randal LEISTIKOW – Levels of Temporal Resolution in Sonification of Network Performance, CCRMA, Music Department, Stanford University, Stanford, CA USA 94305, [cc@ccrma.stanford.edu](mailto:cc@ccrma.stanford.edu) [randal@ccrma.stanford.edu](mailto:randal@ccrma.stanford.edu))

Rețeaua (INTERNET-ul) devine astfel și un autentic instrument muzical ce execută o partitură concepută prin conectarea specifică a două computere aflate la o distanță cât mai mare (pentru a se sintetiza o coardă virtuală cât mai amplă ca spectru armonic) – compoziția rezultată fiind difuzată public în timp real. Totodată, tehnica SoundWIRE reprezintă și o confirmare a viabilității percepției holistice quasi-acustice a Universului – demonstrând o dată în plus caracterul cosmogonic al Vratiei Transcendentale.

- Capitolul B -  
ELABORAREA AUDIO-NUMERICA

1.) PROLEGOMENE

- Ciclul creatiei prin analogie (in perspectiva panenteista si prin reductie fenomenologica):  
DUMNEZEU (« LOGOSUL CREATOR », « MARELE ARHITECT AL UNIVERSULUI ») >  
Continuumul realitatii informational-energetice (« Panarmonios Kosmou Sintaxis », « Musica Caelestis » - cf. Appendix 2) > Creatia Muzicala (componistica si interpretativa) > Creatia Instrumentala > Creatia Electro-Acustica > Computer Music.

- Definirea Informatiei : a.) ontologic (sub aspect existential) = componenta a traidei  
« informatie-energie-materie » ( ca principiu universal) ; b.) cibernetic (matematic, prin analogie  
formala) = cantitatea de noutate (dependenta si de gradul de interes al receptorului) ;  
epistemologic (prin cunoastere stiintifica) = componenta a dihotomiei « realitate-informatie »  
(realitatea manifestandu-se prin informatie in procesul delimitarii « adevar/eroare ») ; semiotic  
(sub aspectul logicii simbolice) = un ansamblu logic de semne (sau « semnificanti ») purtatoare de  
sensuri (sau « semnificati »), in contextul comunicarii.

- Comunicarea Muzicala : DUMNEZEU – CREATORUL >[comunicarea unui Sens Mistic,  
soteriologic –exprimat prin Semn Divin]> Compozitor >[a.) decodificarea quasi-hermeneutica a  
Semnului Divin prin descoperirea « irationala » (pnevmatologica) a Sensului Mistic  
(« mysterium tremendum »); 2.) codificarea Sensului Mistic in semn grafic muzical (partitura),  
prin procesul de « creatie componistica »; 3.) comunicarea partiturii (in manuscris sau prin  
intermediul editorului)]> Interpret [a.) decodificarea partiturii (rationala la nivel formal,  
intuitiva/« irationala » la nivel conceptual) si decelarea Sensului Mistic-muzical; b.) codificarea  
Sensului Mistic-muzical in semn acustic (sunet), prin procesul de « creatie interpretativa » ; c.)  
comunicarea interpretarii (prin concert sau inregistrare)] > Public [a.) decodificarea individuala  
(in functie de cultura muzicala, dar si de intuitie) a semnului acustic in Sens Mistic ; b.)  
asimilarea personala dar si in comuniune (« ab alio in alis ») a Sensului Mistic al muzicii in  
procesul soteriologic al perfectionarii spirituale, conform Planului Divin].

- Dimensiuni sonore : 1.) fizice (obiective) : spatiul sonor [frecventa (audibilila la om : 16  
20000Hz) x amplitudine (perceptibila/suportabila la om : de la 10 la puterea -16 W/cm<sup>2</sup> pana la  
12 W/cm<sup>2</sup>) x structura spectrala (« naturala » si « artificiala » - acustica/electroacustica) x  
locatie (inchisa/deschisa)] x timpul fizic-infinit (‘, ’, h, d, m, y, etc.) ; 2.) muzicale (subiective) :  
spatiul muzical [inaltime (netemperata - in sistemele extraeuropene si in cele europene de  
sorginte pitagoreica ; temperata in sistemul european occidental, incepand din sec.al XVIII-lea) x  
intensitate (relativa : ppppp-fffff, valorile depinzand de sursa, stil, acustica topos-ului, etc.) x  
timbru (vocal, instrumental-acustic/electroacustic, mixt) x topos (amplasamentul sursei :  
scenic/extra-scenic, mono-/stereo-/qudrofonic/panoramic/multi-dimensional)] x timpul muzical-  
finit : ritm, agogica, forma [evolutiva/non-evolutiva ; repetitiva/non-repetitiva ; catenata (mono-  
/bi-/tri-/tripentapartite/rondo/suita/forma “mozaic”)/contrastanta (sonata) ; variationala/meta-  
(ana-)morfotica ; monodica/polifonica/heterofonica ; omogena/mixta ; inchisa/deschisa ; supra-  
/juxtapusa ; determinista/stochastica (aleatorie - controlata/necontrolata) ; micro-  
/macrostructurala (de la celula, motiv, fraza, perioada, sub-sectiune si sectiune la parte si intreg)  
].

- Evolutia Muzicii Electro-Acustice: 1.) Tape Music (Musique Concrète; Electronic (Acousmatic)  
Music (Synthesizer Music: - analog-RCA, Buchla, Moog, Korg, etc.; - digital-Synclavier,

**Yamaha, etc.); 2.) Live-Electronic Music (Tape and Instruments; Electronics and Instruments); 3.) Computer Music (Bell Labs, Princeton Studio, CCRMA, IRCAM, etc.); 4.) Cyber-Art (Digital Music; Computer Animation/Audio-Visual Effects; Interactive Art; Net Vision (SoundWIRE Project-CCRMA, etc.).**

- **Calculul algoritmic in sinteza audio-numerica :**

1.) Daniel CUMMEROW: „The Sound of Mathematics“ [combinari (*triumghiul lui Pascal*), constante (*e, pi, omega, numarul lui Ramanujan*), functii (*phi-Euler, mu-Möbius, functii trigonometrice*), numere (*Niven, prime, tripletii primitivi ai lui Pitagora*), siruri (*fluturile lui Lorenz, sirul lui Fibonacci, sectiunea de aur*)] ([www.geocities.com/Vienna/9349/](http://www.geocities.com/Vienna/9349/) ; [daniel.cummerow@stockholm.mail.telia.com](mailto:daniel.cummerow@stockholm.mail.telia.com));

2.) Chris K. CALDWELL : "*Prime Number Listening Guide*"  
([www.utm.edu/research/primes/programs/music/listen/](http://www.utm.edu/research/primes/programs/music/listen/));

3.) Ivars PETERSON: *Dancing chaos* (MAA Online, Jan. 11, 1999), *Prime listening* (MAA Online, June 22, 1998) –*The Mathematical Association of America* ([webmaster@maa.org](mailto:webmaster@maa.org) , [ip@sciserv.org](mailto:ip@sciserv.org) );

4.) José Oscar MARQUES: "The Strange Beauty of Fractal Music"  
([www.midiworld.com/c/jmarques.htm](http://www.midiworld.com/c/jmarques.htm));

## - 2.) SINTEZA SUNETULUI DIGITAL

- **Tipuri de sunete electro-acustice (waveforms/waveshapes):** sinusoidal (sine -  $\sim$ ), “dinti de ferastrau” (sawtooth -  $\nabla$ ), rectangular (square -  $\square$ ) si triunghiular (triangle -  $\wedge$ ).

**- Anvelopa sunetului: Attack-Decay-Sustain-Release (ADSR).**

- **Conversia sunetului:** ADC sau A->D = “Analog to Digital Conversion” [transformarea imaginii acustice in imagine numerica binara (0 si 1)]; DAC sau D->A = “Digital to Analog Conversion” [transformarea imaginii numerice binare (0 si 1) in imagine acustica]. Sunetul analog are un caracter continuu, iar cel digital este gradual, format din **“trepte”** succesive de **informatii** (numite **“samples”**) - a caror viteza este direct proportionala cu fidelitatea (calitatea) reproducerii; astfel, **“Teorema Nyquist”** a stabilit ca **respectiva viteza (“sampling rate” sau “sampling frequency” - masurata in Hz)** trebuie sa aiba o valoare cel putin dubla in raport cu cea mai inalta frecventa cuprinsa in semnalul sonor.

- **Sampling frequency:** Unitatea de masura a **informatiei** in teoria statistica a comunicatiei este **“BIT”**-ul (ca prescurtare a **“Binary digIT”**). [Considerand doua evenimente cu probabilitati egale de realizare, BIT-ul reprezinta informatia obtinuta asupra unui eveniment prin realizarea sa, sau incertitudinea asupra evenimentului inlaturata prin realizarea sa.] Multiplii BIT-ului sunt: 4 bits = **1 nibble**; 8 bits = 2 nibbles = **1 byte**; 16 bits = 2 bytes = **1 word**; 1024 bits = **1 kilobyte (K)** ; 1000 K = **1 megabyte (MB)** ; 1000 MB = **1 gigabyte (GB)** ; 1000 GB = **1 terabyte (TB)** . **Formula standard de reproducere sonora** (utilizata si in realizarea CD-urilor audio) este **aceea a unei viteze (“sampling frequency” sau “sampling rate”) de 44100 Hz la 16 bits** [conform **“Teoremei Nyquist”** enuntate mai sus, “sampling frequency” de 44100 Hz este raportata la pragul auditiv superior (la om), ce este situat la cca 20000 Hz]. **NB** - data fiind constitutia exclusiv numerica a sunetului digital, imaginea sonora este perfect conservata, eliminandu-se zgomotele complementare ce apar in cazul inregistrarilor analoge.

- **Dimensiunile audio si compresia digitala:** o secunda de muzica reproducuta in formatul standard “audio-CD Stereo” este alcatuita din doua “samples” (cate unul pentru fiecare canal) de 16-bit (= 2 bytes) totalizand asadar 4 bytes derulati cu viteza de 44100 Hz – consumand in consecinta un spatiu de 176.400 bytes (= 176,4 kilobytes). Un minut va consuma asadar 10. 584 kilobytes (= 10,584 MB), iar o ora – 635,04 MB. In aceste conditii, necesitatile transmiterii muzicii pe Internet au determinat realizarea unor noi formate audio ce sunt comprimate dupa algoritmi specifici. De pilda, aplicand principiul de codificare “mu-law” (conform caruia auzul uman este mult mai sensibil la schimbarile joase de amplitudine decat la cele inalte), formatul MP3 reduce spatiul ocupat de fluxul sonor “citindu-l” printr-o grila cu numai 256 de elemente.

### - 3.) TIPURI DE FISIERE DIGITALE AUDIO

**ACID Project Files (acd, acd-bak), ACID Projekt With Embedded Media (acd-zip), Ad Lib Sample (smp), Amigo SVX (svx, iff), Audacity projects (aup), Audition Loop (cel), CAKEWALK Files (wrk, bun), CD Audio (cda), Covox V8 (v8), Creative Labs VOC (voc), Dialogic VOX ADPCM (vox), Gravis Patch (pat), ENCORE File (enc), FINALE Coda Notation File (mus),**

FINALE ENIGMA Transportable File (etf), FINALE Coda Template File (ftm), InterVoice (ivc), IRCAM Files (snd), Main Concept MPEG 1 (mpg, mpeg, m1a), Main Concept MPEG 2 (mpg, mpeg, m2a), Macintosh Audio Interchange File Format/AIFF (aif, snd), Macintosh Resource (snd), Macromedia Flash (swf), MIDI SDS (sds), MIDI Files – Format 1 [all instruments saved to separate tracks] si Format 2 [all instruments saved into a single track] (mid, smf, rmi), MidiScan File (mnd), MOZART File (mz), MP3 Audio (mp3), Mp3PRO FhG (mp3), OggVorbis (ogg), Music Write 2000 File (mwk), NeXT/Sun (Java) File (au, snd), NoteWorthy Composer (nwc), PIZZICATO File (piz), QuickScore File (qsd), Quick Time (mov, qt, dv, gif), Raw File (raw), RealMedia (rm, ra), RealNetwork G2 (rm), RHAPSODY File (rhp), Sample Vision (smp), SmartScore File (fin), SCORE File (pge, pag, mus), SIBELIUS File (sib), SIBELIUS Scorch Web Page (htm), Sonic Foundry (sfr), Sound Designer 1 (dig, sd), Sounder/Sound Tool (snd), Video for Windows (avi), Tune Smithy Fractal Tunes (ts), TwinVQ ver 2.0 format (vqf), Windows Media Audio (wma), Windows Media Format (asf), NIFF (Notation Interchange File Format - format standard pentru notatia muzicala).

#### - 4.) PRINCIPALELE FISIERE DIGITALE AUDIO UTILIZATE IN ACEST CURS:

- MIDI [Musical Instrument Digital Interface] (mid) a aparut in 1983 (lansarea sa a avut loc la Los Angeles – The First North American Manufacturers Show) si cuprinde: (1) Protocolul de comunicatii (limbajul codificat in forma binara), (2) Conectorul (interfata hardware – ce este de tipul „5 pins DIN MIDI“) si (3) Formatorul de distributie „Standard MIDI Files“ ( SMF sau „mid“), ce contine „Status Byte“ (format din „Note On“, „Note Off“, „System Exclusive“, „SysEx“ si „Path Change“) configurat in „Chains“ si „Loops“ distribuite pe cele 16 canale – „MIDI Channels 0-15“ – fie in forma mixata intr-un singur traiect („MIDI O“), fie in cea spatializata pe 16 voci separate („MIDI 1“). Fisierul este foarte redus, iar celelalte coordonate (dinamica, timbrul, panoramarea) sunt mobile, putand fi precizate de catre utilizator – aceste aspecte constituind principalele diferente in raport cu celelalte tipuri de fisier audio (wav, mp3, aiff, rm, etc.), ce sunt cu mult mai voluminoase (deci mai greu de transmis prin Internet) si au toti parametrii inamovibili. Formatul MIDI are numeroase aplicatii: instrumente muzicale electronice, sintetizoare digitale, sequencers, programe de redactare muzicala („MIDI Notation Software“ – ca de pilda „MOZART“, „FINALE“, „CAKEWALK“, „SIBELIUS“, etc.), „MIDI Show Control“ (in spectacole), „MIDI Machine Control“ (in studiourile de inregistrari) – toate putand fi interconectate prin noile protocoale „GENERAL MIDI 1“ (GM1 din 1991) si „GENERAL MIDI 2“ (GM2 din 1999) stabilite de catre „MIDI Manufacturers Association Incorporated“ din Los Angeles.

- WAVE (wav) – formatul standard audio-digital necomprimat CD-DA [aplicat in realizarea CD-urilor – format CD-Audio (cda)], ce a fost asimilat in sistemele de operare MICROSOFT WINDOWS. Este formatul cel mai voluminos (1 minut = 10 MB – contraindicat asadar in transmisiile prin Internet), dar si cel mai fidel sub aspect acustic – fiind singurul format utilizat in procesul de editare a CD-urilor.

In sistemul Macintosh, formatul standard necompresat (deci echivalentul formatului „Wave“ din Windows) este “AIFF” (Audio Interchange File Format).

- MP3 [MPEG I – layer 3 Audio Codec] (mp3, mpeg, mpg) este unul dintre cele mai eficiente si mai populare fisier de compresie audio - “compresia Hoffman” utilizata implicand analiza muzicii prin grila pragurilor de audibilitate umana (2 Hz – 20 KHz) si eliminarea elementelor inaudibile. Marimea fisierului este determinata de numarul de kilobiti per secunda (8, 16, 18, 20, 24, 32, 40, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 kbps – configuratia optima - in raportul fidelitate/dimensiune - fiind cea de 128 kbps). Acest tip de fisier este format din milioane de cadre, fiecare cadru continand titlul (de identificare a punctelor de reper), eticheta (cu informatii despre muzica respectiva) si datele propriu-zise (compresate si inregistrate sub forma de biti).

O alternativa free la MP3 este reprezentata de formatul “Ogg Vorbis” (marcat prin sufixul “ogg”).

#### - 5.) PROGRAME DE CONVERTIRE UTILIZATE IN ACEST CURS:

- MIDI-WAV (Midi2Wav Demo - [www.midi2wav.com](http://www.midi2wav.com) );

- **WAV-MIDI** (IntelliScore Poliphonic Demo – [www.intelliscore.net](http://www.intelliscore.net); AmazingMIDI Demo - [www.pluto.dti.ne.jp/~araki/amazingmidi/](http://www.pluto.dti.ne.jp/~araki/amazingmidi/));
- **WAV-MP3-WMA** (Shuffler Music Converter – [www.illustrate.org](http://www.illustrate.org) ; MusicMatch Jukebox Demo - <http://mmjb.musicmatch.com> ; Sound Forge 4.5 Demo - [www.sonicfoundry.com](http://www.sonicfoundry.com) ; ACID Pro 4.0 Demo - <http://sonicfoundry.com/acid> ; Adobe Audition 1.0 Demo - [www.adobe.com/audition](http://www.adobe.com/audition) );
- **WAV-AIFF si WAV-OggVorbis-WAV** (Audacity 1.2.0.-pre2 Free Digital Audio Editor – [www.sourceforge.net](http://www.sourceforge.net) )

1 minut de muzica stereo = 10 MB WAV = 10 MB AIF = 973 KB OGG = 950 KB WMA (128 kbps) = 937 KB MP3 (128 kbps) = 253 KB AUD (Audacity Projects) = 122 KB RM (16 kbps).

1' WAV = 1' AIF = 10,27' OGG = 10,53' WMA (128 kbps) = 10,67' MP3 (128 kbps) = 39,53' AUD = 82' RM (16 kbps) = 1100,1' MIDI (format 0) = 10 MB.

### **- 6.) PROGRAME MUZICALE**

**NB** - Prezentul compendium are un caracter strict didactic. Programele de calculator analizate fac obiectul dispozitiilor legale (interne si internationale) in materie de copyright – utilizarea lor impunand respectarea conditiilor specificate de producatori pe site-urile indicate la fiecare software.

#### **- a.) Programe de redactat partituri (Music Notation Programs):**

**ABC**, **Braeburn Software products** (Noteworthy 2, Music Publisher, Music Publisher 32), **Brahms** (Koobase), **Cakewalk family**, **Capella**, **CodaMusic** products (Finale, Finale Allegro, PrintMusic), **CSound**, **CuBase**, **Graphire**, **Music Press**, **GVOX products** (Encore, MusicTime Deluxe), **Igor**, **LilyPond**, **Lime**, **Melody Assistant**, **MidiScore**, **Mosaic**, **Mozart**, **MTX**, **MUP**, **Muse**, **Musicator**, **MusicEase**, **MusicWrite**, **MusiXTeX**, **NIFF**, **Nightingale**, **Noteworthy Composer**, **Object Composer**, **Opcode products** (Fermata, Studio Vision Pro 4.5.1, Vision DSP 4.5.1 – pentru Macintosh -, la [www.opcode.com](http://www.opcode.com)), **OpusTeX**, **Personal Composer**, **PMX**, **Rosegarden**, **Sibelius**, **Sionsoft** (QuickScore Elite 9.0, Copyst 6.0).  
(cf. <http://www.mulveyfamily.com/Katy/Music/Notation/contents.html>)

Site-urile principalelor programe: **Mozart** ([www.mozart.co.uk](http://www.mozart.co.uk)), **Finale** ([www.codamusic.com](http://www.codamusic.com)), **Sibelius** ([www.sibelius.com](http://www.sibelius.com)), **Score** ([www.scoremus.com](http://www.scoremus.com)), <http://ace.acadiau.ca/score> si adresa autorului Prof. Leland SMITH [lcs@ccrma.stanford.edu](mailto:lcs@ccrma.stanford.edu)), **Encore** ([www.gvox.com](http://www.gvox.com)), **Pizzicato** ([www.arpeggemusic.com](http://www.arpeggemusic.com)), **Sion QuickScore Elite**([www.sionsoft.com](http://www.sionsoft.com)), **Nightingale Music Notation Software for Macintosh Entrance** ([www.ngale.com](http://www.ngale.com)), **MusEdit Powerful Notation Software** ([www.musedit.com](http://www.musedit.com)), **Music Publisher** ([www.braeburn.co.uk](http://www.braeburn.co.uk)), **NoteWorthy** ([www.braeburn.demon.co.uk](http://www.braeburn.demon.co.uk)), **MusicWrite Professional** ([www.voyetra-turtle-beach.com](http://www.voyetra-turtle-beach.com)), **NoteWorthy Composer** ([www.noteworthysoftware.com](http://www.noteworthysoftware.com)), **Opcode** ([www.opcode.com](http://www.opcode.com)), **Sionsoft** ([www.sionsoft.com](http://www.sionsoft.com)), **OpusTeX** (<ftp://ftp.tex.ac.uk/incoming/opustex/arwork>), **Csound**, **Rosegarden** si **SNDAN** ([www.csound.com](http://www.csound.com)), **NIFF** (Notation Interchange File Format) Notation File Standard ([www.musitek.com/niff.html](http://www.musitek.com/niff.html)), **Lime Notation Software** ([www.cerlsoundgroup.org](http://www.cerlsoundgroup.org))

#### **- b.) Programe audio de fonotecare (Music Editors):**

**AudioEdit Deluxed**, **Digitonix Element**, **DubIt**, **FruityLoops**, **Midi Quartet**, **Midi Works**, **Mobius**, **Music Publisher 32**, **QUARTET X2 Music Studio**, **Song Writer**, **TablEdit** Tablature Editor, **XG-Gold**, **Blaze Media Pro**, **ezMP3edit**, **MP3 Audio Mixer**, **MP3 File Editor**, **Advanced MP3 Cutter**, **AAA Wave**, **Ace of WAV 2.6**, **Acoustic Labs Mixer 2.5**, **Adobe Audition**, **All Editor 2.2**, **Anvil Studio 2003**, **Audio Edit 3.4**, **AudioEdit Deluxe**, **AVI Splitter**, **AVS Audio Utilities**, **Blaze Audio RipEditBurn**, **Blaze Media Pro**, **BlazeAudio Wave Creator**, **BPS Audio Converter Pro**, **Cakewalk**, **Claudio** Complete luxury audio recorder with MP3, **Cool Edit 2000 1.1**, **Cool Edit Pro 2.0**, **DART XP**, **Digidesign**, **GoldWave**, **MagicScore**, **n-Track Studio**, **Wave Splitter**, **Midi Tracker**, **Sound Forge**, **Native Instruments**, **Propellerhead**, **Steinberg**, etc.  
(cf. <http://www.freefunfiles.com>)

Site-urile principalelor programe: **Sound Forge** ([www.sonicfoundry.com](http://www.sonicfoundry.com)), **Pro Tools** ([www.digidesign.com](http://www.digidesign.com)), **Audacity** (<http://audacity.sourceforge.net>), **MusicMatch Jukebox** (<http://www.musicmatch.com>), **Real** ([www.real.com](http://www.real.com)), **Cakewalk** ([www.cakewalk.com](http://www.cakewalk.com)), **Voyetra Digital Orchestrator Pro** ([www.voyetra.com](http://www.voyetra.com)),

Adobe Audition ([www.adobe.com](http://www.adobe.com)), Magix ([www.magix.com](http://www.magix.com)).

Alte site-uri cu programe muzicale : [www.rocketdownload.com](http://www.rocketdownload.com), [www.zdnet.com](http://www.zdnet.com), [www.hitsquad.com](http://www.hitsquad.com), [www.sonicspot.com](http://www.sonicspot.com), [www.asp-shareware.org](http://www.asp-shareware.org), [www.square1music.com](http://www.square1music.com), <http://garbo.uwasa.fi>, [www.freefunfiles.com](http://www.freefunfiles.com), [www.simplythebest.net/shareware/music](http://www.simplythebest.net/shareware/music).

### **PROGRAME AUDIO IN SISTEMUL DE OPERARE LINUX** (Audio software for LINUX)

Majoritatea sunt prezentate pe site-ul <http://linux-sound.org/>, cele mai utilizate fiind :

- **Ardour** (free software multi-channel – <http://ardour.sourceforge.net/>);
- **FinalScratch** (generator de sunete ce ruleaza atat pe Linux cat si pe MacOS X – [www.finalscratch.com/fs4/](http://www.finalscratch.com/fs4/));
- **MusE** (sequencer MIDI/Audio pe Red Hat, ce proceseaza date MIDI controland device-urile de sunet - realizat la Center for Computer Research in Music and Acoustics (CCRMA) - Department of Music, Stanford University (USA) - [www.ccrma.stanford.edu/planetccrma/software/](http://www.ccrma.stanford.edu/planetccrma/software/));
- **Rosegarden 4** (editor de partituri, de tip KDE3 – bazat pe bibliotecile « kdelibs3 » - [www.all-day-breakfast.com/rosegarden/](http://www.all-day-breakfast.com/rosegarden/));
- **Sweep** (editor de sunet - inclus in distributia « SuSE 8.2 » - utilizat pentru post-procesarea inregistrarilor digitale prin lectorul virtual « Scrubby » - [www.metadecks.org/software/sweep](http://www.metadecks.org/software/sweep));
- **NoteEdit** (editor de partituri si sintetizor de instrumente muzicale virtuale – inclus in distributia « SuSE » - <http://rnvs.informatik.tu-chemnitz.de/~jan/notedit/notedit.html>);
- **FluidSynth** (sintetizor software bazat pe samples/ « wavetable synthesis » - [www.fluidsynth.org](http://www.fluidsynth.org));
- **AlsaModularSynth** [sintetizorul software ALSA (« Advanced Linux Sound Architecture ») utilizeaza module pre-definite, precum MCV (« MIDI Controlled Voltage Supply » - ce converteste timbrele MIDI in valori de tensiune), VCO (« Voltage Controlled Oscillator » - generator de sunete determinate de valorile de tensiune), PMC (« Pulse Code Modulation » - converter analog/digital si digital/analog, ca interfata pentru difuzoare) si VCA (« Voltage Controlled Amplifier » - amplificator bazat pe valorile de tensiune) - <http://alsamodular.sourceforge.net/>];
- **NB** – revista « *LINUX MAGAZIN* » ([www.linux-magazin.ro](http://www.linux-magazin.ro)) Nr.4/Decembrie 2003 (pag.21-35) include o prezentare amanuntita a acestor noi programe audio.

### **PROGRAME AUDIO IN SISTEMUL DE OPERARE MACINTOSH** (Apple MacIntosh – Mac OS Audio Software)

Numeroase programe specifice pot fi procurate pe Internet, ca de pilda pe site-ul [www.hitsquad.com/smm/mac](http://www.hitsquad.com/smm/mac), atat in categoria « *Music Notation* » (Cubase Score 5 ; Lime Music Notation Software 8.08 ; NoteAbility Pro v.1.996 ; ScoreWriter 2 ; Sibelius 3.1 ; Finale 2003 ; Vivaldi Gold Mac ; Sonata 4.0, etc.), cat si in categoria « *Audio Editors* » [Ableton Live 3.0.2 (real-time audio production) ; Amadeus II 3.6.1 (direct-to-disk sound editor and analyser with MP3 support) ; Audacity 1.1.1 for Mac (free cross-platform multi-track sound editor) ; Sound Sculptor II (multi-track sound editor), Peak (http://eamusic.darmouth.edu/masters.courses/Music24/software.htm), etc.].

### **PROGRAME AUDIO IN SISTEMUL DE OPERARE WINDOWS** (Windows Audio Software)

**NB-** Sunt prezentate doar programe disponibile in versiunile „Free“ si „Demo“

#### **- a.) PROGRAME MIDI DE REDACTARE MUZICALA**

**„MOZART VIRTUOSO 6“ THE MUSIC PROCESSOR BY DAVID WEBBER**  
© David WEBBER 1994-2004  
<http://www.mozart.co.uk>  
[dave@mozart.co.uk](mailto:dave@mozart.co.uk)  
484 Warrington Rd., Culcheth, Warrington, WA3 5RA, UK

## **FUNCTIILE PROGRAMULUI „MOZART 6“**

### **I.) GENERALE**

- **File:** *New* (+ *Template*: *None*, *Alto Sax Jazz Quartet*, *Brass Band*, *Brass Quintet*, *Clarinet and Piano*, *Clarinet Choir*, *Clarinet Jazz Quartet*, *Clarinet Quartet*, *Crumhorn Quartet*, *default Part.*, *Fake Book*, *Flute and Piano*, *Flute Jazz Quartet*, *Guitar*, *Jazz Band 1*, *Jazz Band 2*, *Oboe and Piano*, *Orchestra* [2 Fl., 2 Ob., 1 C:I., 2 Cl., 1 Cl.B., 2 Fg., 4 Hr., 3 Trbe, 3 Trbn., Tuba, Timp., 2 Perc., *Archi* = 29 staves], *Piano solo*, *Recorder Consort*, *Recorder Quartet*, *Sax Quartet*, *Solo bass clef*, *Solo treble cleff*, *Song Sheeet*, *Soprano Sax Jazz Quartet*, *String Quartet*, *Tenor Sax Jazz Quartet*, *Trombone and Piano*, *Trumpet and Piano*, *Trumpet Jazz Quartet*, *Viola and Piano*, *Violin and Piano*, *Voice and Piano*, *Wind Band*, *Wind Octet*, *Wind Quintet*), *Open*, *Import* (*Open clipboard*, *Play in new piece*, *Re-import played-in piece*, *Import MIDI*), *Print Setup*, *Stop playing*, *Exit*.

- **View:** *Tool bars*, *Keyboard shortcuts*, *Colour scheme*, *Global preferences*: *Metronome*, *Chord symbols*, *Autosave*, *Settings*, *Music*, *Playback*, *MIDI echo*, *MIDI port*.

- **Help:** *Mozart help topics*, *Search for help*, *Lesing help*, *Command list*, *Editing commands*, *Getting started*, *Tip of day*, *Optaining support*, *About Mozart*.

### **II.) SPECIALE**

- **File:** *New*, *Open*, *Close*, *Save*, *Save as*, *Import* (*Open clipboard*, *Play in new piece*, *Re-import played-in piece*, *Import MIDI*), *Export* (*Save MIDI*, *Save MIDI as*, *Save Template*), *Duplicate*, *Print*, *Print preview*, *Print setup*, *Play* (*Play & track*, *Play*, *Play & track forward*, *Play forward*), *Send*, *Exit*.

- **Edit:** *Undo*, *Redo*, *Cut*, *Copy*, *Paste*, *Copy image*, *Copy print image*, *Insert bars*, *Delate bars*, *Cut bars*, *Insert beat*, *Delate beat*, *Select all staves*, *Select whole piece*, *Go to bar*.

- **View:** *Music font*, *Zoom in*, *Zoom out*, *Tool bars*, *Keyboard shorcuts*, *Visible music items*, *Colour scheme*, *Global preferences*, *MIDI options*, *Swing*, *MIDI in connection*, *MIDI out connection*, *Tune properties*, *Refresh*.

- **Item:** *Note* (*Enter note*, *Enter rest*, *Sharpen*, *Flatten*, *Accidental*, *Enharmonic*, *Enharmonic default*, *Dot*, *Double dot*, *Octave up*, *Octave down*, *Pitch*, *Convert to note*, *Convert to rest*), *Partition* (*Merge notes*, *Split note (#)*, *Split note (^)*, *Split note (\)*, *Multiplet*, *Triplet*, *Soublet*, *Remove multiplet*), *Tails* (*Joint*, *Invert*, *Default direction*, *Flip note head*), *Accents* (*Accent*, *Attack*, *Staccato*, *Tenuto*, *Open*, *Closed*, *Pause*, *Accent below*, *Attack below*, *Staccato stem*, *Tenuto stem*, *Pause below*), *Ornaments* (*Trill*, *Mordent*, *Inverted Mordent*, *Turn*, *Inverted Turn*, *Appoggiatura*, *Grace note*, *Reiteration-0,1 /, 2 //, 3 ///*), *Phrasing* (*Phrase mark*, *Phrase mark below*, *Tie*, *Tie...*, *Invert Tie*), *Bar lines* (*Bar line*, *Repeat*, *Final bar line*, *Line break*, *Music break*, *Number*, *Rehearsal mark*, *First time*, *Second time*), *Dynamics* (*fz*, *fff*, *ff*, *f*, *mf*, *mp*, *p*, *pp*, *ppp*, *cresc.*, *dim.*, *swell*, *fade*), *Symbol* (*Chord symbol*, *Chord repeat*, *Text*, *Down bow*, *Up bow*, *Pedal*, *Pedal off*, *Break*, *Tempo*), *Control* (*Mute*, *Unmute*), *Properties* (*Offset*, *Hide/Show*, *Properties*), *Spacing* (*Insert*, *Compress end*).

- **Bar:** *Joint Tails*, *Invert Tails*, *Default Tails direction*, *Accidents*, *Enharmonic default*, *Octave up*, *Octave down*, *Compress bar*, *Whole bar repeat (/.)*, *Whole bar rest*, *n bar rest*, *Pad with rests*.

- **Score:** *Transpose piece*, *Key*, *Time signature*, *Tempo*, *Stave*, *Clef*, *Instrument*, *Concert octave* (*up*, *down*), *Combine strands*, *Separate strands*, *Score layout*, *Lyric lines* (*Add lyric line*, *Remove lyric line*, *Move lyric line up*, *Move lyric line down*), *Style options* (*Chord symbols*, *Clefs*), *Written pitch*.

- **Layout:** *Titles*, *Page format*, *Music font*, *Bar numbering*, *Print empty stave*, *Justify*.

- **Window:** *New window*, *Cascade*, *Title*, *Arrange items*, *Close all*, *Next window*, *Previous window*, *n Mozart n*.

- **Help:** *Mozart help topics*, *Search for help*, *Lesing help*, *Command list*, *Editing commands*, *Getting started*, *Tip of day*, *Optaining support*, *About Mozart*.

-

## **OPERATII CURENTE**

### **1.) O noua lucrare:**

*File-New- precizand Template/Formatul de solist sau ansamblu pre-existent*, *Key/Tonalitate*, *Time/Masura*, *Tempo -OK*; apoi:

*Layout Titles* (*precizand Title/Titlu*, *Composer/Compozitor*, *Reference/Denumirea si/sau caracterul Tempo-ului*);

- sau:

*File-New- precizand Template <None>*, *Staves (Portative) “n”* (de la 1 la 64)-OK; apoi



*Score-Clef/Cheie, Instrument, Score layout (precizand Score si Style), eventual Lyric lines; apoi: Layout Titles (precizand Title/Titlu, Composer/Compozitor, Reference/Denumirea si/sau caracterul Tempo-ului);*

## **2.) O lucrare pre-existenta:**

File-Open; sau File-Import MIDI.

## **3.) Redactarea textului muzical:**

Scrierea efectiva a notelor implica urmatoarele trei operatii: precizarea duratei (longa = 0, nota intraga = 1, doimea = 2, patrimea = 3, optimea = 4, saisprezecimea = 5, etc.), precizarea inaltimii cu butonul stang al mouse-ului (sau cu tastele de orientare sus/jos/stanga/dreapta, sau cu claviatura virtuala ce apare in imaginea programului) si fixarea notei prin apasarea tastei de spatiu a keyboard-ului. Pentru stergera rapida a unei note se utilizeaza tastele de orientare si apoi tasta Delete, iar pentru stergera mai multor note, acestea se selecteaza cu mouse-ul, dupa care se apasa aceeaasi tasta Delete. Pentru anulara unei/unor masuri se utilizeaza comanda Edit-Delete bars, iar pentru adaugarea unei/unor masuri - comanda Edit-Insert bars.

## **4.) Alte operatii frecvente:**

ItemPartitionMultiplet (pentru formule ritmice exceptionale), ItemTails (pentru orientarea "cozilor"), ItemAccents (pentru accente), Item Ornaments (pentru ornamente), ItemPhrasing (pentru indicarea legaturilor de frazare), ItemBarline (pentru barele de masura, de repetitie, precum si pentru bara finala), ItemDynamics (pentru nuante), ItemSymbolText (pentru textele integrate in partitura, ca de pilda indicatiile de expresie), ScoreTranspose (pentru transpunerea lucrarii). Schimbarile de tonalitate, masura, tempo si chei se realizeaza cu comenzile din Score: Key, Time signature, Tempo si, respectiv, Clef. Transpunerile la octava superioara sau la cea inferioara - prin comenzile din Bar: Octave up si Octave down, numerotarea masurilor - prin comanda Layout - Bar numbering, repetarea masurilor ("lenesii") - prin Bar-Whole bar repeat, extragerea stimulor - prin File-Duplicate, iar tiparirea - prin File-Print. Explicatii suplimentare se pot obtine prin activarea functiei Help, sau prin accesarea site-ului [www.mozart.co.uk](http://www.mozart.co.uk)

### **Funcțiile programului**

#### **FINALE 2003**

#### **The Art of Music Notation**

#### **© 2002 by MakeMusic! Inc**

#### **Coda Music Technologies**

#### **[www.codamusic.com](http://www.codamusic.com)**

## **"Keyboard Shortcuts and Special Mouse Clicks"**

**(material extras din "Finale User Manual")**

- **File Menu:** New (Ctrl-N), Open (Ctrl-O), Close (Ctrl-W), Save (Ctrl-S), Import (Ctrl-I), Print Score (Ctrl-P), Quit (Alt-F4);

- **Edit Menu:** Undo (Ctrl-Z), Redo (Ctrl-Y), Undo List (Ctrl-shift-Z), Cut (Ctrl-X), Cut-create Clip file (Press ctrl when choosing Cut), Cut-display Items to Clip dialog box (Press shift when choosing Cut), Cut-create Clip file *and specify* items (Press ctrl-shift when choosing Cut), Copy (Ctrl-C), Copy-create Clip file (Press ctrl when choosing Copy), Copy-display Items to Clip dialog box (Press shift when choosing Copy), Copy-create Clip file *and specify* items (Press ctrl-shift when choosing Copy), Insert-insert from a Clip file (Press ctrl when choosing Insert), Replace Entries Ctrl-V, Replace Entries-paste from a Clip file (Press ctrl when choosing Replace Entries Select All Ctrl-A), Update Layout (Ctrl-U), Update Layout and remove measure groupings (Press shift when choosing Update Layout);

- **View Menu:** Page View (Ctrl-E), Scroll View (Ctrl-E), Home Position (Home key), End Position (End key), Redraw Screen (Ctrl-D), View at 400% (Ctrl-4), View At 200% (Ctrl-2), View At 100% (Ctrl-1), View At 75% (Ctrl-7), View At 50% (Ctrl-5), View At X % (Ctrl-0), View At Last Size (Double-right-click on the score), Define a Staff Set (Press Ctrl when choosing Staff Set-in Scroll View only), Change layers (Alt-Shift-layer number 1-4);

- **General Keyboard Shortcuts:** OK all open dialog boxes (Ctrl-click the OK button), Cancel all open dialog boxes (Ctrl-click the Cancel button), Redraw Interrupt (Esc), Apply a Metatool (Press a number or letter and click the score), Program a Metatool (Press shift-number or shift-letter), Program a keyboard equivalent for a tool (Press shift-Function key F2-F12), Switch to a tool you've programmed (Press Function key F2-F12), Select Yes or No in dialog boxes (Type N for "no" and Y for "Yes"), Move to top of page/score (Page Up), Move to bottom of page/score (Page Down), Next or Previous Page (Ctl-PageUp or Ctl-PageDown), Change layers (Alt-Shift-layer number);
- **Articulation Tool:** Display the Articulation Selection dialog box (Click on, above, or below a note or rest that doesn't have an articulation attached, or click on a note whose articulation handles are visible, OR drag-enclose a group of notes), Display articulation handle (Click a note to which an articulation has been attached), Select an ( Click, or shift-click the handle), Move an articulation (Drag the handle -ctrl-drag the handle to move without using dynamic drawing), Delete an articulation (Select the handle and press delete, or right-click the handle and select Delete from the contextual menu. Drag-enclose a group of notes while holding delete to delete articulations on all the notes), Display the Articulation Designer dialog box (Double-click an articulation handle, or right-click the handle and select Edit Articulation Definition from the contextual menu);
- **Chord Tool:** Display positioning arrows (Click the staff - but not on a note or rest), Display the Chord Definition dialog box (Click a note with no chord symbol attached - with Manual Input selected in the Chord Menu -, or double-click a chord symbol handle, or right-click the handle and select Edit Chord Definition from the contextual menu), Display a handle on chord symbols (Click a note with a chord symbol attached or select Show All Chord Handles from the Chord Menu -when Manual Input is selected in the Chord Menu), Delete a chord symbol (Select the handle and press delete, or right-click the handle and select Delete from the contextual menu), Move a chord symbol (With Manual Input selected in the Chord Menu, drag the symbol handle or ctrl-drag the handle to move without using dynamic drawing), Input chord symbols using MIDI keyboard (With MIDI Input selected click a note and play chord on the MIDI keyboard), Analyze chord in one or two staves (With One- or Two-Staff Analysis selected in the Chord Menu, click on a note in the chord);
- **Clef Tool:** Display the Change Clef dialog box (Click a measure without a mid-measure clef), Display handles in mid-measure clefs (Click a measure with a mid-measure clef), Adjust the mid-measure clef position (Drag the handle of the mid-measure clef), Delete a mid-measure clef (Select the handle and press delete, or right-click the handle and select Delete from the contextual menu), Change a mid-measure clef to another clef (Double-click the mid-measure clef's handle and drag left or right, or right-click the handle and select Edit Clef Definition), To insert another mid-measure clef (Double-click in the measure), Display the mid-measure clef dialog box (Ctrl-click a mid-measure clef's handle, or right-click the handle and select Edit Clef Definition from the contextual menu);
- **Expression Tool:** Display the Expression Selection dialog box (Double-click on, above, or below a measure or note that doesn't have an expression attached), Display an expression handles (Click on a measure or note with an xpression attached - when show all handles is not selected); Select an expression handle (Click, or shift-click to select multiple handles or press ctrl-A to select all available handles), Move selected expressions (Drag the selected handles), Move selected expressions without using dynamic drawing (Ctrl-drag the selected handles), Delete selected expressions (Press delete, or right-click the handle and select Delete from the contextual menu), Resize a shape expression (Double-click an expression handle, or right-click the handle and select Edit Score Shape Expression Graphically from the contextual menu), Display the Text Expression Designer dialog box (Double-click an expression handle - text expression -, or right-click the handle and select Edit Text Expression Definition from the contextual menu), Display the Shape Expression Designer dialog box (Ctrl-double-click an expression handle - shape expression -, or rightclick the handle and select Edit Shape Expression Definition from the contextual menu), Display the Measure or Note Expression Assignment dialog box (Shift-double-click an expression handle, or right-click the handle and select Edit Expression Assignment from the contextual menu);
- **Graphics Tool:** Align Left (Ctrl-Shift- [ -left square bracket), Center Horizontally (Ctrl-Shift- ' -apostrophe), Align Right Ctrl-Shift- ] -right square bracket), Align Top (Ctrl- - minus), Center Vertically (Ctrl-Shift- = -equals), Align Bottom Ctrl-Shift- - -minus), Place a graphic in the Shape Designer (Click in the Shape Designer display area, the Place Graphics

dialog box appears), Select a graphic or graphics (Click a graphic or drag-enclose graphics, shift-click a graphic), Display the Graphic Attributes dialog box (Ctrl-Shift- T or double-click a graphic), Place a graphic in the score (Double-click in the score, the Place Graphics dialog box appears), Select a region containing the musical example to Export (Double-click and drag to enclose a region in Page View), Delete the selected graphics (Press delete for one or more selected graphics), Adjust the graphic's position in the score (Drag a selected graphic), Resize the graphic horizontally or vertically (Drag a graphic's bounding handle);

- **Hand Grabber Tool**: Temporarily switch to Hand Grabber Tool (Press the right-button);
- **HyperScribe Tool**: Indicate where to begin transcription (Click a measure), End HyperScribe in the middle of measure (Ctrl-click anywhere on the score);

- **Transcription Tool**: Display the Transcription window (Click a measure or ctrl-click a measure if you had Transcribe in Measures selected while transcribing), Transcribe a measure at a time (Click a measure with Transcribe in Measures selected);

- **Lyrics Tool**: Click Assign lyrics one syllable at a time (Click within the staff lines at the position of the note), Click Assign lyrics all at once (Ctrl-click within the staff lines at the position of the first note), Display a Word Extension handle (Click within the staff lines at the position of the sustained syllable With), Edit Word Extension selected from the Lyric Menu), Move Syllables Click within the staff lines at the position of the syllable with Adjust Syllables selected from the Lyric Menu), Move to the previous or next verse, chorus or section ("up arrow" or "down arrow" using Type into Score), Left Justify syllable (Ctrl- [ -left square bracket), Right Justify syllable (Ctrl- ] -right square bracket), Center Justify syllable (Ctrl- ' -apostrophe), Align syllable block to the Left (Ctrl-Shift- [ -left square bracket), Center syllable block Horizontally (Ctrl-Shift- ' -apostrophe), Align syllable block to the Right Ctrl-Shift- ] -right square bracket);

- **Mass Edit Tool**: Display the Fit Measures dialog (Ctrl- M -with measures selected in Page View), Lock currently selected systems (L), Unlock currently selected systems (U), Select a measure or measures (If "Select Partial Measures" is selected in the Edit Menu, doubleclick a measure; If "Select Partial Measures" is off, a single click selects a measure; drag-enclose a region), Extend a selection of measures vertically (Double-click a selected measure to include the entire vertical measure "stack" -that measure in all staves; If "Select Partial Measures" is turned on, the first double-click selects a single full measure, and the second double-click selects the measure stack; Shift-click a measure or a beat within a measure), Extend a selection of measure horizontally to end or beginning (While holding down Shift, press "right arrow" or "left arrow". If "Select Partial Measures" is turned on, Shift-"right arrow" or Shift-"left arrow" selects the end or beginning of the measure, then to the end or beginning of the score), Select a staff or staves Click to the left of a staff; Shift-click to the left of a staff to extend the selection), Move or Copy a selected section of music (Drag the region so it is superimposed on the beginning of an unselected region, which elements and whether you are moving or copying are selected in the Mass Edit Menu before you drag; Ctrl-shiftclick the place where the selected elements should be copied or moved to), Display the Items to Clip dialog box (Press ctrl or shift while choosing Cut or Copy from the Edit Menu), Display the Paste dialog box (Press ctrl while choosing Insert or Replace Entries in the Edit Menu), Delete selected music (Press delete), Move selected measures to the previous or next staff system ("up arrow" or "down arrow"), Erase selected music (Press backspace), Cancel a Mass Edit operation (Press esc), Implode Music -displays the Implode Music dialog box (Select the measures you want to affect, then press 1 on your computer keyboard), Drag-Implode Music for multiple staves -displays the Implode Music dialog box (Press I while dragging selected measures to their destination), Drag-Explode Music for multiple staves -displays the Explode Music dialog box (Select the measures you want to affect, then press 2 on your computer keyboard), Explode Music -displays the Explode Music dialog box (Press E while dragging selected measures to their destination), Respace notes, lyrics, and accidentals -Apply Beat Spacing command - using the settings in Document Options-Music Spacing (Select the measures you want to affect, then press 3 on your computer keyboard), Respace notes, lyrics, and accidentals - Apply Note Spacing command - using the settings in Document Options-Music Spacing (Select the measures you want to affect, then press 4 on your computer keyboard), Show elapsed time based on current tempo -displays the Elapsed Time dialog box (Select the measures you want to affect, then press 5 on your computer keyboard), Transpose -programmable (Select the measures you want to affect, then press any number between 6 and 9 on your computer keyboard), Select or deselect the SmartFind Source Region (Control-F), Display the Apply SmartFind and Paint dialog box (Control-Shift-F);

- **Measure Tool:** Display the Add Measures dialog box (Ctrl-click the Measure Tool, or right-click the Measure Tool and select Add Measures from the context menu), Add single blank measure to the score (Double-click the Measure Tool, or right-click the Measure Tool and select Add One Measure from the context menu), Display the Measure Attributes dialog box (Double-click the top barline handle or measure, or right-click the handle -or upper handle- and select Edit Measure Attributes from the contextual menu), Make the Measure wider or narrower (Drag the top barline handle right or left), Display a beat chart Click the second barline -or middle if there are three- handle, or rightclick the handle and select Edit Beat Chart from the contextual menu), Display a split-point bar (Click the third -bottom- barline handle, or right-click the handle and select Edit Split Points from the contextual menu), Move a beat horizontally in all staves (Drag one of the lower handles in the beat chart), Move a beat and all subsequent beats horizontally in all staves (Shift-drag one of the lower handles in the beat chart), Add another pair of beat positioning handles (Double-click between two upper handles of a beat chart), Display the Beat Chart Element dialog box (Double-click an upper handle in the beat chart), Delete a beat chart pair from the beat chart (Click on an upper handle to select it and press delete), Change a barline (Right-click the handle and select the desired barline type -Normal, Double, Final, Solid, Dashed, Invisible, Tick- from the contextual menu), Display a handle on every measure number (Click the Measure Tool), Reset measure number positioning (Press backspace, or right-click the handle and select Restore Default Position from the contextual menu), Delete a measure number (Press delete, or right-click the handle and select Delete from the contextual menu), Move a measure number Drag the measure number's handle Display the Enclosure Designer dialog box (Double-click a measure number's handle, or right-click the handle and select Edit Enclosure from the contextual menu), Force a measure number to appear (Ctrl-click a measure without a measure number), Force measure numbers on a measure in all staves of a staff system (Ctrl-shift-click on a measure • Break a multimeasure rest (Right-click the handle and select Break a multimeasure rest from the contextual menu);

- **Mirror Tool:** Display Mirror and Placeholder icons (Click the Mirror Tool), Display the Placeholder dialog box (Click a measure with notes or with a Placeholder icon), Display the Tilting Mirror dialog box (Click an empty measure or a measure with a Mirror icon), Display the Mirror Attributes dialog box (Shift-click a measure with a Mirror icon);

- **Note Mover Tool:** Display a handle on every notehead in the measure (Click a measure); Select a handle or handles (Click, shift-click, drag-enclose or shift-drag-enclose the handles), Delete selected notes -still in their original measure (Press delete, or right-click the handle and select Delete from the contextual Menu), Move or Copy notes to another measure (Drag a note or a group of notes to the end of the measure and the selected action in the Note Mover Menu will take place), Copy notes to the beginning of a measure (Drag a note or a group of notes to the beginning of the measure -if the measure isn't rhythmically full);

- **Ossia Tool:** Display handles on every ossia measure (Click the Ossia Tool in Page View), Display a handle on a measure-assigned ossia measure (Click the Ossia Tool in Scroll View and click the measure to which the Ossia measure is attached), Display the Ossia Measure Designer dialog box (In Page View, double-click anywhere on the document; In Scroll View click a measure with no ossia measure attached, or double-click a measure with an ossia measure attached; Double-click a floating measure's handle, or right-click the handle and select Edit Ossia Definition from the contextual menu), Select an ossia measure (Click the ossia measure's handle); Move a selected ossia measure (Drag the handle), Delete a selected ossia measure (Press delete, or right-click the handle and select Delete from the contextual menu), Display the Page Assignment for Ossia Measure dialog box (Shift-double-click a page-assigned floating measure's handle, or right-click the handle and select Edit Ossia Assignment from the contextual menu -in Page View), Display the Measure Assignment for Ossia Measure dialog box (Shift-double-click a measure-assigned floating measure's handle, or right-click the handle and select Edit Ossia Assignment from the contextual menu);

- **Page Layout Tool:** Display Page and System margins (Click the Page Layout Tool), Resize page, margins or system (Drag a handle in Page View), Move a system (Drag the system in Page View), Move a system without moving other systems( Hold down Ctrl and drag the center of a staff system), Select handles (Drag-enclose to select handles), Select all handles (Ctrl-A);

- **Repeat Tool:** Display the Repeat Selection dialog box (Click a measure without a repeat or double-click a measure with a repeat), Display handles on a repeat (Click a measure with a repeat), Delete a text repeat, repeat barline (Click on the handle and press delete, or right-click the handle and select Delete from the contextual menu), Move a text repeat (Select the handle

and drag), Change the size of a repeat barline's bracket (Drag the repeat bracket handle up or down, left or right), Display the Repeat Designer dialog box (Double-click a text repeat handle, or right-click the handle and select Edit Repeat Definition from the contextual menu), Display the Backward Repeat Bar Assignment dialog Box (Double-click a repeat barline handle, or right-click the handle and select Edit Repeat Assignment from the contextual menu), Display the Ending Repeat Bar Assignment dialog box (Double-click a repeat ending number handle, or right-click the handle and select Edit Repeat Assignment from the contextual menu), Display the Repeat Assignment dialog box (Shift-double-click a text repeat handle, or right-click the handle and select Edit Repeat Assignment from the contextual menu);

- **Resize Tool:** Reduce or enlarge a notehead (Click on the notehead or right-click and select Resize Notehead from the contextual menu), Reduce or enlarge an entire note or beam group (Click on the note stem or right-click and select Resize Note or Rest from the contextual menu), Reduce or enlarge a staff (In Page View, click to the left of the staff or right-click and select Resize Staff from the contextual menu), Reduce or enlarge a system (In Page View, click between any two staves in the system or rightclick and select Resize System from the contextual menu), Reduce or enlarge a page, or a range of pages (In Page View, click the upper-left corner of the page or right-click and select Resize Page from the contextual menu);

- **Selection Tool:** Switch to Selection Tool (Ctrl-Shift-A), Select an item (Click on the item), Select the appropriate tool to edit item With item selected, double-click or press enter), Select between overlapping items (Click on the item then press plus or minus to cycle through overlapping items);

- **Simple Entry Tool:** 128th Note through Double Whole ( 0-8 ) • 128th Rest through Double Whole Rest (Shift and a number key (0-7) or Enter-0 through Enter-8 on the Number Keypad) • Switch Tools and clear other selections (Double-click tool or quickly repeat tool selection keyboard shortcut) • Erase selected Note or Rest or select the Eraser Tool to delete accidentals, ties, dots or tuplets (Delete) • Make a selected note sharp or select the Sharp Tool (S or + plus) • Make a selected note flat or select the Flat Tool (F or - minus) • Make a selected note natural or select the Natural Tool (Shift-8 or N or \* asterisk) • Add double-flat to selected note(V) • Add double-sharp to selected note (X) • Lower selected note by half step or select the Half Step Down Tool (Shift-F or Enter- -minus With selection,"down arrow") • Raise selected note by half step or select the Half Step Up Tool (Shift-S or Enter-+ plus With selection,"up arrow") • Change selected note to a rest or toggle between Note and Rest Tools ® • Add an augmentation dot to the selected note or select the Dot Tool (. period) • Tie selected note to the next note or select the Tie Tool (T or = equals or Enter-/ ) • Tie selected note to the previous note or select the Tie Tool (Shift-T) • Toggle grace note state of selected note or select the Grace Note Tool (G or / backslash) • Toggle tuplet state (create new one or erase existing tuplet) of selected note or select the Tuplet Tool (9) • Access Simple Entry Tuplet Definition dialog box for duplet, septuplets or other tuplets (With the Tuplet Tool, shift-click the staff ) • Show/Hide a courtesy accidental on selected note (A) • Break/Join Beam on selected note (B) • Restore default beaming (Shift-B) • Show/Hide selected note or rest (H) • Flip stem on selected note (L) • Restore stem direction to "floating" status on selected note (Shift-L) • Flatten beams for selected note (M) • Add or remove parentheses around accidentals for selected note (P) • Select a note or rest (Control-click the note or rest) • Select a note or rest within a chord without clearing previous selection (Control-shift-click the note or rest) • Move selection one note/rest to the left If no selection, select the last edited note/rest ("left arrow") • Move selection one note/rest to the right ("right arrow") • Move selection one note up, if chord selected Control -"up arrow") • Move selection one note down, if chord selected Control-"down arrow") • Select all notes in selected chord (Ctrl-A-click the chord) • Clear selection (Escape or Backspace);

- **Smart Shape Tool:** Flip a selected Slur (Ctrl- F), Change a selected Slur back to Automatic (Ctrl-Shift- F), Display handles on all smart shapes (Click the Smart Shape Tool, Edit or Delete a Smart Shape Click the handle of the Smart Shape) • Control-A (Select all Smart Shapes on the page) • Drag or nudge an endpoint handle Change the slur's ending or starting note • Drag or nudge a center curve handle Change the slur's arc height • Shift-drag a center curve handle Change the slur's arc height and angle • Drag or nudge an inner curve handle (Change the slur's arc and inset asymmetrically) • Control-drag an inner curve handle (Change the slur's arc and inset symmetrically) • Control-double-click and drag (Create an inverted bracket with the hook pointing away from the staff instead of toward the staff. It will also change the text for an 8va or 15ma below the staff or 8vb or 15mb above the staff), Display the Smart Line Style Selection dialog box (Ctrl-click the Custom Line Tool), Add a slur (S) • Add a dashed slur (V), Add a

crescendo (<), Add a decrescendo (>) • Add a trill (T) • Add a trill extension (E) • Add an 8va or 8vb marking (8) • Add a 15ma or 15mb marking (1) • Add a double-ended bracket (O) • Add a dashed double-ended bracket (H) • Add a bracket (K) • Add a dashed bracket ® • Add a line (L) • Add a dashed line (D) • Add a glissando (G) • Add a bend (N) • Add a tab slide (A) • Add a custom line (C);

- **Speedy Entry Tool:** Display the Edit Frame dialog box (Ctrl-click any measure that contains music), Remove note, rest or chord (delete), Hide/show note or rest (letter O or H), Add or remove accidental parentheses (P), Jump to previous measure ([ -left square bracket- or shift “left arrow”), Jump to next measure (] -right square bracket- or shift “right arrow”), Flip stem in opposite direction (L), Restore stem direction to “floating” status (Ctrl-L) • Change to/from a grace note (; -semicolon- or G) • Change to/from a slashed flagged grace note (˘ -accent- or ; -semicolon- or G), Voice 1/2 (‘ -apostrophe) Switch to next layer (shift-‘ -apostrophe) Move editing frame down a staff (shift “down arrow”), Move editing frame up a staff (shift “up arrow”), Add or change note 64th–double whole note (1–8), Add or change 128th note (ctrl-0 -zero) Insert 64th note–whole note (shift-1 through shift-7 -on keyboard only-with MIDI, while playing note) Insert 128th note -without MIDI (ctrl-0 –zero-in insert mode only), Add 64th rest–whole rest -with MIDI (shift-1 through shift-7 without pressing note). Add rest -with or without MIDI (ctrl-shift-1-7 on keyboard only) Add 128th rest with MIDI (ctrl-0 -zero) Add a rest with Hands-Free MIDI (play any three note cluster), Toggle Insert mode (insert or shift-0 -zero) Constrain dragging a note horizontal/vertical (shift-drag), Begin a tuplet -duplet–octuplet (ctrl-2 through ctrl-8), Define a tuplet (ctrl-1) • Raise by a half step (+ plus or shift-S) • Lower by a half step (– minus or shift-F), Raise by a half step for entire measure (ctrl- + plus) Lower by a half step for entire measure (ctrl- – minus) • Flat note (F) • Sharp note (S) • Natural note (N) • Double-sharp (X) • Double-flat (V), Previous note (“left arrow”), Next note (“right arrow”), Move to first note or rest in measure (ctrl-“left arrow”), Move just beyond last note or rest in measure (ctrl-“right arrow”), Down a step (“down arrow”), Up a step (“up arrow”), Remove note from chord (backspace) • Change single note to rest (backspace or R) • Tie/untie to next note (= equals or T) • Tie/untie to previous note (ctrl = equals or shift-T), Flip a tie (ctrl-F), Restore tie direction to automatic (ctrl-shift-F) • Break/join beam from previous note (/ -backslash or B) • Restore default beaming (Shift-B) • Flatten a beam (\ -forward slash or M), Show/hide any accidental (\* asterisk) • Show/hide a courtesy accidental (A), Restore courtesy accidental to optional status (ctrl-\* asterisk) Return a rest to its default position (\* asterisk), Exit measure and redraw/re-enter measure (0 zero) Flip a note to its enharmonic equivalent (9), Flip enharmonic throughout measure (ctrl-9 - cursor on first note in measure), Add a dot (. period) Add a note to a chord (enter), Change a rest to a note (enter) • Specify a pitch, high C–B without MIDI (Q-W-E-R-T-Y-U - with Caps Lock) • Specify a pitch, middle C–B without MIDI (A-S-D-F-G-H-J - with Caps Lock) • Specify a pitch, low C–B without MIDI (Z-X-C-V-B-N-M - with Caps Lock) • Raise all pitch keys an octave ( , comma with Caps Lock) • Lower all pitch keys an octave (I -letter I with Caps Lock) • Restore all pitch keys to normal register (K with Caps Lock);

- **Special Tools Tool:** Display handles in the measure (Click the Special Tool you want to use and click on the measure), Select a handle or handles (Click, shift-click or drag-enclose, or ctrl-A), Reset the note to its original state (Press delete or backspace), Move selected items very slightly (Use the arrow keys), Flip a selected tie (Ctrl-F), Restore tie direction to automatic (Ctrl-shift-F);

- **Staff Tool:** Display the Staff Menu and handles (Click the Staff Tool), Select a staff or staves (Click a staff or a staff handle, or drag-enclose staff handles), Add the staff to the selection. If a staff is already selected, remove the staff from the selection (Shift-click a staff or a staff handle), Display the Staff Attributes dialog box (Double-click a staff or a staff handle, or double-click a full or abbreviated staff name handle, or right-click the handle and select Edit Staff Attributes from the contextual menu), Add a staff without repositioning the lower staves to make room for the new staff. (Double-click in the score in Scroll View), Insert a staff between staves, repositioning the lower staves to make room for the new staff (Shift-double-click below a staff in the score in Scroll View), Display the Group Attributes dialog box (Double-click a group handle, or double-click a bracket handle, or right-click the group or bracket handle and select Edit Group Attributes from the contextual menu. right-click the staff handle and select Add Group and Bracket from the contextual menu), Delete the selected staves without repositioning the remaining staves (Press delete for selected staves, or right-click the handle and select Delete Staves from the contextual menu), Delete the selected staves and reposition the remaining staves (Press shift-delete for selected staves, or right-click the handle and select Delete Staves and

Reposition from the contextual menu). Adjust the staff's position in Scroll View only. The placement of staves remains unchanged in Page View. When you choose Special Part Extraction from the Edit Menu, Finale removes the checkmark by the command, and displays the full score using the new positioning in Scroll View. (Drag a staff or a staff handle in Scroll View -when Special Part Extraction is selected in the Edit Menu), Adjust the staff's position in every staff system in Page View and the position of the staff in Scroll View. When the top staff is adjusted, Finale adjusts the distance between staves, as well as staff systems (Drag a staff or a staff handle in Page View -when Special Part Extraction is not selected in the Edit Menu. Note: If two handles appear on a staff, drag the top handle), Adjust the staff's position in every staff system in Page View; leave the position of the staff unchanged in Scroll View. Finale adjusts the distance between staves, as well as staff systems (Drag a staff or a staff handle in Page View -when Special Part Extraction is selected in the Edit Menu. Note: If two handles appear on a staff, drag the top handle), Adjust the staff's position only in the current staff system -drag the top handle to adjust the position of the staff in all staff systems in Page View (Drag the staff's lower handle in Page View. Note: If a staff system has been optimized using the Page Layout Tool, two handles will appear on each staff in the optimized staff system), Select a group or groups (Click a group handle, or drag-enclose group handles), Add the group to the selection. If a group is already selected, remove the group from the selection (Shift-click a group handle), Edit a full or abbreviated group name using the Edit Text window. (Ctrl-click a group handle, or right-click the handle and select Edit Full Group Name or Edit Abbreviated Group Name from the contextual menu.), Position a group name using the Position Full Group Name or Position Abbreviated Group Name dialog box. (Ctrl-shift-click a group handle, or right-click the handle and select Position Full Group Name or Position Abbreviated Group Name from the contextual menu.), Revert the position of the group names to their default position. (Press backspace for selected groups), Remove the selected group definitions. (Press delete for selected groups, or right-click the handle and select Delete Group from the contextual menu.), Adjust the position of a group name. (Drag a group handle), Select a staff name or names. (Click a staff name handle, or drag-enclose staff name handles), Add the staff name to the selection. If a staff name is already selected, remove the staff name from the selection. (Shift-click a full or abbreviated staff name handle), Edit a full or abbreviated staff name using the Edit Text window. (Ctrl-click a full or abbreviated staff name handle, or right-click the handle and select Edit Full Staff Name or Edit Abbreviated Staff Name from the contextual menu), Position the selected staff name using the Position Full Staff Name or Position Abbreviated Staff Name dialog box. (Ctrl-shift-click a full or abbreviated staff name handle, or right-click the handle and select Position Full Staff Name or Position Abbreviated Staff Name from the contextual menu.), Revert the position of the full or abbreviated staff name to its default position. (Press backspace for a selected staff name handle), Adjust the position of the selected staff name. (Drag a full or abbreviated staff name handle), Select a bracket or brackets (Click a bracket handle, or drag-enclose several bracket handles), Add the bracket to the selection. If a bracket is already selected, remove the bracket from the selection. (Shift-click a bracket handle), Remove the selected brackets. (Press delete for selected brackets, or right-click the handle and select Delete from the contextual menu.), Revert the selected brackets to their default length. (Press backspace for selected brackets), Make a bracket taller or shorter. (Drag a bracket handle vertically), Move a bracket closer to or away from bracketed staves. (Drag a bracket handle horizontally) Select a clef for the staff. (Right-click the staff handle and select Select Clef from the contextual menu.), Remove Staff Styles from selected region. (Backspace);

- **Text Tool:** Left Justify text in a text block (Ctrl- [ left square bracket), Right Justify text in a text block (Ctrl- ] right square bracket), Center Justify text in a text block (Ctrl- ' apostrophe), Full Justify text in a text block (Ctrl- ; semicolon), Forced Full Justify text in a text block (Ctrl-Shift- ; semicolon), Bold (Ctrl-Shift- B), Italic (Ctrl-Shift- I), Underline (Ctrl-Shift- U), Increase Point Size by one (Ctrl-Shift- . period), Decrease Point Size by one (Ctrl-Shift- , comma), Page Number Text Insert (Ctrl-Shift- P), Sharp sign Text Insert (Ctrl-Shift- S), Flat sign Text Insert (Ctrl-Shift- F), Natural sign Text Insert (Ctrl-Shift- N), Display Character Settings dialog box (Ctrl-T Display), Line Spacing dialog box (Ctrl-Shift-L), Align Text block to the Left (Ctrl-Shift- [ left square bracket), Center Text block Horizontally (Ctrl-Shift- ' apostrophe), Align Text block to the Right (Ctrl-Shift- ] right square bracket), Align Text block to the Top (Ctrl- - minus), Center Text block Vertically (Ctrl-Shift- = equals), Align Text block to the Bottom (Ctrl-Shift- - minus), Display the Standard Frame dialog box (Ctrl- M), Display the Custom Frame dialog box (Ctrl-Shift- M), Display the Frame Attributes dialog box (Ctrl-Shift- T or shift-double-click a

text block handle, or right-click the handle and select Edit Frame Attributes from the contextual menu.), Display the Text Menu (Click the Text Tool), Display handles on text blocks (/Click the Text Tool), Select a text block or text blocks (Click a text block handle or drag-enclose text block handles, shiftclick a text block handle), Create an unbounded frame that expands as you enter text (Double-click in the score), Create a bounded, fixed-size frame for text (Double-click and drag in the score), Edit the text block (Double-click a text block handle, or right-click the handle and select Edit Text from the contextual menu.), Delete the selected text blocks (Press delete for one or more selected text blocks, or right-click the handle and select Delete from the contextual menu.), Adjust the text block's position in the score (Drag a selected text block handle);

- **Tuplet Tool**: Display positioning handles (Click the first note of a tuplet), Position tuplet (Drag a positioning handle), Position tuplet without dynamic drawing (Ctrl-drag a positioning handle), Delete tuplet (Press delete for selected tuplet, or right-click the handle and select Delete from the contextual menu.), Display the Tuplet Definition dialog box (Double-click a positioning handle or the first note in a group that you want to define as triplets, or right-click the handle and select Edit Tuplet Definition from the contextual menu.), Display the Default Tuplet Visual Definition dialog box (Ctrl-click the Tuplet Tool, or right-click the Tuplet Tool and select Edit Default Tuplet Visual Definition from the drop-down list);

- **Zoom Tool**: Zoom in - enlarge 2x, if tool is selected (Click the score), Zoom out - reduce by 1/2, if tool is selected (Ctrl-click the score), Temporary switch to Zoom Tool: enlarge (Shift-click the right-button), Temporary switch to Zoom Tool: reduce (Ctrl-Shift-click the right-button), Fill the screen with the selected area (Drag-enclose an area);

- **Playback**: Begin/Pause playing - Playback Controls open (Alt-D-P or Alt-D-O), Begin playing from the measure clicked (Spacebar-click in staff), Begin playing from the clicked measure in the clicked staff only (Shift-spacebar-click in staff), Begin playing from the clicked measure in all staves (Spacebar-click in between staves), Begin playing from measure one in all staves (Spacebar-click to the left of a staff system), Begin playing from measure 1 for the clicked staff (Spacebar-shift-click to the left of staff), "Scrub" onscreen music - all staves (Ctrl-spacebar -and drag across music), "Scrub" onscreen music - clicked staff only (Ctrl-Shift-spacebar -and drag across music).

### Funcțiile programului

#### SIBELIUS

#### Versiunea 2

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- **File**: *New* (Type of manuscript paper, Instruments, Play using the device), *Open* [All Music Files (sib, mid, opt, mus, etf, tmp, pag, pge, s7), Sibelius (sib), MIDI (mid), Photo Score (opt), Finale/Allegro/PrintMusic (mus), Finale ENIGMA (etf), SCORE File (tmp)/Page (mus, pag, pge), Sibelius 6/7 (s7)], *Append Score* (sib), *Close*, *Close All*, *Save*, *Save As* [Sibelius (sib), Scorch Web Page (htm), MIDI (mid)], *Save As Graphics* (EPS, BMP, EMF), *Save As Manuscript Paper*, *Save All* [Sibelius (sib), Scorch Web Page (htm), MIDI (mid)], *Print*, *Extract Parts*, *Publish on SibeliusMusic.com*, *Score Info*, *Plug-ins* [Batch Processing (Apply House Style to Folder of Files, Convert: Folder of Acorn Sibelius Files/Folder of Files to Graphics/Folder of Finale Files/Folder of MIDI Files; Print Folder of Scores), *Composing Tools* (Double Notes Values, Finf Motif, Find Range, Halve Notes Values, Invert, Pitch Mapping, Retrograde), *Notation* (Add: Brass Fingering/Cautionary Accidrentals,/Chord Symbols/Ficta Above Note/Note Names/String Fingering/Tonic Sol-Fa; Make Layout Uniform/Pitches Constant, Number Beats, Remove Dangling Ties/Rests, Respell Flats as Sharps/Sharps as Flats, Split Dotted Quarter Rests), *Playback* (Copy Dynamics, Cresc./Dim. Playback, Quarter-tone Playback), *Proof-reading* (Check: Clefs/for Parallel 5ths-8ves/Harp Pedaling/Pizzicatos/Repeat Barlines; Proof-read), *Edit Plug-ins*, *Show Plug-in Trace Window*], *Preferences* (General, Keyboard Shortcuts, Word Menus), *Register/Transfer* (Register Sibelius, Transfer SavingOut/In), *Exit*.



- **Edit:** Undo, Redo, Undo/Redo History, Cut, Copy, Paste, Repeat, Delete, Flip, Voice (1-4; All; Swap 1-2/1-3/1-4/2-3/2-4/3-4), Hide or Show (Hide, Show, Show in Score/in Parts), Select (All/More/System Passage/None), Filter [Advanced Filter, Chord Symbols, Dynamics, Expression Tool, Guitar Frames, Hairpins, Lyrics, Notes and Chords, Slurs, Tuplets, Voice 1-4, Voice 1-4 Only, Top/2<sup>nd</sup>/3<sup>rd</sup>/Bottom Note, Top Note/2<sup>nd</sup> Note/3<sup>rd</sup> Note/bottom Note or Single Notes, Player 1-2 (for Delation)], Find, Find Next, Go to Bar/Page;
- **View:** Attachment, Breacks and Locks, Hidden Objects, Highlights, Note Colors (Note out of Range, Pitch Spectrum, Voice Colors, None), Page Margins, Textures, Selection/Object/Staff Rulers, Full Screen, Scroll Bars, Toolbar, Zoom (Zoom, Zoom In/Out);
- **Create:** Bar, Barline, Clef, Graphic, Guitar Frame, Highlight, Instruments, Key Signature, Line, Rehearsal Mark, Symbol, Text [Expression, Technique, Lyrics, Lyrics verse 3-5, Chord symbol, Other Staff Text (Plain text, Lyrics verse 3-5, Figured bass, Fingering, Boxer text, Small text, Lyrics above staff, Nashville chord numbers, Footnote, Technique 2, Note flags 2, Small Text 2), Title, Subtitle, Composer, Lyricist, Dedication, Tempo, Metronome mark, Other System Text (Copyright, Header, Header – after first page, Footer – outside edge/inside edge, Rit./accel., Title 2, Header 2, Footer 3, Footer, Footer 2), Special Text (Bar numbers, Guitar frame fret, Instrument name at top left, Instrument names, Multirests, Page numbers, Rehearsal marks, Time signatures-huge/large, Tablature letters/numbers, Tuplets)], Bar Numbers Change, Bracket or Brace (Bracket, Sub-bracket, Brace), Extra Slur Arc, Extra Staff (Above, Below, Ossia Above/Below), Staff Type Change [Pitched (1-5 lines, No lines, etc.), Tab (Standard guitar, Bass guitar, etc.), Percussion (1-5 lines)], Transposition Change;
- **Play:** Play or Pause, Stop, All Notes Off, Mixer, Performance, Dictiunary, Devices, Substitute Devices, Playback Options;
- **Notes:** Flexi time, Flexi-time Options, Arrange, Edit Arrange Styles, Transpose, Transposing Score, Add Interval (2-9 Above/Below, Unison), Add Interval (A-B-C-D-E-F-G + Shift), Cross-Staff Notes (Move Up/Down a Staff), Respell Accidental, Reset Beam Groups/Stems and Beam Angles;
- **Layout:** Document Setup, Break (System/Page Break, Split System/Multirest), Format (Make Into System/Page, Lock/Unlock Format), Align: in a Row/in a Column/Staves; Hide/Show Empty Staves; Reset: Portion/Design/Note Spacing/Space Above Staff/Space Below Staff;
- **House Style:** Engraving Rules, Note Spacing Rule, System Object Positions, Default Positions, Timecode, Edit: Lines/Noteheads/Staff Types/Symbols/Text Styles; Use: Multirests/“Show in Part”; Import/Export House Style;
- **Window:** New Window, Title Horizontal/Vertical, Cascade, Mixer, Navigator, Properties, Keypade (separate);
- **Help:** Sibelius Help, Tip of the Day, Help Center, Sibelius.com, Sibelius.com Education Area, SibeliusMusic.com Internet Publishing, Sibelius Magazine, PhotoScore Professional, Sibelius Teaching Tools, About Sibelius.
- **Comenzile operative (ce apar suprapuse partiturii in lucru):** General, Text, Lines, Bars, Staves, Notes, Keypad;
- **Comenzi rapide uzuale:** A/B/C/D/E/F/G (LA/SI/DO/RE/MI/FA/SOL), 1-6 pe keypad (TREZECIDOIME-NOTA INTREAGA), 7-9 pe keypad (BECAR,DIEZ,BEMOL), Ctrl + 3 (TRIOLET), Ctrl + 2-9 (ALTE DIVIZIUNI EXCEPTIONALE), P (PLAY), Esc (STOP), Ctrl + F/M/P (f/m/p – ca expresie), Ctrl + Shift + C/D (CRESC./DIM.).

*Functiile programului*  
*NoteWorthy Composer v. 1.75*  
© 2002 NoteWorthy Software. Inc  
[www.noteworthysoftware.com](http://www.noteworthysoftware.com)

- **File:** New, Open (NWC Files, MIDI Files, Song Files) Save, Save As (Standard NWC File, Type 1 Midi File, Type 0 Midi Files, Uncompressed NWC File), Revert, Close, Info [Title, Author, Copyright Notice 2 (All Rights Reserved), Comments], Page Setup, Printer Setup, Print Preview, Print, History, Exit;
- **Edit:** Undo Page Setup, Redo, Cut, Copy, Copy Special, Paste, Clear, Select All, Remove Chord Note, Beam, Triplet, Find, Find Next, Go to, Lyrics, Properties;
- **View:** Zoom In/Out, Zoom, Refresh Score, Status Bar, Toolbars;
- **Staff:** New Staff, Import Recording, Delete Staff, Move Staff, Move Staff Up/Down, Mute Staff, Staff Properties;
- **Insert:** Note, Rest, Chord Member, Bar Line, Bar Line (Decorated), Clef, Dynamic, Dynamic Variance, Flow Direction, Key Signature, Performance Style, Special Ending, Sustain Pedal, Tempo, Tempo Variance, Text, Time Signature, Instrument Patch, Multi-point Controller;
- **Notes:** Whole, Half, Quarter, Eight, Sixteenth, Thirty-second, Sixty-fourth; Natural, Flat, Sharp, Double Sharp, Double Flat; Accent, Dotted, Double-Dotted, Grace, Slur, Staccato, Tenuto, Tied, Stem Up/Down;
- **Tools:** Record, Staff Play, Play, Stop; Score Review, Mute List, MIDI Input Active, Persistent Note Tools; Automatic Beam, Transpose Staff, Force Accidentals; Audit Bar Lines/Accidents/Enharmonic Spelling/Note Stems; Options;
- **Window:** Cascade, Title, Arrange Icons, Close All;
- **Help:** Contents, Search for Help on, Did you know, Getting Started, Command Reference, Keyboard Reference, Benefits of Registering, How to Order, Support, Go to NoteWorthy Software.com, Check for Web Updates, About.

*Functiile programului*  
**LIME 8.00**  
© January 2003 by Lippold HAKEN and Dorothea BLOSTEIN  
[www.cerlsoundgroup.org](http://www.cerlsoundgroup.org)  
lime, 1906 Augusta, Champaign, IL-61821, USA

- **File:** New, Open, Import NIFF, Import MIDI, Close, Save, Save As (Lime Fle – lim), Export NIFF, Export MIDI, Revert, Layout, Print Setup, Print, Print Multiple, About Lime, Exit;
- **Edit:** Undo, Redo, Cut, Copy, Copy Music, Paste, Clear (Note, Text, Annotation, At Each System, On Each Page, In Every Context, Staff/Chord/Accident Drag, Invisible Notes), Copy Measures, Align Annotations, Duplicate, Extend Line to Here, Allow Any Alt-click, Enable Duration Edits, Shortcut Keys, Options;
- **Context:** Previous Notation Context, Next Notation Context, Part Extraction, Score;
- **Page:** Previous/Next Page, Go to Page/Bar, Split Page/System, Add to Next Page/System, Systems, Insert/Delete Measures, Correct Measure;
- **Voice:** Previous/Next Part or Voice, Record, Note Entry, Parts and Voices, Voice to Staff Above/Below, Staff Drag, Highlight Voice, Voice on Channel;
- **Note:** Previous/Next Note, Show Accidental, Default/Special Accidentals, Transpose, Notehead Color, Tablature String/Thumb, Hide Tuplet/Rest, Don't Combine Rest, Chord Drag, Internal Fields;
- **Stem:** Stem Up/Down, No Stem, Slashed Stem, Stem Between Staves, Continue/End Beam, Continue/End Subbeam, Default Beaming, Beaming Rule, Tremolo Beam, Swing Eight Beam, Modify Slur/Tie;
- **Hear:** Hear, Tuning, Dynamic Levels, Default Playback, Modify Playback (Softer, Louder, Level, Lower, Higher, Pitch, Shorter, Longer, Earlier, Later), Recompute Playback, Play

Octave Higher/Lower, Keyboard Shift (3-1 Octaves Up, Normal, 1-3 Octaves Down), MIDI Input/Output;

- **Symbol:** Clef, Key/Time Signature, Bar Line, Align Bars, System Bracket, Parameters, Hidden Test;
- **Annotation:** Preview/Next Annotation, Text Category, Font, Size, Style, Text Assistant, Line, Curve, Line and Curve Style, Horizontal/Vertical Lock, All Notation Context, Only In Score, Not In Score, This Notation Context Only;
- **Window:** Previous/Next Window, Arrange Icons, Close All.

*Funcțiile programului*

**ENCORE - The Musician's Choice for Composing & Publishing**

**Version 4.5.5**

**© 1993-2003 Interactive Music, Passport Designs, Inc.**

[www.gvox.com](http://www.gvox.com)

**PO Box 2755, NJ 07091, USA**

- **File:** New (Page Layout: Staves per system, Systems per page, Measures per system, Staff Format), Open [Scores (enc, mus, mto, rhp), MIDI (mid, miff), MT Pro (mts)], Close, Save, Save As [Encore Files (enc), MIDI Files (mid), MT Pro Files (mts)], Revert to Saved, Extract Part, Score Settings/Page Setup (Score Window Title; Enlarge or Reduce Score; Margin Setting), Print, Export to ESP, Exit;
- **Edit:** Undo Guess Durations, Cut, Copy, Paste, Clear, Select All, Nudge Left/Right/Up/Down;
- **Notes:** Attributes (Notes, Beams, Rests), Voice (Set to Voice 1-8), Accidents to (Enharmonics, Sharps, Flats), Stems (Up, Down, Normalize), Marks (Add, Remove), Tie Notes, Slur Notes, Beam Notes (Beam Group, Beam on Beat, Sub Group, Flatten Beams), Change – Pitch, Duration, Velocity; Make-Chord, Tab, Grace/Cue; Revert to Raw, Guess Durations;
- **Measures:** Add/Delete Measure, Tempo, Time/Key Signature, Barline Types, Endings, Coda Phrases, Measure Numbers, Compressed Rests, Align/Swing Playback, Align Spacing;
- **Score:** Text Elements, Add/Delete Page, Add/Delete Staff, Split this Staff, Tablature Staff, Percussion Staff, Connect/Center Staves, Center Systems, Measure per System, Systems per Page;
- **View:** Show/Hide Score Colors, Guitar Frets, Show/Hide Staves, Refresh Score, Linear View, Hide Floating Windows;
- **Windows:** Palette (Notes, Clefs, Graphics, Tools, Dynamics, Marks 1, Marks 2, Symbols, Guitar, Expressions, Color), Keyboard, Tempo, Toolbar, Staff Sheet, Tile, Cascade, Arrange Icons, Close All;
- **Setup:** MIDI Setup, Record Setup, Transcription Setup, Spacing Defaults, Click Setup, Toolbar Setup, Click On, Follow Playback, Auto Guess/Beam, Auto Space, Save Preferences;
- **Help:** Topics, Current Topic, Help on Help, Link to Web Site, About Encore.

**Prezentarea generală a programului**

**SCORE**

**Computer Music Typography System**

**Written by Leland SMITH**

**Programers: Leland SMITH, Perry DEVINE**

**© 1977-1992 by Leland SMITH**

**© 1986-1992 by Passport Designs, Inc.**

**© 1995-2004 by San Antonio Press, PO Box 60247, Palo Alto, CA-94306, USA**

[www.scoremus.com](http://www.scoremus.com)

<http://ace.acadiau.ca/score>

[lcs@ccrma.stanford.edu](mailto:lcs@ccrma.stanford.edu)

- Complex de programe [SCORE Version 4.01, Midiscor (SCORE to MIDI), MIDISCORWRITE (MIDI to SCORE), FINALSCORE (Finale to SCORE)] realizate la Center for Computer Research in Music and Acoustics (CCRMA) - Department of Music, Stanford University (USA) de Prof. Leland SMITH - toate operand pe MS-DOS (drive: floppy - cf."Appendix 1") si avand urmatoarele coordonate: 1100 items, 11000 parameters, 29000 graphic vectors.

#### **- b.) PROGRAME WAV DE EDITARE MUZICALA**

##### **Functiile programului**

##### **SOUND FORGE 4.5**

<http://www.sonicfoundry.com>

#### **GENERALE**

- *File:* New, Open (All Types), Work space (open), Exit;
- *Edit:* Paste to New;
- *View:* Full Screen, Toolbars, Clipboard (Contents, Play), Region List, Playlist/Cutlist, Keyboard, Mixer, Time Display, Video Preview, Play Meters, Undo/Redo History;
- *Special:* Record;
- *Tools:* Batch Converter, Preset Manager;
- *Options:* MIDI Input Sync/Trigger, MIDI Output Sync, MIDI Triggers, Preferences;
- *Window:* New Window;
- *Help:* Contents, Search for Help, Keyboard Shortcuts, Troubleshooting, Tip of Day, Sonic Foundry on Web (Product News, Frequently Asked Questions, Online Support, Sound Forge Home Page, Send Feedback, Sonic Foundry Home Page), About Sound Forge.

#### **SPECIALE**

- *File:* New, Open (All Types), Close, Workspace, Save, Save As (asf, smp, svx, iff, v8, voc, vox, pat, ivc, aif, snd, sds, au, snd, rm, ra, smp, sfr, dig, sd, snd, avi, wav, wma), Save All, Properties, Send, Exit;
- *Edit:* Can't Undo, Can't Redo, Can't Reper, Cut, Copy, Copy Object Link, Paste, Paste Special (Crossfade, Mix, Overwrite, Replicate, Paste to New), Trim/Crop, Delete (Clear), Select All, Preview Cut/Cursor, Pre-roll Cursor, Tool (Edit, Magnify, Pencil), Go To, Selection (Snap to Time, Snap Edge to Time, Snap to Yero, Snap Edge to Yero, Set), Undo All, Disable Undo/Redo;
- *View:* Maximize Width, Full Screen, Clipboard (Contents, Play), Zoom Level (Out Full, Window, Selection), Zoom Time (In Full, Normal, Out Full, Selection), Focus to Data Window, Region List, Playlist/Cutlist, Keyboard, Mixer, Time Display, Video Preview, Play Meters, Undo/Redo History, Loop Tuner;
- *Special:* Transport (Record, Play All, Play, Pause, Stop, Go to Start, Rewind, Forward, Go to End, Play Normal Mode, Play Looped Mode, Play as Sample/Cutlist Mode), Region list (Add, Delete, Edit, Replicate, Split, Update, Clear, Markers to Regions, Open, Save As, Copy onto Clipboard), Playlist/Cutlist (Add, Delete, Edit, Replicate, Clear, Stop Point, Pre-roll Playback, Open, Save As, Copy onto Clipboard, Convert to New, Treat as Cutlist, Delete Cut Regions), ASF Markers/Commands (Save As, Import, Add Command), ACID Looping Tools (Halve Selection, Double Selection, Shift Selection Left, Shift Selection Right, Rotate Audio), Edit ACID Properties, Edit Sample, Edit Frame Rate, Edit Tempo, Center Cursor, Drop Marker, Create Region, Create Sample Loop, Mark In, Mark Out, Toggle Selection, Undo/Redo History (Clear, Clear All), Rebuild Peak Data;
- *Process:* Audio Trim/Crop, Channel Converter, Convert to 8-Bit, DC Offset, EQ (Graphic, Paragraphic, Parametric), Fade (Graphic, In, Out), Insert Silence, Invert/Flip, Mute, Normalize, Pan/Expand, Resample, Reverse, Smooth/Enhance, Time Compress/Expand, Volume;
- *Effects:* Amplitude Modulation, Chorus, Delay/Echo (Multi-Tap, Simple), Distorsion, Dynamics (Graphic, Multi-Band), Envelope, Flage/Wah-Wah, Gapper/Snipper, Noise Gate, Pitch (Bend, Shift), Reverb, Vibrato;

- **Tools:** Auto Region, Batch Converter, Crossfade Loop, Extract Regions, Find, Preset Manager, Run Batch Script, Sampler, Spectrum Analysis, Statistics, Synthesis (DTMF/MF Tones, FM, Simple);
- **DirectX :** Audio Plug-In Chainer, CW, SF, etc.;
- **Options:** Status Format (Samples, Time, Seconds, Time& Frames, Absolute Frames, Measures & Beats, SMPTE - Non-Drop, Drop, EBU, Film Sync), Annotations (Marker - Names, Lines; Region - Names, Lines; Loop – Region, Lines), Play Meters (Reset Clip, etc.), Time Display (Position, Sync/Trigger Status, Playlist Position, Passive Update), Video (Passive Update, etc.), Scroll Playback, Scroll Smoothy, Drag and Drop Snapping, Lock Loop/Region Length, Past Events, Selection Grid Lines, Auto Snap - to Time, to Yero, MIDI – Input Sync/Trigger, Output Sync, Pre-Queue for SMPTE/MTE, MIDI Triggers, Preferences;
- **Window:** New Window, Cascade, Title – Horizontally, Vertically, Arrange Icons, Minimize All, Restore All, Close All;
- **Help:** Contents, Search for Help, Keyboard Shortcuts, Troubleshooting, Tip of Day, Sonic Foundry on Web (Product News, Frequently Asked Questions, Online Support, Sound Forge Home Page, Send Feedback, Sonic Foundry Home Page), About Sound Forge.

**Funcțiile programului**  
**Audacity 1.2.0-pre2**  
**<http://audacity.sourceforge.net>**

- **File :** *New , Open (Audacity Projects-aup, WAV-wav, AIFF-aif, AU-au, MP3, OggVorbis-ogg, List of Files-lof), Close, Save Project (aup), Save Project As (aup) Export As WAV, Export Selection As WAV, Export As MP3, Export Selection As MP3 (NB-funcția mp3 este viabilă doar prin adăugarea « lame\_enc.dll », ce poate fi obținut la [mitiok.free.fr](http://mitiok.free.fr) sau la [www.jthz.com/~lame/](http://www.jthz.com/~lame/) ), Export As OggVorbis, Export Selection As OggVorbis, Export Labels, Preferences, Exit ;*
- **Edit :** *Undo, Redo, Cut, Copy, Paste, Trim, Delete, Silence, Split, Duplicate, Select (All, Start, to Cursor, Cursor to End) , Find O Crossing, Selection Save, Move Cursor (to Track Start, to Track End, to Selection Start, to Selection End), Snap-To (On, Off) ;*
- **View :** *Zoom In, Zoom Normal, Zoom Out, Fit in Window, Fit Vertically, Zoom to Selection, Set Selection Format (min :sec, sec, ho :min :sec, film , PAL, NTSC, cdda, samples, etc.), History, Plot Spectrum, Float Control Toolbar, Float Edit Toolbar, Float Mixer Toolbar ;*
- **Project :** *Import Audio, Import Labels, Import MIDI (NB-doar vizualizat), Import Raw Data, Edit ID3 Tags, Quick Mix, New Audio Track, New Stereo Track, New Label Track, New Time Track, Remove Tracks, Align Tracks (with Zero, with Cursor, with Selection, Together), Align and move cursor (with Zero, with Cursor, with Selection), Add Label Art Selection ;*
- **Generate :** *Silence, Tone, White Noise ;*
- **Effect :** *Amplify, BassBoost, Change Pitch, Change Speed, Change Tempo, Compress, Echo, Equalization, Fade In, Fade Out, FFT Filter, Invert, Noise Removal, Normalize, Nyquist Prompt, Phaser, Repeat, Reverse, Wahwah ;*
- **Analyse :** ;
- **Help :** *About Audacity, Online Help.*

**NB** – Acest performant program\_este utilizat si in experimentele efectuate la CCRMA – Stanford University.

**Funcțiile programului**  
**PRO TOOLS Free**  
**version 5.0.1.471**  
**© 1991-2000 digidesign – A divios of Avid**  
**<http://www.digidesign.com>**

- **File:** *New Session, Open Session, Close Session, Save Session, Save Session As, Save Session Copy In, Revert to Saved, Bounce to Disk, New Track, Rename Selected Tracks,*

- Group Selected Tracks, Delete Selected Tracks, Import Audio/Track, Import MIDI/Track, Import MIDI, Get Info, Exit;
- **Edit:** Can't Undo, Cut, Copy, Paste, Merge Paste, Clear, Duplicate, Repeat, Shift, Select All, Trim, Capture Region, Separate Region, Heal Separation, Quantize Regions, Mute/Unmute Region, Lock/Unlock Region, Consolidate Selection, Identify Sync Point, Identify Beat, Identify Silence, Strip Silence, Insert Silence, Fades (Create/Delete Fades, Fade To Start/End), Thin Automation;
- **AudioSuite:** DeEsser, Compressor, Limiter, Expander-Gate, Gate, 1-Band EQ II, 4-Band EQ II, Invert, Duplicate, short delay, slap delay, medium delay, long delay, Normalize, Gain, Reverse, DC Offset Removal, Time Compression Expansion, Pitch Shift;
- **MIDI:** Change Tempo, Change Meter, Quantize, Change Velocity, Change Duration, Transpose, Select Notes, Split Notes, Input Quantize, Click, Click Options, MIDI Beat Clock, Input Filter, MIDI Thru, All Notes Off;
- **Operations:** Destructive Record, Loop Record, QuickPunch, Auto Input Monitor, Input Only Monitor, Online, Pre/Post-Roll Playback, Loop Playback, Scroll Options, (No Auto-Scrolling, Scroll After Playback, Page Scroll During Playback), Link Edit and Timeline Selection, Play Edit Selection, Active In Background, Pre-Fader Metering;
- **Display:** Show Edit Window, Narrow Mix Window, Mix Window Shows (Comment View, 1/0 View, Insert View, Sends View, All, None), Edit Window Shows (Comment View, 1/0 View, Insert View, Sends View, All, None), Transport Window Shows (Counters, MIDI Controls, Expanded), Sends View Shows (Bars:Beats, Minutes:Seconds, Samples, Markers, Tempo, Meter, All, None), DSP Usage Window Shows, Disk Space Window Shows, Display Time In Regions (None, Current Time, Original Time Stamp, User Time Stamp), Display Name In Regions, Display Auto-Created Regions, Bars:Beats, Minutes:Seconds, Samples;
- **Windows:** Show/Hide Mix; Show Edit, MIDI Operations, Tempo/Meter; 1-9 on numeric keypad only – show: Transport, Session Setup, Big Counter, Automation Enable, Memory Locations, Disk Space;
- **Help:** Pro Tools Reference Guide, DigiRack Plug-Ins Guide, MIDI Controllers Guide, Keyboard Shortcuts, About Pro Tools.

**- c.) CONVERTERE**

**- WAV-MP3-WMA -**

**Funcțiile programului**

**MusicMatch Jukebox 6.00**

<http://www.musicmatch.com>

- **File :** *Open* [All Song Files (cda, epcx, mp2, mp3, saf, wav, wma)], *Convert* [din wav in wma (5, 6, 8, 10, 12, 16, 20, 22, 32, 36, 40, 44, 48, 64, 80, 96, 128, 160 kbps), sau in mp3CBR (8, 16, 18, 20, 24, 32, 40, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 kbps), sau in mp3VBR (1-100%) ; din mp3 in wav, sau in wma (5-160 kbps), sau in mp3CBR (8-320 kbps), sau in mp3VBR (1-100%) ; din wma doar in wma (5-160 kbps)], *Add New Track(s) to Music Library*, *Open Music Library*, *Print*, *Export Play List Tracks*, *Create CD from Playlist*, *Exit* ;
- **Edit :** *Playlist Track Tag(s)*, *Select All in Playlist*, *Clear Playlist*, *Copy Art to Clipboard*, *Paste/Tag Art from Clipboard* ;
- **View :** *Small Player View*, *Full Player View*, *My Library*, *MusicMatch Radio*, *Music Guide*, *NowPlaying*, *Recorder*, *Media Window*, *Buy CD Site*, *Visualizations* (Select, Start, Configure), *Sound Enhancement* (Select, Enable, Show UI), *Auto Arrange Components*, *Always on Top* ;
- **Options :** *Player* [Play Control (Previous, Record, Play, Pause, Stop, Next, Seek backward/forward, Skip back songs/forward songs, Increase Volum, Decrease Volum, Mute), Play Cycle (Once, Repeat), Play Reording (Reorder by Album/Track, Shuffle), Equalizer, Settings], *Playlist* [Open Music, Auto DJ, Save Playlist, Clear Playlist], *Music Library* [New/Open/Save/Clear/Export/Import/Add New Track(s) to Music Library, Delete/Edit/Find Track(s), Search and Add Track(s) from All Drives, Music Library Settings], *Recorder* [Control (Start, Stop, Cancel, CDDb Refresh, Select All/None), Source

(E:/CD, Line In, Mic In, System Mixer), Quality (MP3-160, 128, 96, 64 kbps ; WMA-128, 96, 64 kbps ; WAV ; Custom VBR-6% ; Custom CBR-48 kbps ; Custom WMA-5 kbps), Send Album Info to CDDb, Settings – NB-pentru auto-configurare : Settings/Recorder/Advanced/Autoconfig/medium], *Add New Features, Get Music Recommendations, Update Software, Change Skin, Download Skins, Change Text Size, Settings ;*

- *Help : MusicMatch Jukebox Help, Getting Started, Tip of Day, Additional Help Online, Purchase Update/Registration, Request Technical Support, Online Satisfaction Survey, About MusicMatch Jukebox.*

**Funcțiile programului**  
**Shuffler Music Converter 4 r2**  
<http://www.ilustrate.org>

- *Convert (From): MP3 File(s), Wave File(s), WMA File (s);*
- *Next – Convert to Audio Format: Wave (Quality 44.100 Hy, 16 Bit, Stereo), MP3 (Quality 56, 64, 96, 128, 160, 192, 256, 320 Kbps, Stereo/Mono), WMA (Quality 32.000 Khz – 36, 48, 64, Kbps Stereo; 44.100 Khz – 48, 64, 96, 128, 160 Kbps Stereo); *Save Converted File(s): Same Folder as Original/This Folder-Browse;**
- *Back/Convert;*
- *Exit;*
- *Help;*
- *About.*

**- WAV in MIDI -**

**Funcțiile programului**  
**AmazingMIDI v1.70**  
 Copyright © 1998-2003 arakissoftware  
<http://www.pluto.dti.ne.jp/~araki/amazingmidi/>

- *File : Specify Tone File (piano0, piano1, pulse, sample, sine), Specify Input File (wav), Specify Output File (mid), Exit ;*
- *Play : Play Tone File, Play Input File, Play Output File ;*
- *Transcribe : Transcribe ;*
- *View : Zoom In Horizontally, Zoom Out Horizontally, Zoom In Vertically, Zoom Out Vertically ;*
- *Help: Contents, About AmazingMIDI.*
- 

**- MIDI in WAV (sau MP3) –**

**ACID Pro 4.0**  
<http://sonicfoundry.com/acid>

- Prin activarea funcțiilor File/Open/MIDI Files si apoi File/ Render As/Save as type WAV (sau MP3) [**NB** - toate funcțiile acestui complex program de editare sunt prezentate mai jos].

**-IMAGINEA PARTITURII IN SUNET -**

**Funcțiile programului**  
**SharpEye Music Reader**  
**version 1.15 (Mar 18 2000)**  
**© 1999-2000 Graham Jones**  
[www.visiv.co.uk](http://www.visiv.co.uk)

- **Image:** Display Image, Open (TIFF, BMP), Zoom (25%, 50%, 100%), Edit (Rotate Left/Right/By 180, Invert), Delete Zone, Read, Batch process, Exit ;
- **Music:** Save, Save As, Open ;
- **MIDI:** Save, Save As ;
- **NIFF:** Save, Save As ;
- **Options:** MIDI Options, Save window positions ;
- **Help:** Content, About SharpEye.

**NB** – Acest interesant program transforma imaginile partiturilor editate (dar nu si manuscritele) - scanate in prealabil (in formatele BMP si TIFF) - in fisiere audio (MIDI si NIFF/Notation Interchange File Format).

#### **- TEXT SCRIS, IN SUNET (VOCE) -**

##### **Funcțiile programului**

##### **River Past Talkative**

##### **Version 1.5.1.31216**

##### **© 2003 River Past Corporation**

[www.riverpast.com](http://www.riverpast.com)

- **File:** New, Open [Text File (txt), Rich Text Format (rtf)], Save As [Text File (txt), Rich Text Format (rtf)], Open Settings [River Past Talkative Settings 8sts], Save Settings [River Past Talkative Settings 8sts], Exit;
- **Edit:** Undo, Redo, Cut, Copy, Paste, Clear, Select All;
- **Speech:** Start, Pause, Stop, Record (WAV, PM3, WMA, AVI; Stereo/Mono; Resolution 8/16 bits, Sample Rates 8-48 khy, Bitrate 352, 8 kb/sec.);
- **Download:** Latest DirectX, Windows Media Format runtime, Text-to-Speech Engine (SAPI 5.1);
- **Try:** Audio: Capture/CD Ripper/Converter; Screen Recorder, Video Cleqner, Video Perspective, Web Slides;
- **Help:** Contents, Buy Now, Register, Go to River Post Website, About River Past Talkative.

**NB** – Acest converter necesita si instalarea unor programe complementare (DirectX, SAPI 5.1 Text-to-Speech Engine, etc.), ce sunt descarcate automat de pe Internet prin activarea functiei “Download”.

#### **- IMAGINEA FOTOGRAFICA, IN SUNET -**

##### **(pixels in MIDI)**

##### **Funcțiile programului**

##### **MIDImage – The Loxound Musical Pixelator**

##### **Version 2.4.4.1**

##### **(conceput cu “Borland Delphi v.5”)**

##### **© 2003 Brute Force Programming,**

**© by Daniel J. Wojcik, Landstuhlerstr.2,Ramstein-Miesenbacg 66877 Germany**

[lmj@genjerdan.com](mailto:lmj@genjerdan.com)

[www.genjerdan.com](http://www.genjerdan.com)

- **File:** New Project [Project Files (Iprj), MIDI Files (mid), Configuration Files (Impc), WAVE Files (wav)], Open Project [Project Files (Iprj), Images (bmp, jpg, gif), MIDI Files (mid), Configuration Files (Impc), Patches (bank)], Save Project, Add Image to Project (jpg, jpeg, bmp, gif), Create Web Page, Save Settings As (mid, Iprj, Impc, wav), Load MIDI, Print Composition Settings, Exit;
- **Configure:** Pathes & Note Ranges, Select MIDI Device, Configure Scales, Bank Settings, Load Additional Patches (Banks);
- **Options:** Track 10 is Percussion, Boost Dynamics, Show Flyover Hints, Overwrite Image on Save, Strict Bank Control;
- **Tools:** Create Bank Patch List, Autoload SoundFonts, Go to Position, Track Editor;
- **Help:** Help, Program Info, Registration, Credits, MIDImage Homepage.



## - d.) PROGRAME (WAV, MP3, MIDI) DE EDITARE MULTI-TRACKS

### Funcțiile programului

#### ACID Pro 4.0

<http://sonicfoundry.com/acid>

- **File:** *New, Open* [All Project and Media Files – incl. ACID Project Files (acd, acd-bak), MIDI Files (mid, smf, rmi), CD Audio, MP3 Audio (cda), Audio Interchange File Format (aif), OggVorbis (ogg), Quick Time (mov, qt, dv, gif), Sonic Foundry Audio (sfa), Sonic Foundry Perfect Clarity Audio (pca), Sonic Foundry Wave64 (w64), Wave Microsoft (wav), Windows Media Audio V8 (wma), Windows Media Video V8 (wmv)], *Save, Save As* [ACID Project File (acd), ACID Project File With Embedded Media (acd-zip)], *Export Loops* [AIFF (aif), MP3 Audio (mp3), OggVorbis (ogg), Sonic Foundry Perfect Clarity Audio (pca), Wave Microsoft (wav)], *Render As* [AIFF (aif) Main Concept MPEG1 (mpg), Main Concept MPEG2 (mpg), MP3 Audio (mp3), OggVorbis (ogg), Quick Time (mov), Real Media (rm), Sonic Foundry Perfect Clarity Audio (pca), Sonic Foundry Wave64 (w64), Video for Windows (avi), Wave Microsoft (wav), Windows Media Audio V8 (wma), Windows Media Video V8 (wmv)], *Extract Audio from CD, Get Media from Web, Publish Setup, Publish, Properties* (Summary (Title, Artist, Engineer, Copyright, Comments), Audio (Master bus mode Stereo/5.a Round, Number of additional stereo busses, Sample rate-Hz., Bit depth-8/16/24)], *Exit*;
- **Edit:** *Undo Draw Event, Redo, Cut, Copy, Paste, Delete, Select All, Paste Repeat, Paste Insert, Trim, Split, Join, Fit to Time, Editing Tool* (Draw, Selection, Paint, Erase, Envelope, Time Selection, Next Tool, Previous Tool), *Undo All, Clear Undo History*;
- **View:** *Toolbar, Status Bar, Focus to Track View, Explorer, Chooper* (vizualizeaza in detalii fisierul deschis), *Mixer, Video, Audio Plug-In* (introduce EQ), *Track Properties* (descrie fisierul deschis), *Surround Panner, Soft Synth Properties, Show Video Track, Show Bus Track, Zoom* (Normal, Edit, Overview), *Time Rules* [Show Time Ruler, Samples, Seconds, Time & Frames, Absolute Frames, Feet and Frames 16 mm (40 fpf) si 35 mm (16 fpf), SMPTE Film Sync (24 fps), SMPTE EBU (25 fps, Video), SMPTE Non-Drop (29.97 fps, Video), SMPTE Drop (29.97 fps, Video), SMPTE 30 (30 fps, Audio), Set Time at Cursor], *Show Envelopes* (Volume, Pan), *Minimize All Tracks*;
- **Insert:** *Marker, Region, Time Marker, Tempo/Key/Time Signature Cnage, Command MIDI Track, Assignable FX, Bus, Soft Synth* (DLS Soft Synth, Sonic Foundry Inc.), *Time, Envelopes* (Volume, Pan);
- **Tools:** *Render to New Track, Burn Track-at-Once Audio CD, Start AC-3DVD Burner, Reset All MIDI Ports, Edit in Sound Forge*;
- **Options:** *Snapping* (Enable, Grid Only), *Grid Spacing* (Ruler Marks, Measures, Half Notes, Quarter Notes, Quarter Notes Triplets, 8<sup>th</sup> Notes, 8<sup>th</sup> Notes Triplets, 16<sup>th</sup> Notes, 16<sup>th</sup> Notes Triplets, , 32<sup>th</sup> Notes, 32<sup>th</sup> Notes Triplets, 64<sup>th</sup> Notes, 64<sup>th</sup> Notes Triplets), *Ripple Edits, Lock Envelopes to Events, Loop Playback, Enables Real-Time MIDI, Timecode* (Generate MIDI Timecode, Generate MIDI Clock, Trigger from MIDI Timecode), *Customize Toolbar, Preferences*;
- **Help:** *Contents and Index, What`s This ?, Keyboard Shorcuts, ACIDplanet.com, Sonic Foundry on the Web, About ACID Pro.*

**Comenzi Mouse-dreapta:** *Select in Chopper, Select All on Track, Select Events to End, Cut, Copy, Paste, Delete, Split at Cursor, Join, Pitch Shift* (Up Semitone, Down Semitone, Reset), *Insert/Remove Envelope* (Volum, Pan, Bus A,B,C, FX Automation), *FX Automation Envelopes* (FX Automation), *Quick Fade Edges, Properties, Zoom to Loop Region*;  
**Add Point:** *Cut, Copy, Paste, Delete, Linear Fade, Fast Fade, Slow Fade, Smooth Fade, Sharp Fade, Hold, Select All, Reset All*;

Comenzi incluse in Track (de la stanga la dreapta): Minimize/Restore, Nume Track, Microsoft Sound Mapper, Track FX, Mute, Solo.

#### OPERATII CURENTE CU „SAMPLES“ SI „LOOPS“

Acest program bazat pe tehnica buclelor sonore („loops based music creation“) implica combinarea mai multor scurte fragmente muzicale pre-inregistrate („samples“), ce sunt ordonate intr-un folder special, reprezentand o banca de esantioane sonore (de obicei in formatele wav, mp3 sau midi). Prin comanda „File/Open“ acestea pot fi inserate in track-uri (linii temporale), prin trasarea lor cu „creionul“ digital activat prin comanda „Draw Tool button“. Esantioanele mai lungi de 30“ se pot sincroniza prin „Beatmapper Wizard“, ce determina precizarea unui tempo comun tuturor track-urilor (in BPM = bits per minute, primul timp din prima masura fiind considerat „Downbeat“). Tempourile si inaltimele acestor esantioane sonore („samples“) pot fi ulterior reformulate la diferite scari („rates“) de durate si frecvente, prin operatia „resample“. De asemenea, in cadrul track-urilor se pot efectua operatiile curente, (cut, copy, paste, delete, split, etc.), precum si cele referitoare la configurarea dinamicii si a micro-structurii sonore („envelope“). Compozitia rezultata prin suprapunerea mai multor track-uri poate fi salvata („Save“, „Save As“) in formatele specifice programului (acd, acd-zip), precum si in celelalte formate uzuale – ca bucla sonora („File/Export loops“ – aif, mp3, ogg, pca, wav) sau ca lucrare definitivata („File/Render As“ – aif, mp3, ogg, mov, rm, pca, wwav, wma, etc.). Acest program bazat pe bucle sonore („loops“) reprezinta o cale foarte eficienta de sinteza a structurilor muzicale de factura repetitiva.

#### - e.) PROGRAME COMPLEMENTARE

##### Funcțiile programului

##### KB PIANO Version 1.1

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<http://www.qfsoftwqre.com>

- File: New, Open (KBPiano Files – kbp), Save, Save As (kbp), Export to MIDI File (mid), Properties (Title, Author, Comment), Exit;
  - Channel: Delete Events, Remove Vol Messages, Remote Pan Messages, Clear channel;
  - Options: Tuning, Show notes, Mem used, Midi devices, Restart Device;
  - Metronome: Set up (Milliseconds, Sound number, Volume), Enabled;
  - Help: Contents, KB Shortcuts, Quick Help, Support the author, About;
  - Alte comenzi: Patch, QChord, Play, Rec (Rec Over, Solo), Stop, Undo, Pan, Octave (1-6), Channel [1-12, + (13-15), Name], Channel Volume, Master Volume.
- NB – Prin comanda “Rec”, programul transforma tastatura (keyboard-ul) computerului intr-o claviatura muzicala: prima linie de taste alfabetice in sistemul anglo-american (QWERTYUIOP[ ]) devine o claviatura cu un ambitus diatonic de o duodecima (C2-G3), cromatizabil prin adaugarea accidentilor (linia de taste numerice “2356790=” de deasupra) si extensibil la 6 octave (C2-G8), prin comanda “Octave 1-6” (sau F1 – F6); de asemenea, prin activarea liniei IV de taste alfabetice (ZXCVBNM) se pot obtine trisonuri diatonice pe ambitusul C2-G3, extensibil la 6 octave prin tastele F7 – F12 (configuratia acordurilor putand fi setata prin comanda QChord). Linile de taste alfabetice monodice (tastele diatonice “QWERTYUIOP[ ]” – la care se adauga tastele cromatice “2356790=”) si acordice (ZXCVBNM) se pot utiliza simultan; astfel, programul permite inregistrarea unor linii monodice (“Rec/Solo”), cat si omofonice, polifonice sau eterofonice (prin suprapuneri consecutive - “Rec/Rec Over”) pe toate cele 15 canale disponibile – canalul 9 fiind rezervat percutiei. Compozitia rezultata poate fi salvata (prin “Save” sau “Save As”) in formatul specific “KBPiano File” (kbp – ce nu este insa recunoscut de alte programe) sau in formatul MIDI (prin “Export to MIDI File”) – format universal ce poate fi ulterior convertit intr-o partitura muzicala (de pilda, prin programul “MOZART 6” - comanda “File/Import MIDI”), sau integrat ca mostra (“sample”) sau bucla (“loop”) in programul “ACID Pro 4.0”.

*Funcțiile programului*  
*PRAAT doing phonetics by computer*  
*Version 4.1.12*  
 © 1992-2003 by Paul Boersma and David Weenink  
 © 1992-1998 Summer Institute of Linguistics

**- 1.) PRAAT objects**

- *Control*: *Statistics, New Praat script, Open Praat script, Goodies* (Calculator, Stop playing sound, Report floating point properties), *Preferences* (Buttons, Sound input prefs, Sound output prefs), *Quit*;
- *New*: *Record mono sound, Record stereo sound, Sound* (Create sound, Create sound from: tone complex, gamma tone, Shepard tone), *Matrix* (Create Matrix, Create simple Matrix), *Tables* [Create Table, Create TableOfReal, Create formant table (Pools & Van Nierop 1973), Create formant table (Peterson & Barney, 1952), Create TableOfReal (Pols 1973)], *Tiers* (Create: empty PointProcess, Poisson process, PitchTier, FormantTier, IntensityTier, DurationTier, AmplitudeTier), *Create TextGrid, Create Strings as file list, Optimally Theory* (OT learning tutorial, Create: NoCoda grammar, place assimilation grammar, place assimilation distribution, tongue-root grammar, metrics grammar), *Articulatory synthesis* (AS tutorial, Create: Articulation, Speaker, Artword, Vocal Track from phone), *Polynomial* (Create: Polynomial, LegendreSeries, ChebyshevSeries, MSpline, Ispline), *Multidimensional scaling* (MDS tutorial, Create: letter R example, INDSCAL Carrol Wish example, Configuration; Draw splines and MDS class relations), *Neural nets* (FFNet tutorial, Create: Feedforward Net, Pattern with zeroes, empty Categories, iris example);
- *Read*: *Read from file, Open long sound file, Read two Sounds from stereo file, Read from special sound file* (raw Alaw file, 16-bit Little Endian file, 16-bit Big Endian file), *Read Matrix from raw text file, Read Strings from raw text file, Read TableOfReal from headerless spreadsheet file, Read Table from table file, Read from special tier file* (Text Tier from Xwaves, Interval Tier from Xwaves);
- *Write*;
- *Help*: *Object window, Intro, FAQ, What's new, Types of objects, Editors, Acknowledgments, Formulas tutorial, Scripting tutorial, Programming, Go to manual page, Search Praat manual, About Praat.*

**- 2.) PRAAT picture**

- *File*: *Read from praat picture file, Write to praat picture file, Write to Windows metafile, Copy to clipboard, PostScript setting, Write to EPS file, Write to fontless EPS file, Print*;
- *Edit*: *Undo, Erase all*;
- *Margins*: *Draw inner box; Text-left, right, top, bottom; Marks-left every, right every, bottom every, top every; One mark-left, right, bottom, top; Marks (left, right, bottom, top); Logarithmic marks (left, right, bottom, top), One logarithmic mark (left, right, bottom, top); Axes*;
- *World*: *Text; Text special; Draw-line, arrow, two-way arrow; Draw/Paint rectangle; Draw:Paint sounded rectangle; Draw arc; Draw/Paint ellipse; Draw/Paint circle; Draw/Paint circle (mm); Axes; Measure [Horizontal-mm to wc, wc to mm; Vertical-mm to wc, wc to mm; Text width (wc, mm), PostScript text width (wc, mm)]*;
- *Select*: *Plain/Dotted/Dashed line; Line width, Black/White/Red/Green/Blue/Yellow/Cyan/Magenta/Maroon/Lime/Navy/Teal/Purple/Olive/Silver/Grey*;
- *Font*: *10/12/14/18/24; Font size; Times/Helvetica/New Century Schoolbook/Palatino/Courier*;
- *Help*: *Picture window help, About special symbols, About text styles, Phonetic symbol chart, Search manual.*

**NB** – Acest foarte specializat program este dedicat analizei, sintezei și prelucrării sunetelor (cuvintelor), precum și generării unor imagini grafice complexe ale fenomenului sonor. Programul PRAAT este utilizat și în experimentele efectuate la CCRMA – Stanford University.

### Principalele functii ale programului

#### Fractal Tune Smithy v.2.21

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[www.tunesmithy.co.uk](http://www.tunesmithy.co.uk)

[support@tunesmithy.co.uk](mailto:support@tunesmithy.co.uk)

- **NB** – Programul genereaza melodii fractale in baza unor moduri prefigurate, dar sintetizeaza si noi moduri, precum si noi configuratii ale desenelor melodice fractale imparate de utilizator. Structurile melodice rezultate pot fi salvate in mai multe formate audio - inclusiv in formatul MIDI, ce poate fi convertit ulterior in partituri, inclusiv prin programele de redactat mentionate mai sus: “Mozart” (functia “Import MIDI”), “Finale”, “Sibelius”, “NoteWorthy Composer”, “Lime”, “Encore”, etc.
- **Funcțiile de baza** : *Chose a View* (la lansarea programului – cu optiunile: Tune Smithying, Play Fractal Tunes, Scales Work, etc.), *File* (New, Open, Save, Save As, etc.), *Out* (Midi default, Play Control, etc.), *In* (Options, etc.), *Voices* (configurarea timbrelor MIDI), *Parts*, *Pitch*, *Bs* (Play, Stop, Pause/Continue, Record, Arpeggio & Scale Playback, etc.), *View* (Tune Smithying, Play Fractal Tunes, Scales Work, etc.), *Help* (Help, About, etc.).
- **Cele mai importante arhetipuri modale incluse in program:**

1 n(1/7) ! 7 tone modes: 1 1 2 1 2 Thai mode 1; +1 2 1 2 1 Thai mode 2; 2 1 1 2 1 Thai mode 6.

Modes for default scales.lmd Alternate notes: 1 122 cents 271 cents 571 cents 677 cents 785 cents 947 cents ! Typical 7 note Pelog scale; [2] 1 1 2 3 Slendro Alit; +[1] 1 2 2 2 Jegog; 1 3 1 1 1 Dangsoe; 1 1 1 3 1 Manyura; 1 1 2 1 2 Patet Lima, Patet Nem, Jawar, Selisir; [1] 1 2 1 1 2 Patet Barang; 1 2 1 1 2 Patet Lima, Nem with Pelog; [1] 1 1 2 1 2 Patet Barang with Pelog, Manangis, Slendro Gede, Pergenter 2; [2] 1 1 2 1 2 Liwung, Pergenter 1, Pengenter Alit; [3] 1 1 2 1 2 Tembung; [4] 1 1 2 1 2 Nyorog, Sunaren; [5] 1 1 2 1 2 Nyorog handap, Baro; 2 1 1 2 1 Pelog; 1 2 1 2 1 Bem, Pengenter; 2 1 2 1 1 Miring, Slendro 2; [4] 2 1 2 1 1 Slendro 1; [1] 2 1 2 1 1 Slendro 3; [3] 2 1 2 1 1 Slendro 4; 1 1 1 1 1 1 1 Lebeng.

Modes for default scales.lmd Alternate notes: 1 n(1/12) ! 12 tone modes; 10 2 Warao ditonic: South America; +5 7 Honchoshi: Japan; 7 5 Niagari: Japan; 6 1 5 Raga Ongkari; 3 7 2 Ute tritonic; 5 2 5 Raga Sarvasri, Warao tritonic: South America; 5 5 2 Sansagari: Japan; 3 4 5 Peruvian tritonic 2; 4 3 5 Raga Malasri, Peruvian tritonic 1; 1 5 1 5 Messiaen truncated mode 5; 5 1 5 1 Messiaen truncated mode 5 inverse; 2 1 7 2 Warao tetratonic: South America; 2 4 5 1 Raga Sumukam; 1 4 3 4 Raga Lavangi; 2 2 3 5 Eskimo tetratonic (Alaska: Bethel); 2 3 2 5 Genus primum; 5 2 3 2 Genus primum inverse; 2 4 2 4 Messiaen truncated mode 6; 4 2 4 2 Messiaen truncated mode 6 inverse; 2 3 4 3 Raga Bhavani; 4 3 3 2 Raga Mahathi; 3 4 3 2 Bi Yu: China; 1 6 1 3 1 Raga Deshgaur; 1 3 1 6 1 Raga Megharanji; 1 1 4 1 5 Raga Nabhomani; 1 5 1 1 4 Raga Saugandhini, Yashranjani; 5 2 1 3 1 Raga Devaranjani (Devaranji); 2 1 4 1 4 Hira-joshi, Kata-kumoi: Japan; =1 4 2 1 4 Hon-kumoi-joshi, Sakura, Akebono II: Japan, Olympos Enharmonic, Raga Salanganata, Saveri, Gunakri (Gunakali), Latantapriya; 1 4 1 4 2 Iwato: Japan; 4 2 1 4 1 Raga Amritavarshini, Malashri, Shilangi; 4 1 4 2 1 Raga Bhinna Shadja, Kaushikdhvani, Hindolita; 1 2 4 1 4 Balinese Pelog, Raga Bhupalam, Bhupala Todi, Bibhas; 4 1 2 4 1 Raga Gambhiranata, Ryukyu: Japan; 1 4 2 4 1 Raga Gauri; 4 1 4 1 2 Raga Khamaji Durga; 2 1 4 1 1 Raga Vajrayanti, Hamsanada; 4 1 2 1 4 Raga Zilaf; 4 1 3 3 1 Bacovia: Romania, Raga Girija; 1 4 3 3 1 Raga Kshanika; 1 3 1 3 4 Raga Megharanjani, Syrian pentatonic; 3 3 1 4 1 Raga Multani; 1 3 3 1 4 Raga Reva, Revagupti, Ramkali, Vibhas (bhairava); 2 2 5 1 Raga Kumurdaki (Kumudki); 5 2 2 1 2 Raga Kuntvarali; 2 5 2 1 2 Raga Matha Kokila (Matkokil); 2 2 5 2 1 Raga Neroshta; 2 1 2 2 5 Raga Purnalalita, Chad Gadyo: Jewish, Ghana Pentatonic 1; 5 2 2 2 1 Raga Puruhutika, Purvaholika; 2 3 2 1 4 Han-kumoi: Japan, Raga Shobhavari; 1 4 2 3 2 Kokin-joshi, Miyakobushi, Han-Iwato: Japan, Raga Vibhavari (Revati), Bairagi, Lasaki

1 4 2 2 3 Altered Pentatonic, Raga Manaranjani II: 2 1 2 4 3 Raga Abhogi; 2 1 2 3 4 Raga Audav Tukhari; 2 2 3 1 4 Raga Bhupeshwari, Janasammodini; 3 2 4 2 1 Raga Chandrakans (modern), Marga Hindola, Rajeshwari; 3 2 4 1 2 Raga Chandrakans (kafi), Surya, Varamu; 1 2 3 2 4 Raga Chhaya Todi; 2 3 2 4 1 Raga Desh; 4 2 1 2 3 Raga Dhavalashri; 2 2 3 4 1 Raga Hamsadhvani (Hansadhvani); 3 2 1 4 2 Raga Jayakauns; 3 2 2 1 4 Raga Kokil Pancharam; 4 3 2 2 1 Raga Mamata; 4 1 2 2 3 Raga Nagasvaravali, Raga Mand; 3 2 2 4 1 Raga Nata, Udayaravandrika, Madhuranjani; 4 2 3 2 1 Raga Hindol (Sunada Vinodini), Sanjh ka Hindol; 2 3 4 2 1 Raga Rasranjani; 2 1 4 2 3 Raga Sivaranjini (Shivranjani), Akebono I: Japan, Dorian Pentatonic; 3 4 1 2 2 Raga Shailaja; 2 4 1 2 3 Raga Shri Kalyan; 4 3 2 1 2 Raga Valaji; 4 1 2 3 2 Mixolydian Pentatonic, Raga Savethri; 3 2 3 3 1 Raga Chandrakans (kiravani); 1 3 3 3 2 Raga Manaranjani I; 3 1 3 2 3 Raga Mohanangi; 2 3 3 3 1 Raga Priyadarshini; 1 3 3 2 3 Raga Rasika Ranjani, Vibhas (marva), Scriabin; 3 3 1 3 2 Raga Samudhra Priya, Madhukauns (pentatonic); 2 3 2 3 Ritusen, Ritsu (Gagaku): Japan, Zhi, Zheng: China, Raga Devakriya, Durga, Suddha Saveri, Arabhi, Scottish Pentatonic, Ujo: Korea, Major complement; 2 2 3 2 3 Major Pentatonic, Ryosen: Japan, Man Jue, Gong: China, Raga Bhopali (Bhup), Mohanam, Deskar, Bilahari, Kokila, Jait Kalyan, Peruvian Pentatonic 1, Ghana pent.2; 2 3 2 3 2 Yo: Japan, Suspended Pentatonic, Raga Madhyamavati, Madhmat Sarang; gyptian; Rui Bin, Jin Yu, Qing Yu: China; 2 3 2 2 2 Chao: China; 2 2 2 3 3 Kung: China; 3 2 2 3 2 Minor Pentatonic, Raga Dhani (Suddha Dhanyasi), Abheri, Udhayaravi Chandrika, Qing Shang, Gu Xian, Jia Zhong, Yu: China, P'yongjo-kyemyonjo: Korea, Minyo: Japan, Peruvian Pentatonic 2, Blues Pentatonic; 3 3 2 2 2 Raga Harikauns, Chin: China; 3 2 3 2 2 Raga Malkauns (Malakosh), Raga Hindola, Man Gong, Quan Ming, Yi Ze, Jiao: China; 2 2 3 3 2 Dominant Pentatonic, Shang: China; 3 2 2 2 3 Minor added sixth Pentatonic, Kyemyonjo: Korea; 1 1 4 1 4 1 Raga Vijayasri; 1 1 4 1 1 4 Messiaen mode 5; 4 1 1 4 1 1 Messiaen mode 5 inverse; 2 2 1 1 1 5 Raga Dipak; 2 1 3 1 4 1 Raga Amarasenapriya; 1 1 4 1 2 3 Raga Chandrajyoti; 1 3 2 1 1 4 Raga Dhavalangam; 1 3 1 2 4 1 Raga Gaula; 1 4 2 1 1 3 Raga Kalakanthi; 2 4 1 3 1 1 Raga Malarani (Hamsanada); 1 3 2 1 4 1 Raga Mandari, Gamakakriya, Hamsanarayani; 1 4 2 1 3 1 Raga Padi; 4 1 2

- 1 3 1 Raga Paraju, Ramamanohari, Simhavahini, Sindhu Ramakriya, Kamalamanohari;1 3 1 2 1 4 Raga Purna Pancama, Malahari, Geyahajjaji, Kannadabangala;3 1 2 1 4 1 Raga Rasamanjari;1 3 1 4 1 2 Raga Rudra Pancama;4 1 2 1 1 3 Raga Saravati (Sharavati);2 1 3 1 1 4 Raga Syamalam;4 1 2 3 1 1 Raga Tilang, Savitri, Brindabani Tilang;1 3 1 4 2 1 Raga Vasanta, Chayavati;4 2 1 3 1 1 Raga Vijayavasanta;1 3 3 1 3 1 Raga Bauli;3 3 1 3 1 1 Raga Jivanti, Gaurikriya;1 3 3 1 1 3 Raga Kalagada;1 3 1 3 3 1 Raga Lalita, Sohini, Hamsanandi, Lalit Bhairav;1 1 3 3 1 3 Raga Suddha Mukhari;1 3 1 3 1 3 Messiaen truncated mode 3, Prometheus (Liszt);3 1 3 1 3 1 Messiaen truncated mode 3 inverse, Major Augmented, Genus tertium.
- 2 1 4 2 2 1 Hawaiian:2 1 2 4 1 2 Raga Bagesri, Sriranjani, Kapijingla;2 2 2 1 4 1 Raga Caturangini;2 2 1 4 2 1 Raga Hamsa Vinodini;4 1 2 2 2 1 Raga Hari Nata, Genus secundum;2 4 1 1 2 2 Raga Jaganmohanam;1 4 2 2 2 1 Raga Jivanti;4 2 1 1 2 2 Raga Jyoti;4 1 2 1 2 2 Raga Kamalamanohari;4 1 2 2 1 2 Raga Khamas, Baduhari;2 1 4 2 1 2 Raga Manavi;2 2 1 2 4 1 Raga Nalinakanti, Kedaram;1 4 2 1 2 2 Raga Phenadyuti, Insan, Honchoshi, Niagari; Japan;1 2 2 1 4 2 Honchoshi plagal form: Japan;2 2 1 4 1 2 Raga Rageshri (Rageshwari), Nattaikurinji;1 4 2 2 1 2 Raga Rasavali;1 2 4 2 1 2 Raga Salagavarali;2 4 1 2 1 2 Raga Sarasvati;2 1 2 2 4 1 Raga Sindhura Kafi;1 2 2 2 1 4 Raga Suddha Simantini;2 1 4 1 2 2 Raga Trimurti;4 2 1 2 1 2 Raga Vutari;1 3 2 3 1 2 Prometheus Neapolitan;3 2 1 1 3 2 Blues scale I;2 1 2 1 3 3 Pyramid Hexatonic;1 2 2 1 3 3 Double-Phrygian Hexatonic;3 1 1 2 3 2 Raga Bhanumanjari, Jog;2 3 2 1 3 1 Raga Bhinna Pancama;2 1 2 3 3 1 Raga Ghantana, Kaushiranjani (Kaishikiranjani).
- 1 2 3 2 3 1 Raga Gurjari Todi:1 3 2 3 2 1 Raga Hamsanandi, Marva, Pancama, Puriya;1 3 2 2 1 3 Raga Hejjajji;1 3 1 2 2 3 Raga Kalavati, Ragamalini;2 2 3 1 3 1 Raga Latika;3 3 1 2 1 2 Raga Madhukauns (hexatonic);1 3 2 1 2 Raga Malayamarutam;2 1 3 3 2 1 Raga Ranjani, Rangini;2 3 2 3 1 1 Raga Brindabani Sarang, Megh (Megh Malhar);2 2 1 3 3 1 Raga Sarasanana;2 1 3 1 3 2 Raga Simharava (Sinhavaram);3 2 2 1 3 1 Raga Takka;1 3 1 3 2 2 Raga Vasantabhairavi;2 1 3 1 2 3 Raga Vijayanagari;1 2 2 3 3 1 Raga Viyogavarali;1 2 3 1 2 3 Messiaen truncated mode 2;1 3 2 1 3 2 Messiaen truncated mode 2;3 2 2 1 2 P'yongjo: Korea, Yosen: Japan, Raga Darbar, Narayani, Suposhini, Andolika, Gorakh Kalyan, Mixolydian Hexatonic;2 2 2 3 1 2 Prometheus, Raga Barbara;1 2 2 3 2 2 Ritsui: Japan, Raga Suddha Todi;2 2 1 2 2 3 Arezzo Major Diatonic Hexachord, Raga Kambhoji, Devarangini, Scottish Hexatonic;2 1 2 2 3 2 Minor Hexatonic, Raga Palasi, Manirangu, Nayaki, Yo: Japan, Eskimo Hexatonic 1 (Alaska: King Island);2 2 2 3 1 Eskimo Hexatonic 2 (Alaska: Point Hope);1 2 3 2 2 2 Raga Bhavani;1 2 2 3 2 2 Raga Gandharavam;3 2 2 1 2 2 Raga Gopikavasanta, Desya Todi, Phrygian Hexatonic;2 2 3 2 2 1 Raga Kumud, Sankara (Shankara), Lydian Hexatonic;3 2 2 1 2 Raga Manohari;2 2 3 2 1 Raga Mruganandana;2 3 2 2 2 1 Raga Nagagandhari;2 3 2 1 2 2 Raga Navamanohari;2 2 1 2 3 2 Raga Siva Kambhoji, Vivardhini;2 1 2 2 2 3 Raga Suddha Bangala, Gauri Velavali;2 2 1 2 3 Raga Yamuna Kalyani, Kalyani Keseri, Ancient Chinese;2 2 2 2 2 2 Whole-tone, Messiaen mode 1, Raga Gopriya, Anhemitonic Hexatonic.
- 1 1 4 1 1 1 3 Mela Salaga:1 4 1 1 3 1 Mela Jhalavarali, Raga Varali, Jinavali;1 4 1 3 1 1 Mela Raghupriya, Raga Ravikriya, Ghandarva;1 4 1 1 2 2 Mela Jalarnava;1 4 1 2 1 2 Mela Navanitam, Raga Nabhomani;1 4 1 2 2 1 Mela Pavani, Raga Kumbhini;2 1 4 1 1 1 Raga Ragesri;4 1 2 2 1 1 1 Raga Madhuri;1 3 1 1 3 2 Chromatic Mixolydian;1 3 1 1 3 2 1 Chromatic Lydian, Raga Lalit, Bhankar;3 1 1 3 2 1 1 Chromatic Phrygian;1 1 3 2 1 1 3 Chromatic Dorian, Mela Kanakangi, Raga Kanakambari;1 3 2 1 1 3 1 Chromatic Hypolydian, Purvi That, Mela Kamavardhani, Raga Shri, Pantuvarali, Basant, Kasiramakriya, Suddharamakriya, Puriya Dhanashri, Dhipaka;3 2 1 1 3 1 1 Chromatic Hypophrygian, Blues scale III;2 1 1 3 1 1 3 Chromatic Hypodorian, Raga Dvigandharabushini;2 3 1 1 3 1 1 Chromatic Mixolydian inverse;1 2 3 1 1 3 Chromatic Phrygian inverse;1 1 3 1 1 2 3 Chromatic Hypophrygian inverse;3 1 1 3 1 1 2 Chromatic Hypodorian inverse;1 1 3 2 1 3 1 Mela Ganamurti, Raga Ganasamavarali;1 1 3 2 3 1 1 Mela Tanarupi, Raga Tanukirti;1 3 1 1 2 3 1 Raga Lalita, Chromatic Hypolydian inverse, Raga Suddha Pancama;1 3 1 2 1 1 3 Mela Gayakapriya, Raga Kalakanti, Gipsy Hexatonic;1 3 1 2 1 3 1 Major Gipsy, Persian, Double Harmonic Major, Bhairav That, Mela Mayamalavagaula, Raga Paraj, Kalingada, Second Byzantine mode, Hitzaskiar: Greece, Maqam Zengule, Hijaz Kar, Suzidil;1 3 1 2 3 1 1 Mela Hatakambari, Raga Jeyasuddhamalavi;3 1 1 2 1 1 3 Mela Yagapriya, Raga Kalahamsa;3 1 1 2 1 3 1 Mela Gangayabhusani, Raga Gangatarangini, Sengah: Greece;3 1 1 2 3 1 1 Mela Calanata, Raga None, Chromatic Dorian inverse;1 2 3 1 1 1 3 Mela Gavambodhi, Raga Girvani;1 2 3 1 1 3 1 Todi That, Mela Shubhapantuvarali, Raga Multani, Gamakasamantam, Chromatic Lydian inverse.
- 1 2 3 1 3 1 1 Mela Divyamani:1 3 2 1 1 1 3 Mela Dhavalambari, Foulds' Mantra of Will scale;1 3 2 1 3 1 1 Mela Visvambhari, Raga Vamsavathi;1 3 1 3 2 1 1 Verdi's Enigmatic descending;2 1 3 1 1 1 3 Mela Syamalangi, Raga Shyamalam;2 1 3 1 1 3 1 Minor Gipsy, Mela ;imhendramadhyama, Raga Madhava Manohari, Maqam Nawa Athar, Hisar, Double Harmonic Minor, Hungarian Minor, Niavent: Greece;2 1 3 1 3 1 1 Mela Nitimati, Raga Nisada, Kaikavasi;3 1 2 1 1 1 3 Mela Sucaritra, Raga Santanamanjari;3 1 2 1 1 3 1 Mela Dhatuvaradhani, Raga Dhauta Pancama, Devarashtra;3 1 2 1 3 1 1 Mela Rasikapriya, Raga Rasamanjari, Hamsagiri;1 3 1 1 3 1 2 Oriental, Raga Ahira-Lalita, Minor Gipsy inverse;2 1 2 2 1 3 1 Harmonic Minor, Spanish gipsy, Mischung 4, Pilu That, Mela Kiravani, Raga Kiranavali, Kirvani, Kalyana Vasantha, Deshi(3), Maqam Bayat-e-Esfahan, Zhalibny Minor;1 3 1 2 2 1 2 Harmonic Minor inverse, Mela Cakravaka, Raga Ahir Bhairav, Bindumalini, Vegavahini, Makam Hicaz, Zanjari;2 2 1 2 1 3 1 Harmonic Major, Mela Sarasangi, Raga Haripriya, Mischung 2, Ethiopian;2 1 3 1 2 2 Makam Huzzam, Phrygian flat 4;2 2 1 3 1 2 1 Ionian sharp 5;1 2 2 1 3 1 2 Locrian natural 6, Maqam Tarznauyn;2 1 2 1 3 1 1 Locrian no.2;1 2 1 2 2 1 3 Ultra Locrian, Mixolydian sharp 1;1 2 2 1 2 1 3 Locrian double-flat 7;2 3 1 2 1 2 1 Nohkan Flute scale: Japan;2 1 1 3 1 2 2 Sambah (Sabach): Greece;2 1 2 1 3 1 2 Makam Karcigar, Dorian flat 5, Kiourdi ascending: Greece;2 1 2 1 3 2 1 Jeths' mode;1 3 2 1 2 2 Mela Ratnangi, Raga Phenadyuti;1 3 2 2 1 2 Mela Vanaspati, Raga Bhanumati;1 1 3 2 2 2 1 Mela Manavati, Raga Manoranjani;1 2 2 2 1 1 3 Mela Senavati, Raga Senagrani, Malini;1 2 2 2 1 3 1 Neapolitan Minor, Mela Dhenuka, Raga Dhunibinnashadjam, Maqam Shahnaz Kurdi.
- 1 2 2 2 3 1 1 Mela Rupavati:1 3 1 2 1 2 2 Mela Vakulabharanam, Alhijaz: Arabic, Raga Jogiya, Vativasantabhairavi, Ahava Rabba: Jewish, Maqam Humayun, Hitzaz: Greece, Dorico Flamenco: Spain, Harmonic Major inverse, Phrygian Dominant;1 3 1 2 2 2 1 Mela Suryakanta, Bhairubahar That, Raga Supradhipam, Sowrashtam.
- 2 1 2 1 1 3 2 Modified Blues:2 1 2 2 1 1 3 Mela Jhankaradhvani, Raga Jhankara Bhramavi;2 1 2 2 3 1 1 Mela Varunapriya, Viravasantham;2 2 1 2 1 1 3 Mela Mararanjani, Raga Keseri;2 2 1 2 3 1 1 Mela Naganandini, Raga Nagabharanam, Samanta;3 1 1 2 1 2 2 Mela Ragavardhani, Raga Cudamani;3 1 1 2 2 1 2 Mela Vagadhisvari, Raga Bhogachayanata, Nandkauns, Ganavaridhi, Bluesy R&R;3 1 1 2 2 2 1 Mela Sulini, Raga Sailadesakshi, Raga Trishuli, Houzam: Greece;1 2 3 1 1 2 2 Mela Bhavapriya, Raga Bhavani, Kalamurti;1 2 3 1 2 1 2 Mela Sadvidhamargini, Raga Sthavarajam, Tivravahini;1 2 3 1 2 2 1 Mela Suvarnangi, Raga Sauviram;1 3 2 1 1 2 2 Mela

Namanarayani, Raga Narmada, Pratapa;1 3 2 1 2 1 2 Mela Ramapriya, Raga Ramamanohari, Romanian Major, Petrushka chord;1 3 2 1 2 2 1 Marva That, Mela Gamanasrama, Raga Partiravam, Puriya, Puriya Kalyan, Sohani, Peiraiotikos: Greece.

1 3 2 2 2 1 1 Verdi's Enigmatic ascending;2 1 3 1 1 2 2 Mela Sanmukhapriya, Raga Camara, Chinthamani;2 1 3 1 2 1 2 Mela Hemavati, Raga Desisimharavam, Maqam Nakriz, Tunisian, Hedjaz, Misheberekh: Jewish, Souzinak (Peiraiotiko Minore): Greece, Dorian sharp 4, Kaffa;2 1 3 1 2 2 1 Lydian Diminished, Mela Dharmavati, Raga Arunajualita, Dumyaraga, Madhuvanti, Ambika.

2 2 2 1 1 1 3 Mela Kantamani, Raga Kuntala, Srutiranjani;2 2 2 1 1 3 1 Mela Latangi, Raga Gitapriya, Hamsalata;2 2 2 1 3 1 1 Mela Citrambari, Raga Chaturangini;2 3 2 2 1 1 1 Raga Sorati, Sur Malhar;3 1 2 1 1 2 2 Mela Jyotisvarupini, Raga Jotismatti;3 1 2 1 2 1 2 Hungarian Major, Mela Nasikabhusani, Raga Nasamani;3 1 2 1 2 2 1 Mela Kosalam, Raga Kusumakaram, Lydian sharp 2;3 1 2 2 1 2 1 Aeolian flat 1;1 2 2 1 2 2 2 Gr.Mixolydian, Gr.Hyperdorian, Med.Hypophrygian, Med.Locrian, Pien chih: China, Makam Lami, Yishtabach: Jewish;2 2 1 2 2 2 1 Gr.Lydian, Med.Ionian, Med.Hypolydian, Major, Bilaval That, Mela Shankarabharanam, Ghana Heptatonic, Peruvian major, 4<sup>th</sup> plagal Byzantine, Ararai: Ethiopian, Makam Cargah, Ajam Ashiran, Dastgah Mahur, Dastgah Rast Panjgah;2 1 2 2 2 1 2 Gr.Phyrgian, Med.Dorian, Med.Hypomixolydian, Kafi That, Mela; araharapriya, Raga Bageshri, Sriraga, Bhimpalasi, Mischung 5, Gregorian nr.8, Eskimo Heptatonic, Yu: China, Hyojo, Oshikicho, Banshikicho: Japan;1 2 2 2 1 2 2 Gr.Dorian, Med.Phyrgian, Gr.Med.Hypoeolian, Bhairavi That, Mela Hanumatodi, Raga Asavari (Asaveri), Raga Bilashkhani Todi, In: Japan, Makam Kurd, Gregorian nr.3, Ousak: Greece, Major inverse;2 2 2 1 2 2 1 Gr.Hypolydian, Med.Lydian, Kalyan That (Yaman), Mela Mecakalyani, Raga Shuddh Kalyan, Ping, Kung: China;2 2 1 2 2 1 2 Gr.Hypophrygian, Gr.Ionian (Iastian), Med.Mixolydian, Gr.Med.Hypolionian, Khamaj That, Mela Harikambhoji, Raga Harini, Janjhuti, Surati, Mischung 3, Ching, Shang: China, Gregorian nr.7;2 1 2 2 2 2 Gr.Med.Hypodorian, Gr.Med.Aeolian, Gr.Hyperphrygian, Natural Minor, Asavari That, Mela Natabhairavi, Raga Jaunpuri, Raga Adana, Se, Chiao: China, Gregorian nr.2, Makam Buselik, Nahawand, Peruvian minor, Geez, Ezel: Ethiopian, Kiourdi descending: Greece;2 1 2 2 2 2 1 Melodic Minor ascending, Jazz Minor, Minor-Major, Mela Gaurimanohari, Raga Patdip, Velavali, Deshi(2), Mischung 1, Hawaiian.

2 2 2 1 2 1 1 Lydian Augmented, Lydian sharp 5;2 2 1 1 2 2 2 Major Locrian;2 1 2 1 2 2 2 Minor Locrian, Half Diminished, Locrian sharp 2, Minor flat 5;1 2 1 2 2 2 2 Super Locrian, Altered, Diminished Whole-tone, Locrian flat 4, Pomeroy, Ravel;1 2 2 2 2 2 1 Neapolitan Major, Phrygian Major, Mela Kokilapriya, Raga Kokilaravam;1 2 2 2 2 1 2 Mela Natakapriya, Jazz Minor inverse, Phrygian-Mixolydian, Raga Natabharanam, Ahiri Todi;2 2 1 2 1 2 2 Mischung 6, Mixolydian flat 6, Major-Minor, Mela Carukesi, Raga Charukeshi, Tarangini

2 2 2 1 1 2 2 Lydian Minor, Mela Risabhapriya, Raga Ratipriya;2 2 2 1 2 1 2 Lydian Dominant, Mela Vacaspati, Raga Bhusavati, Overtone, Lydian-Mixolydian, Bartok;2 2 2 2 2 1 1 Leading Whole-tone;1 3 1 1 1 1 3 1 Raga Ramkali (Ramakri)

1 1 1 3 1 1 1 3 Messiaen mode 4;3 1 1 1 3 1 1 1 Messiaen mode 4 inverse;1 3 1 1 1 2 2 1 Raga Bhatiyar;2 1 3 1 1 1 1 2 Raga Cintamani;1 3 1 2 1 1 2 1 Raga Saurashtra;1 2 2 1 1 1 3 1 Half-diminished Bebop;1 3 1 1 2 2 1 1 Verdi's Scala enigmatica;1 1 1 2 2 1 3 1 Harmonic and Neapolitan Minor mixed;1 3 1 2 1 2 1 1 Maqam Hijaz;1 2 1 1 1 3 1 2 Maqam Shadd'araban;2 1 2 2 2 1 1 1 Raga Mian Ki Malhar, Bahar, Sindhura;2 1 2 2 1 1 1 2 Raga Mukhari, Anandabhairavi, Deshi, Gregorian nr.1, Dorian/Aeolian mixed;2 1 1 1 2 2 1 2 Minor Bebop, Raga Zilla, Mixolydian/Dorian mixed;2 2 1 2 2 1 1 1 Genus diatonicum, Dominant Bebop, Raga Khamaj, Desh Malhar, Alhaiya Bilaval, Maqam Shawq Awir, Gregorian nr.6, Major/Mixolydian mixed, Chinese Eight-Tone, Rast: Greece

2 2 1 2 1 2 1 Major Bebop, Altered Mixolydian;2 1 2 1 2 1 2 Blues scale II;1 2 1 1 2 1 2 2 Spanish Phrygian;1 2 1 1 1 2 2 2 Espla's scale, Eight-tone Spanish;2 1 2 1 2 1 2 Diminished, Modus conjunctus, Messiaen mode 2 inverse, Whole-Half step scale;2 2 1 1 1 2 2 1 Ishikotsucho: Japan, Raga Yaman Kalyan, Chayanat, Bihag, Hamir Kalyani, Kedar, Gaud Sarang, Genus diatonicum veterum correctum, Gregorian nr.5, Kubilai's Mongol scale, Major/Lydian mixed;2 1 2 1 1 2 1 1 Zirafkend: Arabic;1 1 1 2 2 2 1 2 Adonai Malakh: Jewish;1 2 1 2 2 1 2 1 Magen Abot: Jewish;2 1 2 1 2 1 1 Maqam Nahawand, Raga Suha (Suha Kanada), Gregorian nr.4, Utility Minor;1 2 1 2 1 2 1 2 Octatonic, Messiaen mode 2, Dominant Diminished, Diminished Blues, Half-Whole step scale

1 1 2 2 1 1 2 2 Messiaen mode 6;2 2 1 1 2 2 1 1 Messiaen mode 6 inverse;1 2 2 1 1 2 2 1 Van der Horst Octatonic;1 1 2 1 1 2 1 1 2 Messiaen mode 3, Tsjerepnin;2 1 1 2 1 1 2 1 1 Messiaen mode 3 inverse;2 1 2 2 1 1 1 1 1 Raga Pilu, Full Minor;2 1 1 1 2 2 1 1 1 Raga Malgunji, Ramdasi Malhar;2 1 2 1 1 1 1 1 1 Raga Pahadi;2 1 1 1 1 1 2 1 2 Blues Enneatonic;2 1 2 1 1 1 1 1 2 Kiourdi: Greece;2 2 1 1 1 2 1 1 1 Taishikicho: Japan, Ryo: Japan, Raga Chayanat;1 2 1 1 2 1 1 2 1 Genus chromaticum;1 2 1 1 2 1 2 1 1 Moorish Phrygian;1 1 2 1 1 1 2 1 2 Youlan scale: China;1 1 1 2 2 1 1 2 Chromatic and Diatonic Dorian mixed;1 1 2 1 2 1 1 2 1 Chromatic and Permuted Diatonic Dorian mixed;2 1 1 1 2 1 1 2 Modes of Major Pentatonic mixed;1 1 1 1 2 1 1 1 2 Messiaen mode 7;2 1 1 1 1 2 1 1 1 1 Messiaen mode 7 inverse;2 1 1 1 2 1 1 1 1 1 Major/Minor mixed;2 1 1 1 1 1 2 1 1 1 Minor Pentatonic with leading tones;1 1 1 1 1 2 1 2 1 1 Raga Sindhi-Bhairavi;1 1 2 1 1 1 1 2 1 1 Symmetrical Decatonic;1 1 1 1 1 1 1 1 1 1 1 Twelve-tone Chromatic

Modes\_for\_default\_scales.lmd Alternate notes-1 3<sup>^</sup>(1/13) ! Bohlen-Pierce scale;+3 1 2 1 3 2 1 Prooijen Major;2 1 3 1 2 3 1 Prooijen Minor;2 1 2 1 1 2 1 2 1 Delta, Moll I;1 2 1 2 1 1 2 1 2 Dur I, Delta inverse;1 2 1 2 1 1 2 2 1 Gamma;1 2 2 1 1 2 1 2 1 Gamma inverse;2 1 1 2 1 2 1 1 2 Dur II;2 1 1 2 1 2 1 2 1 Lambda;=1 2 1 2 1 2 1 1 2 Harmonic, Lambda inverse;1 2 1 2 1 2 1 2 1 Pierce, Moll II;1 1 2 1 2 1 2 1 2 Walker A;1 2 1 1 2 1 2 1 2 Walker B;2 1 2 1 2 1 2 1 1 Walker I;2 1 2 1 2 1 1 2 1 Walker II.

1 n(1/15) ! 15 tone equal modes;4 1 4 1 4 1 Blackwood Hexatonic;+3 1 2 3 1 4 1 Fifteen-tone Harmonic Minorl3 2 1 3 1 4 1 Fifteen-tone Harmonic Majorl3 2 1 3 2 3 1 Fifteen-tone "Major"l3 1 2 3 1 3 2 Fifteen-tone "Minor", Natural Minorl3 1 2 3 2 3 1 Fifteen-tone Melodic Minorl2 2 2 3 2 2 2 Fifteen-tone Miller's Porcupine-7l2 3 2 2 2 2 2 Fifteen-tone Miller's Porcupine-7 Majorl=3 1 1 3 1 1 2 1 1 Fifteen-tone Major/Minor mixedl1 2 1 2 1 2 1 2 1 2 Blackwood Decatonicl1 2 1 1 2 1 1 1 1 1 1 Twelve-tone ChromaticModes\_for\_default\_scales.lmd Alternate notesl.

1 n(1/17) ! 17 tone equal modes;3 3 4 3 4 Seventeen-tone Major Pentatonic;+4 3 3 4 3 Seventeen-tone Minor Pentatonic;=3 4 3 4 3 Seventeen-tone Suspended Pentatonic;3 1 3 3 1 5 1 Seventeen-tone Harmonic Minor;3 3 1 3 1 5 1 Seventeen-tone Harmonic Major;3 3 1 3 3 3 1 Seventeen-tone Major;3 1 3 3 1 3 3 Seventeen-tone Natural Minor;3 1 3 3 3 3 1 Seventeen-tone Melodic Minor;2 1 1 2 1 2 1 2 1 1 1 1 1 1 1 Twelve-tone Chromatic (2/11-comma positive).

Modes\_for\_default\_scales.lmd Alternate notes-Arabic 17-tone pythagorean ! Arabic 17-tone Pythagorean (Arp);3 3 1 3 3 1 3 Safi al-Din's maqam 'Ussaq;+3 1 3 3 1 3 3 Safi al-Din's maqam Nawa;1 3 3 1 3 3 3 Safi al-Din's maqam Abu Salik;3 2 2 3 2 2 3 Safi al-Din's maqam Rast;3 2 2 3 2 3 Safi al-Din's maqam Zangulah;2 3 2 2 2 3 3 Safi al-Din's



Neutral Phrygian;4 5 4 5 4 5 4 Neutral Dorian;5 4 5 4 5 4 4 Neutral Hypolydian;4 5 4 5 4 4 5 Neutral Hypophrygian;5 4 5 4 4 5 4 Neutral Hypodorian;4 6 2 6 4 3 3 3 Genus sextum;5 5 3 5 5 3 2 3 Genus diatonicum;5 3 5 3 5 2 5 3 Modus conjunctus;3 5 2 5 3 5 3 5 Octatonic;5 2 6 5 2 5 6 “ Natural Minor;3 5 2 3 5 3 2 5 3 Genus chromaticum;5 3 3 3 3 5 3 3 3 Rothenberg Generalized Diatonic;3 3 4 3 5 3 4 3 3 Hahn symmetric pentachordal;3 4 3 3 5 3 4 3 3 Hahn pentachordal;4 3 4 3 4 3 4 3 3 Thirty-one tone Orwell;4 1 4 4 4 1 4 4 1 4 Breed 10-tone;4 2 4 2 4 2 4 3 3 3 Lumma Decatonic;5 1 5 1 5 1 5 1 5 1 1 de Vries 11-tone;5 2 1 2 5 3 2 1 4 1 2 3 Genus bichromaticum;3 4 3 3 2 1 4 1 4 1 2 3 Genus enharmonicum vocale;2 2 4 2 2 3 3 3 1 3 3 3 Genus enharmonicum instrumentale;2 3 3 2 3 2 3 2 3 2 3 2 3 Meantone Chromatic (53/220-comma);3 2 3 2 3 2 3 2 3 2 3 2 3 Genus diatonic-chromaticum;3 2 2 3 3 2 3 2 3 2 3 2 3 Fokker 12-tone.

Modes\_for\_default\_scales.lmd Alternate notes-1 100 cents !Equal Temperament (M)-12 Default 12 tone list...:

+10 2 Warao ditonic: South America;5 7 Honchoshi: Japan;7 5 Niagari: Japan;6 1 5 Raga Ongkari;3 7 2 Ute tritonic;5 2 5 Raga Sarvasri, Warao tritonic: South America;5 5 2 Sansagari: Japan;3 4 5 Peruvian tritonic 2;4 3 5 Raga Malasri, Peruvian tritonic 1;1 5 1 5 Messiaen truncated mode 5;5 1 5 1 Messiaen truncated mode 5 inverse;2 1 7 2 Warao tetratonic: South America;2 4 5 1 Raga Sumukam;1 4 3 4 Raga Lavangi;2 2 3 5 Eskimo tetratonic (Alaska: Bethel);2 3 2 5 Genus primum;5 2 3 2 Genus primum inverse;2 4 2 4 Messiaen truncated mode 6;4 2 4 2 Messiaen truncated mode 6 inverse;2 3 4 3 Raga Bhavani;4 3 3 2 Raga Mahathi;3 4 3 2 Bi Yu: China;1 6 1 3 1 Raga Deshgaur;1 3 1 6 1 Raga Megharanji;1 1 4 1 5 Raga Nabhomani;1 5 1 1 4 Raga Saugandhini, Yashranjani;5 2 1 3 1 Raga Devaranjani (Devaranji);2 1 4 1 4 Hira-joshi, Kata-kumoi: Japan=1 4 2 1 4 Hon-kumoi-joshi, Sakura, Akebono II: Japan, Olympos Enharmonic, Raga Salanganata, Saveri, Gunakri (Gunakali), Latantapriya.

1 4 1 4 2 Iwato: Japan;4 2 1 4 1 Raga Amritavarshini, Malashri, Shilangi;4 1 4 2 1 Raga Bhinna Shadja, Kaushikdhvani, Hindolita;1 2 4 1 4 Balinese Pelog, Raga Bhupalam, Bhupala Todi, Bibhas;4 1 2 4 1 Raga Gambhiranata, Ryukyu: Japan;1 4 2 4 1 Raga Gauri;4 1 4 1 2 Raga Khamaji Durga;2 4 1 4 1 Raga Vaijayanti, Hamsanada;4 1 2 1 4 Raga Zilaf;4 1 3 3 1 Bacovia: Romania, Raga Girija;1 4 3 3 1 Raga Kshanika;1 3 1 3 4 Raga Megharanjani, Syrian pentatonic;3 3 1 4 1 Raga Multani;1 3 3 1 4 Raga Reva, Revagupti, Ramkali, Vibhas (bhairava);2 2 2 5 1 Raga Kumurdaki (Kumudki);5 2 2 1 2 Raga Kuntvarali;2 5 2 1 2 Raga Matha Kokila (Matkokil);2 2 5 2 1 Raga Neroshta;2 1 2 2 5 Raga Purnalalita, Chad Gadyo: Jewish, Ghana Pentatonic 1;5 2 2 2 1 Raga Puruhutika, Purvaholika;2 3 2 1 4 Han-kumoi: Japan, Raga Shobhavari;1 4 2 3 2 Kokin-joshi, Miyakobushi, Han-Iwato: Japan, Raga Vibhavari (Revati), Bairagi, Lasaki.

### - Capitolul C -

## MUZICA DE CAMERA ASISTATA DE CALCULATOR

### 1.) Aspecte intonationale

- Acordajul, precum si intonatia – individuala si de ansamblu -, pot fi verificate si corectate prin programul « In-Tune Multi-Instrument Tuner ».

#### Funcțiile programului

#### In-Tune Multi-Instrument Tuner v. 1.8

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[www.MusicMasterWorks.com](http://www.MusicMasterWorks.com)

- Options : Auto-String Select, Tuning Options ;
- Source : Default Windows Input, Wave Out Mix, Yamaha Audio Microphone/CD Audio/Line in ;
- Help ; Unlock ;
- Configurari : Instrument Type, View (Graph ; Gauge), Pitch Range, Strings, Pitch Indicator, Pitch Graph, Frequency, Average Frequency, Target Frequency, View Microphone Input (Yellow=too low, Green=good, Red=too high) .

### 2.) Interpretarea comparata

- Se utilizeaza programul Acid Pro 4 , inserandu-se pe track-uri separate versiunile interpretative analizate, prin comenzile: File-Open-anularea functiei sincronizatoare Beatmapper Wizart (cu „No“ si „Finish“)-trasarea desenului sonor (Mouse-Stanga tinut apasat). Programul vizualizeaza toate configuratiile spatio-temporale specifice, iar versiunile inserate pot fi audiate separat prin comanda Solo (X). Prin aceasta metoda pot fi analizati toti parametrii sonori, iar imaginea grafica a operatiei (ce este edificatoare – inclusiv in realizarea unor studii



teoretice) poate fi conservata prin comenzile: Save As-ACID Project File (acd)/sau ACID Project File With Embedded Media (acd-zip).

### 3.) Politempia structurala

- Elaborata de dirijorul, compozitorul si matematicianul roman Mihai BREDICEANU, teoria timpului polimodular (apud Mihai BREDICEANU, *Timpul polimodular si artele vizuale*, Bucuresti, Ed.Stiintifica si Enciclopedica, 1982, si *Music and Polymodular Time/Structural Polytempi Music. Lecture given at New York University, January 5, 1985* – curs universitar) analizeaza fenomenul politempiei (reliefa de pilda in lucrarile lui Mahler si Ives) si descrie evolutia unui numar finit de evenimente sonore desfasurate simultan in “ceasuri” (masuri de timp) diferite – sau, cu alte cuvinte, proiectarea simultana a mai multor SISTEME DE PULSATII REALE (SPR) reductibile fenomenologic la un SISTEM REFERENTIAL DE TIMP (SRT). Fiecare SPR are proprii MODULI TEMPORALI (M) ce se reflecta la nivelul SPR in tempouri specifice, induse interpretilor sau grupurilor de interpreti prin semnale vizuale sau sonore (“beeps”) – ultimele fiind receptionate prin casti. In acest sens, autorul a inventat un aparat special denumit “Polytimer” si brevetat inca din 1970 in Romania, USA si Franta.
- Computerul permite amplificarea acestor interesante experimente sonore, ce au reprezentat in primul rand o aplicare a teoriei einsteiniene a relativitatii (miscarea relativa a obiectelor si observatorului), dar si o confirmare a teoriei bergsoniene referitoare la perceptia subiectiva a timpului (in functie de varsta si stare emotionala) - asa cum remarca si eminentul muzicolog roman Prof.univ.Dr.Victor GIULEANU (*Tratat de Teoria Muzicii*, Bucuresti, Editura Muzicala, 1986, pag.745-752).
- Astfel modulii temporali pot fi realizati si multiplicati cu programul “MOZART” – ulterior ei fiind difuzati prin “computere paralele” corespunzatoare “muzicilor paralele” ce se suprapun. In prealabil se analizeaza evolutia temporala a fiecărei muzici si se elaboreaza cate o partitura a “beeps”-urilor (cu variatiile de tempouri specifice fiecărei muzici). Aceste partituri de “beeps”-uri (configurate exclusiv pe timbre percutante – de pilda 2 Wood-Block-uri: cel grav pentru timpii principali iar cel acut pentru timpii secundari) sunt difuzate prin casti interpretilor, ce isi adapteaza executia tempourilor respective. “Computerele paralele” sunt eventual subordonate unui server avand functia de a controla (la nivelul “hiperpulsatiei”- ca factor comun al politempiei) evolutia intregului proces, ce poate fi amplificat si prin utilizarea Internetului - de pilda in sensul experimentelor efectuate prin proiectul “SoundWIRE” mentionat mai sus.

### 4.) Efectul de intarziere in practica ansamblurilor – cu aplicatie la proiectul “Sound WIRE”

O analiza pertinenta a acestui aspect a fost realizata in studiul-pilot “*The Effects of Latency on Ensemble Performance*” elaborat in Mai 2002 de Nathan SCHIETT, sub coordonarea lui Chris CHAFE, directorul CCRMA din cadrul Universitatii Stanford (USA). Aceasta ampla cercetare sponsorizata de prestigioasa *National Science Foundation* a implicat efectuarea unor experimente bazate pe scenarii muzicale inedite desfasurate in real-time, ca de pilda cantatul in ansamblu prin transmisii pe Internet la distante continentale. Sub aspect teoretic, s-au luat in considerare urmatoarele elemente: intarzierea de < 7 msec nu este perceptibila; intarzierile tolerabile in convorbirile telefonice sunt de 100-300 msec; intarzierile tolerabile in concerte publice sunt de cca 40 msec pentru ansamblurile simfonice (situate pe scene ce depasesc 40 ft – distanta parcursa in aer de unda sonora in 40 msec) si de cca 5 msec pentru formatiile camerale (motiv pentru care distanta maxima intre muzicieni este de 2 m ! – cf. <http://ww2.mcgill.ca/icc/canarie/learnWare/milestone1/App1.htm> )

Prin masurarea diferitelor nivele ale coordonatei EPT (Ensemble Performance Threshold) s-au stabilit limitele (in msec) ale LDS (Latency Design Spec), sintetizandu-se totodata o serie de concluzii referitoare la: (1) relatia dintre intarziere (*delay, latency*) si tempo (daca intarzierea este mai mare de 30 msec, tempoul are tendinta sa scada; EPT-ul muzicii ritmice este de cca 20-

30 msec); (2) aplicarea strategiei de tip “leader-subordonat” pentru mentinerea unui tempo uniform chiar si in conditiile unei intarzieri mari (de 50-70 msec) a determinat aparitia unor severe desincronizari; EPT-ul variaza in functie de specificul muzicii (viteza, stil, timpul de atac al instrumentelor, etc.); (3) nivelul optim al intarzierii este de 10-20 msec (si nu de 0 msec); (6) EPT-ul determinat prin intarziere electronica este cu mult mai scazut decat in cazul EPT-ului determinat in mediul acustic natural, ce include fenomene complementare de reverberatie si variatie de amplitudine.

- Acest important studiu poate fi obtinut pe site-ul [www-ccrma.stanford.edu](http://www-ccrma.stanford.edu), sau la adresa [cc@ccrma.stanford.edu](mailto:cc@ccrma.stanford.edu)

### 5.) Configurarea Toposului Acustic (de la spatiul arhitectonic la spatiul virtual)

Precizare terminologica : notiunea de « TOPOS » (>gr. *τοπος* = loc) desemneaza in domeniul acusticii muzicale spatiul fizic in care evolueaza sursa sonora (sala de concert). Toposul Acustic impreuna cu Inaltime(Frecventa), Volumul(Amplitudinea) si Timbrul(Structura Spectrala) reprezinta parametrii Spatiului Sonor – proiectiile acestuia in Timp definind Sunetul [ce se clasifica in Sunet muzical (cu Frecventa regulata) si Zgomot (cu Frecventa neregulata)]. Asadar,

$$\text{Sunetul} = \text{Spatiu Sonor} \times \text{Timp}$$

in care :

$$\text{Spatiu Sonor} = \text{Frecventa} \times \text{Amplitudine} \times \text{Structura Spectrala} \times \text{Topos Acustic}.$$

Edificatoare in acest sens sunt cercetarile complexe efectuate la celebrul EXPERIMENTAL MUSIC STUDIOS al Universitatii din Illinois-U.S.A. (<http://ems.music.uiuc.edu/ems/index.html>) de catre Scott WYATT - in domeniul difuzarii/proiectiei sonore (« *Investigative Studies on Sound Diffusion/Projection at the University of Illinois : a report on an explorative collaboration* ») -, precum si cele initiate de Sever TIPEI (compozitor american de origine romana), impreuna cu matematicianul Hans G. KAPER - in directia proiectarii, intr-un mediu imersiv al realitatii virtuale, a compozitiilor multiple, a vizualizarii muzicii si a sonificarii stiintifice (« *Manifold Compositions, Music Visualization, and Scientific Sonification in an Immersive Virtual-Reality Environment* »). Astfel, in introducerea pertinentului sau studiu compozitorul Scott WYATT afirma ca primele investigatii in planul spatializarii sonore s-au concretizat, intre altele, prin muzica concreta elaborata de Pierre SCHAEFFER, prin creatiile lui Edgard VARESE (“*Poème Electronique*”), John CAGE (ciclul “*Imaginary Landscape*”), Earle BROWN (“*Octet*”), Joji YUASA (“*Icon*”), Morton SUBOTNICK (“*Touch*”), John CHOWNING (“*Turenas*”), Salvatore MARTIRANO (“*Sal-Mar Construction*”), Ben JOHNSTON si Herbert BRUN (ultimii trei creatori activand in cadrul “*University of Illinois Experimental Music Studios*”), precum si prin experimentele facute la G.M.E.B. (Bourges) cu “*Gmebaphone*”-ul si cu “*Acousmonium*”-ul utilizat de François BAYLE. In prezent, echipa de acusticieni a IRCAM-Paris ([www.ircam.fr](http://www.ircam.fr)) coordonata de Olivier WARUSFEL are ca domeniu de cercetare controlul propagarii sunetului in spatiu – considerat in dimensiunea sa arhitectonica, sau mediatizat prin mijloace electro-acustice. Aceste investigatii – ce au ca finalitate sintetizarea unor modele de integrare a spatializarii sonore ca parametru constitutiv al unor noi creatii componistice – sunt ordonate (in dimensiunile fundamentale, de natura obiectiva si perceptiva) prin urmatoarele proiecte: caracterizarea obiectiva a fenomenelor acustice ; modelarea fizica (« *physivcal modeling* ») si perceptiva a acestora ; simularea lor pe computer prin crearea unor interfete de comanda a aplicatiilor acustice virtuale cu ajutorul Spatializatorului digital, ce opereaza - in sistem « MacIntosh » - cu un ansamblu de algoritmi bazati pe modele geometrice, oferind diferite ipoteze de propagare si reflexie sonora: difractia, absorbtia in incidenta razanta, reflexia speculara sau ideal difuza. Aceste experimente au dus si la elaborarea unei noi metode de determinare exacta a dimensiunii reverberatiei in salile de concert. Spatializatorul este compus din module logice de *prelucrare a semnalului* si de *comanda in timp real* – generand sinteza locatiei surselor si cea a efectului de sala (*reverberatia artificiala*). Modulul de prelucrare poate fi configurat pentru sisteme individuale de reproducere tridimensionala (la casca sau prin doi transductori), precum si pentru sisteme «multi-tracks» (cu reproduceri « stereo » si « stereo-3/2 »). In coordonata « scenei sonore virtuale », modulul de comanda permite controlul prelucrarii audio-numerice a semnalelor intr-o maniera accesibila, adaptata – prin functii « simbolice » - procesului de elaborare muzicala. In paralel, prin proiectul « Design Sonore », s-a experimentat si fenomenul legat de perceptia si controlul iradiatiei surselor sonore instrumentale

– în scopul realizării unor surse sonore artificiale capabile să reproducă caracteristicile celor naturale și totodată să inducă directivitatea sunetului, printr-un sistem de transductori (difuzoare) ce compun « imaginea de directivitate » a semnalelor prelucrate « prin sinteză aditivă » (în modul și în faza-filtrat), urmărindu-se efectele fizice și psiho-fizice ale fenomenului. S-au sintetizat astfel, cu puține surse sonore, « imagini de directivitate » fascinante prin noutatea și complexitatea lor. Așa cum subliniaza și cercetătorii de la IRCAM, aplicațiile studiului sunt numeroase : « *dincolo de simularea caracteristicilor spațiale ale instrumentelor pentru sunete pre-inregistrate sau pentru sunetelor de sinteză, acest procedeu de reproducere permite optimizarea directivității ansamblurilor de difuzoare, corectia ecoului în sistemele de teleconferință, controlul în timp real a orientării direcției în fluxurile sonore, precum și multe alte efecte* ». Un alt program deosebit de important în domeniul interacțiunii timp-real/spațializare este « Max/MSP - version 4.3.1 » (aplicabil atât pe « Mac » cât și pe « Windows XP » și disponibil la adresa <http://www.cycling74.com/products/download.html> ), utilizat de asemenea la IRCAM în combinație cu programele « AudioSculpt », « Modalys » și « Diphone », ce sunt axate pe analiză/sinteză sonoră.

## 6.) Configurarea Acusticii Instrumentale

Tot la IRCAM-Paris ([www.ircam.fr](http://www.ircam.fr) – proiect coordonat de Rene CAUSSE) – dar și la alte importante centre de cercetare acustică din U.S.A. , precum Bregman Electronic Music Studio/Dartmouth College (<http://eamusic.dartmouth.edu> – proiect coordonat de Charlie SULLIVAN) - s-au efectuat și o serie de experimente dedicate studierii funcționalității instrumentelor tradiționale (în scopul perfecționării lor prin « grefe acustice »), precum și realizării unor noi instrumente reale sau virtuale. Caracterul eterogen al domeniului organologic a impus inițierea unor cercetări fundamentale multidisciplinare (acustică, botanică, mecanică vibrațiilor, mecanică fluidelor), în colaborare cu instituții de specialitate. Un proiect important se referă la modelare fizică (« *physical modeling* ») a instrumentelor și a vocii – în această direcție continuându-se experimentele ce au condus, încă de acum două decenii, la stabilirea « algoritmului Karplus-Strong » (K.KARPLUS and A.STRONG - Digital Synthesis of Plucked-String and Drum Timbres, *Computer Music Journal*, 7(2), 1983. [bibtex-entry] <http://www.cmi.univ-mrs.fr/HASSIP/hassipbib/Author/KARPLUS-K.html> )

pentru unele instrumente cu corzi ciupite (chitară, banjo, koto) și de percuție, prin analizarea elementelor constitutive (sunet, vibrație, aer, coarda, etc.) și prin reconstituirea timbrelor originale cu ajutorul unor sisteme speciale (« building blocks »), bazate pe « delays », filtre, « feedbacks loops » și mai ales pe « buffers » (unități de memorie cu acces aleatoriu – tip RAM, ce acumulează și totodată eliberează permanent informații, într-un proces repetitiv generând – prin periodicitate - frecvențe sonore). S-au elaborat astfel, prin multiple analize și simulări, și alte esanțioane (« semnatuiri acustice ») caracteristice instrumentelor cu ancie simplă (clarinet, saxofon), cu ancie dublă (oboi, fagot), cu jet de aer (Blockflöte, flaut transversal, tub de orgă) și cu ancii libere (acordeon – în acest caz evidențiindu-se faptul că o mișcare sinusoidală a anciei poate genera un timbru foarte bogat, compus din peste 30 de armonice) ; în prezent la IRCAM sunt analizate sunetele pianului (studiindu-se diferențele observate în dubla-diminuare, între diferitele parțiale), precum și cele ale instrumentelor de coarde (în special în zona zgomotelor complementare produse prin contactul arcusului cu coarda). Rezultatele acestor atât de pertinente cercetări sunt ulterior implementate în programele originale (rulând pe sistemul de operare « MacIntosh ») « Resonans » și « Modalys-ER » (ex « Mosaïc ») – ultimul oferind o descriere uniformă a modelelor. Aplicațiile sunt multiple : de la cele mai tradiționale (ca de pildă notarea calității trompetelor), până la determinări ale raportului psiho-fizic în utilizarea unor instrumente tradiționale modificate parțial sau total, ca de pildă flautul cu sfert de ton și sisteme micro-intervalice, arcusul de vioară construit din materiale sintetice, Mundstück-ul cu volum variabil pentru clarinet (permițând schimbarea frecvenței în timp real), noul dispozitiv electronic de acordaj al timpanului sau surdina wawa pentru corn. În acest context trebuie subliniată și contribuția esențială adusă de compozitorul american Rodney OAKES (profesor emerit la Los Angeles Harbor College și fondator al « *Journal SEAMUS* ») în impunerea midtrombonului ca instrument de importanță majoră pentru creația muzicală live-electronică.

În paralel, la Institutul Internațional de Muzică Electroacustică de la Bourges – IMEB ([www.imeb.asso.fr](http://www.imeb.asso.fr) ) coordonat de Françoise BARRIERE și de Christian CLOZIER se utilizează în mod curent două instrumente digitale originale (atât în coordonată « hard », cât și în cea « soft »), deosebit de utile în plan pedagogic (« Cybersongosse 7 ») și interpretativ

(« Cybernophone 7 »). Referitor la sinteza vocala, mentionam cercetarile efectuate la Princeton University din U.S.A. de Perry R. COOK, ce s-au finalizat si prin programul de modelare fizica « SPASM singing voice software » (<http://www.cs.princeton.edu/~prc/NewWork.html> ) , precum si inovatiile in domeniul emisiei vocale prelucrate audio-numeric reliefate in creatiile realizate la prestigiosul « *Brooklyn College Center for Computer Music* » de compozitorul Robert VOISEY, director al societatii « *Vox Novus* » din New York

#### 7.) Alte domenii abordate la IRCAM (apud [www.ircam.fr](http://www.ircam.fr) )

- Cercetarea psihoacustica (Asociatia PECA, Coordonator Stephen McADAMS) – proiectele „Perceptia si memorizarea timbrului muzical“ (analiza parametrilor acustico-auditivi; perceptia proprietatilor fizice ale obiectelor sonore; caracterizarea verbala a timbrului muzical si a relatiilor dintre timbre); „Procesul organizarii auditive“ (organizarea simultana si cea secventiala); „Perceptia structurilor muzicale contemporane“ (perceptia inarmonicitatii in agregatele de inaltimi si a progresiei in secvente de agregate – cu Tristan MURAIL; evolutia atentiei in structuri cu straturi multiple - cu Antoine BONNET; relatia perceptiva intre micro- si macro-structuri in sunetele si secventele sintetizate – cu Marco STROPPA); programe originale: „PsiExp“ si „FTS“;
- Compozitia asistata de ordinator – CAO (Echipa „Representations Musicales“, Coordonator Gerard ASSAYAG) – activitate curenta: aplicatii ale programelor originale „PatchWork“, „Sympatos“ si „OpenMusic“ in cadrul „Forumului utilizatorilor“, implicand colaborari sistematice cu compozitori si muzicologi interesati in elaborarea unor proiecte avansate de informatica muzicala;
- Analiza/sinteza sonora (Echipa coordonata de Xavier RODET) – proiecte: „Sinteza aditiva“ (aplicarea algoritmului de sinteza „FFT-1“ in studiul anvelopei spectrale); „Sinteza sursa-filtru“ (producerea unor variate sunete instrumentale si detectarea inaltimii si analizei zgomotului complementar); „Sinteza SINOLA“ (bazata pe suprapunerea si juxtapunerea formelor elementare de unda, determinand modificarea inaltimii si a duratei sunetelor emise vocal – vorbit sau cantat); „Sinteza modelelor fizice“ (analizarea in timp real a modelelor matematice si informatice ale instrumentelor acustice din clasele clarinet, trompeta si voce; studiul oscilatiilor periodice si haotice); „Caracterizarea semnalelor sonore - diferite de cuvinte“ (extragerea parametrilor constitutivi, separarea de surse, segmentare, identificare si recunoastere, reprezentarile unor scene reale si ale sintezei intr-un limbaj hieratic legat in continut, prelucrari si transformari ale obiectelor sonore, codificarea selectiva a continutului); „Farinelli“ (fuziunea timbrelor – cu aplicatie la reconstituirea vocii celebrului cantaret castrat, pentru filmul realizat de Gerard CORBIAU); programe originale: „Super VP“, „AudioSculpt“, „Diphone Studio“, „Chant“ (sinteza granulara), „Xspect“.

#### 8.) Procedee de sinteza si transformare digitala a sunetului utilizate si in aplicatii camerale live-electronice

**NB** – Se disting 2 categorii de muzici live-electronice : cea pentru interpreti in timp real si banda electronica preinregistrata – numita si «*tape and instruments music*», precum si cea in care banda este inlocuita cu sunete electronice produse ad-hoc sau cu sunetele interpretilor prelucrate chiar in momentul producerii lor (asadar in timp real) - aceasta a doua categorie formand genul «*electronics and instruments music*». In muzica electro-acustica analoga se utilizau sisteme complexe de prelucrare (incluzand mai multe magnetofone, mixere, filtre, ring-modulatoare, amplificatoare, difuzoare – procedeele fiind exemplar analizate de Allen STRANGE in tratatul *Electronic Music. Systems, Techniques, and Controls*. WM.C.Brown Company Publishers, 1972, ISBN 0-697-03612-X, p.126-137). Tehnica digitala a inlocuit insa – cu rezultate acustice net superioare - aceste sisteme analoge prin programe si module specializate in sinteza si prelucrarea numerica a sunetului . Dat fiind faptul ca noile aplicatii sunt in plina evolutie, prezentarea de mai jos nu este (si nici nu ar putea fi !) exhaustiva, ea limitandu-se doar la unele dintre cele mai importante aspecte relevate pana la data elaborarii acestei lucrari – ce sunt expuse concentrat, dar cu trmiteri directe la principalele surse de informatie ce pot oferi celor interesati detalii suplimentare.

- a.) « *Phase Shifting* » - procesul sonor de tip « phasor » este dedus din « Teorema lui Fourier » (toate funcțiile periodice pot fi exprimate prin suma – până la Infinit – a sinusoidelor componente) și se bazează pe baleierea (« sweep ») uniformă și continuă (într-un « perpetuum mobile » ascendent-descendent) a părților (armonicilor) unui sunet, implicând trecerea semnalului inițial printr-o serie de filtre speciale (generând un « phase-lag » asemănător unui « time delay ») și suprapunerea semnalului astfel prelucrat cu semnalul original ; vor rezulta o serie de intersecții (« notches ») în spectrul tonal, determinate de filtrările combinate (« comb filter response »). Funcțiile principale de control în modulul « *MXR Phase 100* » sunt : (1) *Speed* (referitoare la viteza ratei « sweep » între limitele 0.1 – 10 Hz) și (2) *Intensity* (acționând - în patru poziții caracteristice - asupra celor două coordonate fundamentale ale procesului « phase shifting » - amplitudinea dimensiunii « sweep » și profunzimea dimensiunii « notch »).

- b.) « *The Phase Vocoder* » – prin analizarea/resintetizarea sunetului [conform « reprezentărilor Fourier » - DFT (« Discrete Fourier Transform »), FFT (« Fast Fourier Transform » – reprezentarea cea mai frecvent utilizată) și IFFT (« Inverse Fast Fourier Transform »)] se poate schimba atât înălțimea unui sunet fără a-i modifica lungimea (« pitch shifting »), cât și lungimea unui sunet fără a-i altera înălțimea (« time stretching »). Ambele tipuri de transformări pot fi operate cu ajutorul programului « Audacity 1.2.0-pre2 »: « pitch shifting » prin comenzile « Edit-Select-All » + « Effect-Change Pitch without Changing Tempo », iar « time stretching » prin comenzile « Edit-Select-All » + « Effect-Change Tempo without Changing Pitch ».

- c.) « *Convolution* » – convoluția reprezintă un caz particular de utilizare a « phase vocoder » prin realizarea unei « sinteze încrucișate » (« cross-synthesis ») implicând impunerea unei coordonate a unui sunet (numit « impulse response ») altui sunet. Reverberația digitală oferă un exemplu concludent de convoluție: rezonanța caracteristică a unei săli este înregistrată (formând un « impulse response ») și impusă unui alt sunet. Programul « Sound Forge » oferă posibilitatea unui astfel de proces prin comanda « Effects-Reverb » – specificându-se tipul de « impulse record » prin « Reverberation mode »: Rich hall, Wide open hall, Concert hall, Deep hall, Long hall, Warm ambience, Metal tank, etc. Prin convoluție pot fi însă generate și noi sunete, ca de pildă sinteza dintre zgomot și respirație – realizată cu programul « Soundhack » creat de Tom ERBE (*apud* BURK, Phil. POLANSKY, Larry. REPETTO, Douglas. ROBERTS, Mary. ROCKMORE, Dan. *Music and Computers – an interactive web-text.* (<http://eamusic.dartmouth.edu/~book/MATCpages/tableofcontents.html>)). Aceiași autori semnalează un aspect deosebit de interesant: reverberația simplă poate fi simulată și prin convoluția « zgomotului alb » (« whitenoise ») cu orice alt sunet.

- d.) « *Sampling* » – acest foarte popular procedeu (în special în genurile « rap », « dance » și « beat ») constă în selectarea unor mici esanțioane sonore din muzici pre-existente, sau în crearea unor esanțioane originale și în recontextualizarea lor prin mijloace digitale – cu eventuale modificări ale frecvențelor și ale duratelor inițiale. În acest sens au fost realizate - ca « hardware » - instrumente digitale specifice (« Samplers » și « Drum Machines »), iar în domeniul « software » au apărut, în principalele sisteme de operare (Windows, Mac și Linux) noi programe de tip « Digital Audio Workstations » -DAW (incluzând funcțiile: analog/digital-input/output, sound recording/editing/playback/multi-track mixer/amplifier, etc.) - ca de pildă « *Pro Tools* », « *Acid* », « *Cakewalk* », « *The Matk of the Unicorn-MOTU* » (cu « *FireWire interface* »), etc.

- e.) « *Localizare/Spatializare* » – Localizarea sursei sonore prin auzul « *cyclaural* » este determinată de mai mulți factori: intensitatea sunetului (ce este mai puternică la urechea mai apropiată de sursă), diferențele de percepție (« *Interaural Time Delay* »-ITD – aspect determinat de distanțele inegale dintre sursă și fiecare dintre urechi, marcate printr-o mică întârziere a percepției la urechea mai îndepărtată) și cele de frecvență (asa-numitele « Head Related Transfer Functions »-HRTF - generate de obstacolele fonice plasate pe traseul sonor, ce produc un efect de « low-pass filter » specific fiecărei urechi). În consecință, spatializarea sonoră poate fi simulată - în două dimensiuni - prin diferențierile de intensitate, ecou și filtraj dintre cele două canale audio (de pildă, localizarea sursei în partea stângă impune creșterea intensității pe canalul « Left » și totodată adăugarea unui mic ecou și filtrarea frecvențelor înalte pe canalul « Right »). În acest sens s-au efectuat experimente relevante cu « *Binaural Dummy Head Recording* » – o instalație de înregistrare ce reconstituie cutia craniană, având amplasate microfoanele în

orificiile auditive. Soluțiile descrise mai sus se pot aplica și într-o proiecție audio „3-D” (ce ia în considerare și coordonata verticală a percepției auditive). Multe dintre procedeele aplicate au fost utilizate și în „epoca analogă”, fiind pertinent descrise de Allan STRANGE în tratatul *Electronic Music. Systems, Techniques, and Controls*. WM.C.Brown Company Publishers, 1972, ISBN 0-697-03612-X, Cap. 9 “Location Modulation”, p.75-85).

- f.) „Prelucrări grafice” – operații ce determină convertirea imaginilor vizuale în imagini sonore, cu ajutorul unor instrumente și, respectiv, programe speciale: de la aparatul „Spectrogram” (creat de High LeCaine în 1950) și de la „UPIC” (sistem inventat de Iannis XENAKIS și utilizat la CEMAMu-Paris), până la aplicațiile software „MetaSynth”, „Hyperupic”, „SoundHack/QT-coder”, „AudioSculpt”, „Squiggy” (în „Mac”) și „MIDImage” (în „Windows”). Dintre toate acestea, „Squiggy” (creat Douglas REPETTO la renumitul „Darmouth College” din S.U.A.) este cel mai performant program „graphics-to-sound” având ca finalitate interpretările live-electronice.

- g.) „Sinteza aditivă” – conform „Teoremei lui Fourier” („toate funcțiile periodice pot fi exprimate prin sumă – până la Infinit – a sinusoidelor componente”), un sunet complex poate fi creat prin însumarea unor sunete simple – ca de pildă prin aditia de armonice, prin reconstruirea anvelopei ADSR (Attack-Decay-Sustain-Release), prin așa-numitul „Shepard Tone Effect” (bazat pe percepția „chroma” referitoare la circularitatea frecvențelor distantate la o octavă – adică înmultite cu 2), sau prin sinteza formantilor (adică a acelor frecvențe fixe, ireversibile ce definesc un anumit timbru vocal sau instrumental).

- h.) „Filtrări” – tratarea sunetelor cu filtre fixe (formand „filter bank”) și variabile – aceasta ultima categorie incluzând filtrele: „High-pass” (ce elimină frecvențele joase), „Low-pass” (ce elimină frecvențele înalte), „Band-pass” [ce selectează doar o anumită bandă de frecvențe, definită prin „bandwidth” – adică prin diferența dintre „cutoff frequencies” (cea mai înaltă și cea mai joasă frecvență la amplitudine maximă) – și prin „center frequency” (frecvența medie)] și „Band-reject” (ce elimină o anumită bandă de frecvențe). Prin „EO.Graphic Equalizers” (variind de obicei între – 10 și + 12 dB) se pot realiza amplificări și/sau atenuări ale mai multor benzi de frecvență. De asemenea, anumite situații sonore impun utilizarea filtrelor „Finite Impulse Response”-FIR (incluzând „delays” ale unor fragmente sonore anterioare) și „Infinite Impulse Response”-IIR (incluzând efectul „feedback”).

- i.) „Waveshaping” – operație constând în transformarea sunetelor simple în sunete complexe printr-o „funcție de transfer” [ $y = f(x)$ ] – ca de pildă în cazul transformării formei sinusoidale a unui sunet într-una triunghiulară. Funcția de transfer poate avea și configurația unui „Polynomial Chebyshev” – așa cum demonstrează și autorii admirabilului tratat „*Music and Computers – an interactive web-text*” (<http://eamusic.dartmouth.edu/~book/MATCpages/tableofcontents.html>).

- j.) „Modulația de Amplitudine” – „Amplitude Modulation” (AM) este un proces de prelucrare timbrală (analog unui efect de *tremolo*, implicând variații periodice ale volumului sonor), ce constă în modificarea amplitudinii semnalului sonor inițial (numit „carrier signal”) printr-un semnal de modulație (numit „modulating signal”) inducând – prin coordonatele sale de amplitudine, frecvență și formă („waveshape”) – nivelul, viteza și, respectiv, configurația („pattern”) modulației de amplitudine; amplitudinea sunetului inițial va deveni amplitudinea medie a sunetului modulat. De pildă, dintr-un sunet inițial („carrier signal” – pe care îl numim „x”) de 700 Hz sinus modulat în amplitudine cu un sunet („modulating signal” – pe care îl numim „y”) de 5 Hz sinus va rezulta un sunet sinus cu amplitudinea medie de 700 Hz și cu variații de amplitudine între 705 Hz ( $x + y$ ) și 695 Hz ( $x - y$ ), la o viteză de 5 cicluri/secundă. Dacă sunetul de modulație este de peste 20 Hz, viteza schimărilor va fi imperceptibilă în planul amplitudinii (volumului) – în această situație ea percepuându-se ca două noi frecvențe (numite „sidebands”) reprezentând suma ( $x + y$ ) și diferența

( $x - y$ ) dintre sunetul original și cel de modulație, ce se suprapun peste sunetul original.

Astfel, dacă  $x = 700$  Hz sinus și  $y = 20$  Hz sinus, vor rezulta 3 sunete cu frecvențele de 700 Hz sinus ( $x$ ), 720 Hz sinus ( $x + y$ ) și 680 Hz sinus ( $x - y$ ). În programul „*Sound Forge*” AM se realizează prin funcția „*Effects-Amplitude Modulation*”. [apud SCHRADER, Barry. *Introduction To Electro-Acoustic Music*. Published by Prentice-Hall, Inc., Englewood Cliffs, N.J. – p. 88-90;

STRANGE, Allen. *Electronic Music. Systems, Techniques, and Controls*. WM.C.Brown Company Publishers, 1972, ISBN 0-697-03612-X, p.9-11].

- k.) “Modulatia de Frecventa” - “Frequency Modulation” (FM) este de asemenea un proces de prelucrare timbrala (dar analog unui efect de *vibrato*, implicand varieri periodice ale inaltimii sonore), ce consta in modificarea frecventei semnalului sonor initial (numit “carrier signal”) printr-un semnal de modulat (numit “modulating signal”) inducand - prin coordonatele sale de amplitudine, frecventa si forma (“wveshape”) – nivelul, viteza si, respectiv, configuratia (“pattern”) modulatiei de frecventa; frecventa sunetului initial va deveni frecventa medie a sunetului modulat. Procesul FM este asemanator cu procesul AM – primul actionand in planul frecventei sonore (adica al inaltimei), iar cel de al doilea in planul amplitudinii sonore (adica al volumului). Ca si in AM, o modulat de frecventa cu un sunet de modulat de peste 20 Hz va produce doua noi frecvente (“sidebands”) reprezentand suma ( $x + y$ ) si diferenta ( $x - y$ ) dintre sunetul original si cel de modulat, ce se suprapun peste sunetul original. In plus, in FM, “peak frequency deviation” ilustreaza o functie a amplitudinii semnalului modulat in frecventa si indica diferenta dintre maxima/minima sunetului modulat si sunetul initial (de pilda, avand un “carrier signal” de 700 Hz, ce este modulat in sus la 900 Hz si in jos la 500 Hz, valoarea “peak frequency deviation” va fi de 200 Hz). In programul “Sound Forge” FM se realizeaza prin functia “Tools-Synthesis-FM”. Tot in acest domeniu, se remarca si faptul ca frecventele emise sub pragul auditiv uman inferior (de 20 Hz) sunt percepute ca durate – acest fenomen deschizand perspectivele unor interesante transformari ale coordonatelor “spatiu sonor” si “timp muzical”, cu aplicatii directe in practica componistica - asa cum am demonstrat in studiul meu *“Mistica lui Debussy si revelatia universului supratonal”* [ Revista "Muzica" Nr.3/1999, Bucuresti (pag.61-72)]. In sfarsit, “Ring Modulation” reprezinta un caz particular de FM si consta in realizarea sumei si a diferentei dintre doua frecvente cu ajutorul unui aparat (initial analog) numit “Ring Modulator”; acest efect a fost insa transpus si in mediul digital (de pilda in programul “Csound” dezvoltat de Barry VERCOE la MIT). [apud SCHRADER, Barry. *Introduction To Electro-Acoustic Music*. Published by Prentice-Hall, Inc., Englewood Cliffs, N.J. – p.50-51 si 90-92; CHOWNING, John M. *The Synthesis of the Complex Audio Spectra by Means of Frequency Modulation*. in *Journal of the Audio Engineering Society*, vol.21,no.7 (1973); STRANGE, Allen. *Electronic Music. Systems, Techniques, and Controls*. WM.C.Brown Company Publishers, 1972, ISBN 0-697-03612-X, p.12-20; BURK, Phil. POLANSKY, Larry. REPETTO, Douglas. ROBERTS, Mary. ROCKMORE, Dan. *Music and Computers – an interactive web-text*. (<http://eamusic.dartmouth.edu/~book/MATCpages/tableofcontents.html> )].

- l.) “Morphing” – preluat din artele vizuale (domeniu in care “anamorfoza” reprezinta o tehnica descoperita inca din antichitate), acest procedeu de transformare a unei imagini in alta - aparent total diferita de prima - a fost aplicat pentru prima data in arta sunetelor in 1976, in Cvartetul meu de Coarde “Anamorphose” [© 1977 by Edition Modern München – Germany], ce a fost distins cu Premiul I la Concursul International de Compozitie “GAUDEAMUS” din Olanda (1977). Ulterior, in studiul “Anamorfoza Sonora” (publicat in revista “Muzica”-Bucuresti, Nr.6/Iunie 1985, p.18-21) - pe care l-am prezentat de asemenea in conferintele sustinute la “Cursurile Internationale de Muzica Noua” de la Darmstadt-Germania (1980), precum si la Michigan University-USA (1982) – am aratat ca “doua (sau mai multe) structuri muzicale aparent disjuncte pot coexista functional, fara a constitui un colaj, daca raspund conditiei de a avea cel putin un element constitutiv comun. Astfel, intre multimile sonore A, A' si B, avand proprietatile: A intersectat cu B = 0, si A intersectat cu A' = diferit de 0, se poate exprima relatia de colaj prin  $A > A'$  si cea de anamorfoza prin  $A < B$ .” Ulterior, in studiul “Anamorfozele Timpului Muzical” (publicat in revista “Muzica”-Bucuresti, Nr.3/1991, p.100-107), precum si in tratatul “MUSICA CAELESTIS – Anamorfozele Sacralului in Arta Sunetelor” (Editura UNMB, 2000, ISBN 973-0-02102-3), am dezvoltat cercetarea muzicologica in acest domeniu aplicat, de altfel, in majoritatea creatiilor mele componistice (de pilda, in opera “Domnisoara Christina” (1981), conceputa dupa un libret de Mircea ELIADE, in care am extins utilizarea tehnicii anamorfotice din domeniul sonor in cel multi-media. In prezent, posibilitatile practic nelimitate ale sistemelor digitale au determinat aparitia unor programe specializate in anamorfoza muzicala / “music morphing”, precum “Diphone” (promovat la IRCAM-Paris, [www.ircam.fr](http://www.ircam.fr) ), “Cendroid” (creat, in baza programului “SoundHack”, de compozitorii Douglas I. REPETTO si Larry POLANSKY de la Dartmouth College - Bregman Electronic Music Studio <http://music.dartmouth.edu/~douglas/cendroid.sit.hqx> ) si de “PROSONIQ morph VST PC – Realtime

**Audio Morphing Plugin** (<http://products.soniq.com> ), **“Voicechanger Software”** ([www.voicechanger.biz](http://www.voicechanger.biz) ) si deja mentionatul **“crusherX”** ([www.crusher-x.de](http://www.crusher-x.de) – ce poate fi descarcat la adresa : [www.stelkens.de/bs/download](http://www.stelkens.de/bs/download) ). Practic, exista doua modalitati de realizare a efectului **“morphing”** in arta sunetelor: prin substitutie (sau **“replacement morph”**), adica prin inlocuirea treptata a fiecarui sunet din prima imagine cu un sunet din imaginea a doua si prin interpolare (sau **“interpolation morph”**), adica prin compararea/definirea valorilor specifice celor doua imagini si prin intercalarea unei imagini intermediare, ce este bazata pe elementele comune ale imaginilor principale). Toate aceste aspecte expuse in Capitolul 5.6 “Morphing” din recentul tratat *Music and Computers – an interactive web-text* (2003 – <http://eamusic.dartmouth.edu/~book/> ) reprezinta de fapt o confirmare – formulata in baza cercetarilor efectuate cu mijloace tehnice de ultima ora - a teoriei anamorfozei sonore, definite si aplicate intuitiv de mine incepand din anul 1976.

- m.) **“Sinteza granulara”** – **“Granular Synthesis”** se refera la procedee specifice de generare a “norilor de sunete” (“sound clouds”), ca elemente de natura stochastica introduse in limbajul muzical contemporan inca din 1971 de catre marele compozitor grec Iannis XENAKIS (nascut in Romania si stabilit in Franta). Aceste complexe imagini sonore globale sunt alcatuite din multimi – sau **“regiuni schimbatoare de energie sonora” (“shifting regions of sound energy”)** - cuprinzand mii de sunete (de obicei sinusoidale, ce pot fi insa si **“sampled sounds”**) extrem de scurte (cu durate mai mici de 100 de milisecunde), ce isi metamorfozeaza permanent configuratiile de frecventa si amplitudine – comportandu-se (conform principiilor probabilistice) ca niste picaturi de ploaie, transformabile (in anumite conditii meteorologice) in fulgi de zapada... La randul lor, **“norii de sunete”** (proveniti, de pilda, atat de la un ansamblu cameral, cat si de la un computer) se pot intersecta, generand noi fenomene sonore absolut inedite! Cercetarile lui Iannis XENAKIS au fost dezvoltate si de compozitorul canadian Barry TRUAX, ce a elaborat, in 1986, un sistem in real-time (PODX, realizat la Simon Fraser University). Actualmente sunt aplicate o serie de programe speciale, precum **“Chant”** (utilizat, in sistem **“Mac”**, la IRCAM-Paris, [www.ircam.fr](http://www.ircam.fr) ), **“KTGranulator”** ([www.smartelectronix.com/~koen](http://www.smartelectronix.com/~koen) ) si **“crusherX”** ([www.crusher-x.de](http://www.crusher-x.de) ) – ultimul avand, pe langa functia de **“vapor synthesis”**, si pe aceea de **“morphing system”**.

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49  
**PASTORALE**  
**for clarinet and piano**  
**(2003)**

Dedicated to  
Hans de Jong and  
Paul Hermesen

Liana Alexandra

$\text{♩} = 70$  Moderato      2 SCORE IN C      3      4      5      6

sempre 8va sopra

pp sempre

sempre 8va bassa

7 8 9 10 11 12

p mp p

p sempre

13 14 15 16

p mp mf p

p sempre

tremolo

Measures 17 and 18 of a musical score. Measure 17 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. Measure 18 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. The dynamic *mp* is marked in measure 17, and *mf* is marked in measure 18. The instruction *mp sempre* is written below the bass staff in measure 18.

Measures 19, 20, and 21 of a musical score. Measure 19 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. Measure 20 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. Measure 21 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. The dynamic *mf* is marked in measure 19, and *f* is marked in measure 21. The instruction *mf sempre* is written below the bass staff in measure 21.

Measures 22, 23, 24, and 25 of a musical score. Measure 22 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. Measure 23 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. Measure 24 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. Measure 25 features a treble staff with a melody of eighth notes and a bass staff with a single eighth note. The dynamic *f* is marked in measure 22, *ff* in measure 23, and *mp* in measure 24. The instruction *p* is marked in measure 25.

Measures 26-28 of a musical score. Measure 26 features a treble clef with a melodic line and a bass clef with a triplet of eighth notes. Measure 27 continues the melodic line in the treble and the triplet in the bass. Measure 28 shows a continuation of the melodic line in the treble and the triplet in the bass.

Measures 29-30 of a musical score. Measure 29 features a treble clef with a melodic line and a bass clef with a triplet of eighth notes. Measure 30 continues the melodic line in the treble and the triplet in the bass.

Measures 31-34 of a musical score. Measure 31 features a treble clef with a melodic line and a bass clef with a triplet of eighth notes. Measure 32 continues the melodic line in the treble and the triplet in the bass. Measure 33 shows a continuation of the melodic line in the treble and the triplet in the bass. Measure 34 continues the melodic line in the treble and the triplet in the bass.

musical score for "The Rose Tree" in G major, 3/4 time. The score is for voice and piano. The voice part consists of a single line with a treble clef. The piano accompaniment consists of two staves: a right hand with a treble clef and a left hand with a bass clef. The key signature has one sharp (F#). The time signature is 3/4. The score is divided into three measures. Measure 1 (32) features a vocal melody starting on G4, followed by a half note F#4, and a quarter note E4. The piano accompaniment in the right hand has a half note G4 and a half note F#4. The left hand has a quarter note G3, a quarter note F#3, and a quarter note E3. Measure 2 (33) features a vocal melody starting on G4, followed by a half note F#4, and a quarter note E4. The piano accompaniment in the right hand has a half note G4 and a half note F#4. The left hand has a quarter note G3, a quarter note F#3, and a quarter note E3. Measure 3 (34) features a vocal melody starting on G4, followed by a half note F#4, and a quarter note E4. The piano accompaniment in the right hand has a half note G4 and a half note F#4. The left hand has a quarter note G3, a quarter note F#3, and a quarter note E3. The score includes a "tremolo" marking above the first measure of the piano accompaniment. The score is labeled "32", "33", and "34" above the first, second, and third measures respectively.

staccato

35 5 3 36 37

f sempre

f sempre

40 41

42 43

44 45 *rullato* 46 47

*mf* *f* *f* *ff* *f* *mf* *mp* *f*

8va sopra

p sempre

sempre sempre al misura 67

48 49 50 51 52 53

8va sopra

mp mf

mp sempre

8va bassa

54 55 56

f mp mf sempre

mf sempre

Red.

57 58 59

mf sempre

8va bassa

60 8va alta *f* *pp*

61 8va bassa

62 *p* 3 3

63 *mp* 8va sopra

64 locco 8va sopra

65 3

66 3

67 *mp* *mf*

68 *f* *ff*

Red.

Detailed description: The musical score is for piano and voice. It consists of three systems of staves. The first system (measures 60-61) features a treble staff with a melodic line and a piano accompaniment in the bass staff. Measure 60 has a melodic line starting with a slur and a triplet of eighth notes. Measure 61 continues the melodic line. The second system (measures 62-65) shows the piano part with triplets and the voice part with various dynamics and octave markings. Measure 62 has a piano part with a triplet and a voice part with a piano dynamic. Measure 63 has a piano part with a triplet and a voice part with a mezzo-piano dynamic and an octave marking. Measure 64 has a piano part with a triplet and a voice part with a mezzo-piano dynamic and an octave marking. Measure 65 has a piano part with a triplet and a voice part with a mezzo-piano dynamic and an octave marking. The third system (measures 66-68) shows the piano part with triplets and the voice part with various dynamics and octave markings. Measure 66 has a piano part with a triplet and a voice part with a piano dynamic. Measure 67 has a piano part with a triplet and a voice part with a mezzo-piano dynamic. Measure 68 has a piano part with a triplet and a voice part with a forte dynamic. The score includes various musical notations such as slurs, triplets, and dynamics.



musical score for measures 69-78, featuring piano and violin parts. The score includes dynamic markings (*mp*, *mf*, *f*, *ff*) and tremolo instructions. The piano part consists of a continuous tremolo accompaniment in the right hand and a bass line in the left hand. The violin part features melodic lines with various articulations and dynamics.

Measures 69-72: Tremolo accompaniment in the piano right hand. Violin part has melodic lines with dynamics *mp*, *mf*, *f*, and *ff*. Measure 70 includes a *red.* (ritardando) marking in the piano left hand.

Measures 73-75: Violin part has a melodic line with a *h* (hairpin) marking. Piano part continues with tremolo accompaniment. Measure 74 includes a *6* (sixteenth notes) marking in the piano right hand.

Measures 76-78: Violin part has melodic lines with dynamics *mp* and *mf*. Piano part continues with tremolo accompaniment. Measure 77 includes a *mp* marking in the piano right hand.

79 80 81

*f* *mf* *mp* *p* *pp*

*mf* *mp* *mp*

*ped.* *ped.* *ped.*

82 83

*pp*

*p*

*3* *3*

84 85

*mp* *p* *mp*

*3* *3* *3* *3*

*mf*

*ped sempre*

86

*mf*

*mf*

3

3

3

3

87

*mf*

*mp*

*mp*

*mf*

*mp*

[illegible]

59

Measures 59-60. Treble clef: Measure 59 starts with a half note G4 (mf), followed by a half note F#4, then a half note E4. Measure 60 starts with a half note D4 (f), followed by a half note C4, then a half note B3. Bass clef: Measure 59 has a half note G3 (mp), followed by a half note F#3, then a half note E3. Measure 60 has a half note D3, followed by a half note C3, then a half note B2. Fingerings: 6, 5, 3 in the treble; 3, 3, 3 in the bass.

90

Measures 90-91. Treble clef: Measure 90 starts with a half note G4 (mf), followed by a half note F#4, then a half note E4. Measure 91 starts with a half note D4 (mf), followed by a half note C4, then a half note B3. Bass clef: Measure 90 has a half note G3 (mf), followed by a half note F#3, then a half note E3. Measure 91 has a half note D3, followed by a half note C3, then a half note B2. Fingerings: 6, 5, 6 in the treble; 3, 3, 3 in the bass. Dynamics: mf, mf, f, ff, ff. Pedal: ped. sempre.

92

Measures 92-93. Treble clef: Measure 92 starts with a half note G4 (f), followed by a half note F#4, then a half note E4. Measure 93 starts with a half note D4 (mp), followed by a half note C4, then a half note B3. Bass clef: Measure 92 has a half note G3 (mf), followed by a half note F#3, then a half note E3. Measure 93 has a half note D3, followed by a half note C3, then a half note B2. Fingerings: 3, 3, 3 in the treble; 3, 3, 3 in the bass. Dynamics: f, mp, p. Pedal: mp.

94

*mp*

3

3

*mp*

95

3

3

6

6

96

3

3

*mf*

*mp*

97

3

3

6

5

3

*mf*

*mp*

3

3

3

Measures 98-100 of a musical score. Measure 98 features a treble clef staff with a melody starting on a whole rest, followed by a triplet of eighth notes (G4, A4, B4) marked with a *mf* dynamic. The piano accompaniment consists of a steady eighth-note triplet in the bass clef. Measure 99 continues the melody with a triplet of eighth notes (B4, C5, D5) marked with a *mp* dynamic. The piano accompaniment includes a triplet of eighth notes in the bass clef and a triplet of sixteenth notes in the treble clef. Measure 100 shows the melody with a triplet of eighth notes (D5, E5, F5) marked with a *mp* dynamic. The piano accompaniment features a triplet of eighth notes in the bass clef and a triplet of sixteenth notes in the treble clef.

Measures 101-103 of a musical score. Measure 101 features a treble clef staff with a melody starting on a whole rest, followed by a triplet of eighth notes (G4, A4, B4) marked with a *p* dynamic. The piano accompaniment consists of a steady eighth-note triplet in the bass clef. Measure 102 continues the melody with a triplet of eighth notes (B4, C5, D5) marked with a *mf* dynamic. The piano accompaniment includes a triplet of eighth notes in the bass clef and a triplet of sixteenth notes in the treble clef. Measure 103 shows the melody with a triplet of eighth notes (D5, E5, F5) marked with a *mf* dynamic. The piano accompaniment features a triplet of eighth notes in the bass clef and a triplet of sixteenth notes in the treble clef.

Measures 104-106 of a musical score. Measure 104 features a treble clef staff with a melody starting on a whole rest, followed by a triplet of eighth notes (G4, A4, B4) marked with a *mf* dynamic. The piano accompaniment consists of a steady eighth-note triplet in the bass clef. Measure 105 continues the melody with a triplet of eighth notes (B4, C5, D5) marked with a *mf* dynamic. The piano accompaniment includes a triplet of eighth notes in the bass clef and a triplet of sixteenth notes in the treble clef. Measure 106 shows the melody with a triplet of eighth notes (D5, E5, F5) marked with a *mf* dynamic. The piano accompaniment features a triplet of eighth notes in the bass clef and a triplet of sixteenth notes in the treble clef.

102 *mf* *f* *ff*

103 *f* *ff*

104 *mf* *f*

105

106 *ff*

6 5

6

The musical score is written for piano on three systems. The first system contains measures 102 and 103. Measure 102 features a melody in the right hand starting on a whole note, with a triplet of eighth notes in the next measure. The left hand provides a harmonic accompaniment with chords and single notes. Measure 103 continues the melody, ending with a triplet of eighth notes. The second system contains measures 104 and 105. Measure 104 has a similar melodic structure to 102. Measure 105 continues the melody. The third system contains measure 106, which is more complex, featuring a rapid sixteenth-note melody in the right hand and a more active bass line in the left hand. Dynamic markings include *mf* (mezzo-forte), *f* (forte), and *ff* (fortissimo). Fingerings are indicated by numbers 1-5. Articulation marks like slurs and accents are present.

107 *mf* *f* *mf*

108 *f* tremolo *mf* *f* *mf*

109 *f* *mf*

110 *9* repeat simile

Detailed description: This page contains a musical score for piano, measures 107 through 110. The score is written for a grand piano with a treble and bass staff. Measure 107 features a treble staff with a 7-measure melodic phrase and a bass staff with a 7-measure accompaniment. Measure 108 is divided into two parts: the first part has a treble staff with a 6-measure melodic phrase and a bass staff with a 6-measure accompaniment, and the second part has a treble staff with a 6-measure melodic phrase and a bass staff with a 6-measure accompaniment. Measure 109 is divided into two parts: the first part has a treble staff with a 6-measure melodic phrase and a bass staff with a 6-measure accompaniment, and the second part has a treble staff with a 6-measure melodic phrase and a bass staff with a 6-measure accompaniment. Measure 110 features a treble staff with a 9-measure melodic phrase and a bass staff with a 9-measure accompaniment. The score includes various musical notations such as notes, rests, and dynamic markings.



111 6 6 6 6

9 repeat simile

*mf*

*mf* *mp*

3 3

112 113 staccato

tremolo *ff*

*f* sempre

6 6

6 6

114 115 staccato

*mp*

9

*mf* sempre

3 3

115 staccato

mf sempre  
repeat simile

mp

116 6 6 6 117 6 6 6

mp tremolo f mp tremolo f

mp sempre mp mf

118 ff sempre

mf sempre

3 3

119

*ff* sempre

*mf* sempre

120

*f* sempre

*mf*

simile

121

tremolo

*f*

*ff*

*mf*

*f*

122

ff sempre

9 repeat simile

Detailed description: This system contains measures 122 and 123. Measure 122 features a treble clef with a single note, and a piano part with a series of chords marked with a '6' and a '9' measure rest. Measure 123 continues the piano part with more chords. The piano part is marked 'ff' and 'sempre'.

123

9 repeat simile

Detailed description: This system contains measures 123 and 124. Measure 123 features a treble clef with a single note, and a piano part with a series of chords marked with a '6' and a '9' measure rest. Measure 124 continues the piano part with more chords. The piano part is marked '9' and 'repeat simile'.

124

ff sempre

9 repeat simile

Detailed description: This system contains measures 124 and 125. Measure 124 features a treble clef with a single note, and a piano part with a series of chords marked with a '6' and a '9' measure rest. Measure 125 continues the piano part with more chords. The piano part is marked 'ff' and 'sempre'.

Measures 125-126. Treble clef: Measure 125 has a half note G4 with a *ff* dynamic and a slur over measures 125-126. Measure 126 has a half note A4 with a *f* dynamic. Bass clef: Measure 125 has a half note G2 with a *ff* dynamic and a slur over measures 125-126. Measure 126 has a half note A2 with a *f* dynamic. The right hand has a 3-measure rest in measure 125 and a 3-measure rest in measure 126. The left hand has a 9-measure rest in measure 125 and a 9-measure rest in measure 126. The text "repeat simile" is written below the bass clef.

Measures 127-128. Treble clef: Measure 127 has a half note G4 with a *f* dynamic and a slur over measures 127-128. Measure 128 has a half note A4 with a *f* dynamic. Bass clef: Measure 127 has a half note G2 with a *ff* dynamic and a slur over measures 127-128. Measure 128 has a half note A2 with a *ff* dynamic. The right hand has a 5-measure rest in measure 127 and a 5-measure rest in measure 128. The left hand has a 9-measure rest in measure 127 and a 9-measure rest in measure 128. The text "repeat simile" is written below the bass clef.

Measures 129-130. Treble clef: Measure 129 has a half note G4 with a *f* dynamic and a slur over measures 129-130. Measure 130 has a half note A4 with a *f* dynamic. Bass clef: Measure 129 has a half note G2 with a *mf* dynamic and a slur over measures 129-130. Measure 130 has a half note A2 with a *f* dynamic. The right hand has a 6-measure rest in measure 129 and a 6-measure rest in measure 130. The left hand has a 9-measure rest in measure 129 and a 9-measure rest in measure 130. The text "repeat simile" is written below the bass clef.

128

*mf*

*mf* sempre

6 6

9 9 repeat simile

129

*mf*

*mf*

9 9 repeat simile

130

*mf*

*mf* sempre

5 5 5 5

9 9 repeat simile

131

*mf* *f*

*mf* sempre

9 9 9 simile

132

*mf* *mf*

*mf* sempre

9 9 9 simile

tremolo

133

*mp* *mf*

5 5 5 5

9 9 repeat simile

8va bassa

134

*mp*

*mp*

8va bassa

3

5

5

9

9

repeat simile

135

*mp*

*mp*

6

6

9

9

repeat simile

136

*mp*

*p*

6

9

9

repeat simile



137

*pp*

*pp*

9

8va bassa

138

*pp* sempre

*pp* sempre

9

8va bassa

139

*pp* sempre

9

8va bassa

140

*pp* sempre

*pp* sempre

9

8va bassa

141

*pp* sempre

9

142

143

144

145

146

147

*pp* sempre

9

8va bassa

*ppp* sempre

8va bassa

sempre al fine

*pp* sempre

8va bassa

Musical score for measures 148 to 155. The score is written for a single melodic line on a treble clef staff. The key signature has one flat (B-flat). The tempo is marked 'Allegretto'.

Measures 148-155:

- 148: *ppp* (pianississimo), quarter note G4, quarter note A4.
- 149: *mp* (mezzo-piano), quarter note B4, quarter note C5.
- 150: *p* (piano), quarter note D5, quarter note E5.
- 151: *ppp*, quarter note F5, quarter note G5.
- 152: *mp*, quarter note A5, quarter note B5.
- 153: *pp* (pianissimo), quarter note C6, quarter note D6.
- 154: *ppp*, quarter note E6, quarter note F6.
- 155: *ppp*, quarter note G6, quarter note A6.

Musical score for measures 156 to 163. The score is written for a single melodic line on a treble clef staff. The key signature has one flat (B-flat). The tempo is marked 'Allegretto'.

Measures 156-163:

- 156: *ppp*, quarter note B5, quarter note C6.
- 157: *ppp*, quarter note D6, quarter note E6.
- 158: *ppp*, quarter note F6, quarter note G6.
- 159: *ppp*, quarter note A6, quarter note B6.
- 160: *ppp*, quarter note C7, quarter note D7.
- 161: *ppp*, quarter note E7, quarter note F7.
- 162: *ppp*, quarter note G7, quarter note A7.
- 163: *ppp*, quarter note B7, quarter note C8.

## SUMMER MEMORIES

## MEMORIA VERII

Poem by LEON VOLOVICI

*„Eretz, al tehasi et damam...”*

Pe toți i-am putea uita  
 Dacă aerul înmiresmat al verii  
 n-ar fremăta de glasurile lor răscolite de spaimă,  
 dacă zidurile înnegrite ale caselor  
 n-ar păstra umbrele lor hăituite  
 și pietrele drumului – pașii lor precipitați și șovăitori,  
 dacă frunzele copacilor lucind de rouă  
 n-ar răstrânge privirile lor blânde și întrebătoare,  
 dacă cerul înalt al nopților de iunie  
 nu s-ar bolti de strigăte sacre și fără nădejde.

În rotirea fără sfârșit a anotimpurilor,  
 fiecare vară  
 va avea câteva zile și câteva nopți  
 monstruos de frumoase și de nepăsătoare,  
 când vom alerga bezmetici pe străzi,  
 înnebuniți de respirația de gheață a vânătorilor de oameni,  
 când vom blestema soarele și căldura delirantă a amiezii,  
 parfumul sufocant și buimac al florilor,  
 când închipuirea incendiată de sete  
 ne va tortura cu nălucirea apelor de munte.

În fiecare vară, în aceeași zi,  
 plânsul îndurerat al copiilor  
 ne va sfredeli creierul  
 și ne va copleși sufletul de vinovăția lumii...  
 în fiecare vară, în aceeași noapte,  
 sub lumina halucinantă a lunii,  
 sângele lor va mai înfiora firele de iarba,  
 iar bătrânul acela va reveni la marginea padurii  
 să caute trupul fiului său  
 și glasul lui va răsuna, liniștit și grav,  
 îngânând un cântec străvechi de îngropăciune...  
*„Eretz, al tehasi et damam...”*

To the Martyrs of the Jassy Pogrom, 1941

**SUMMER MEMORIES (MEMORIA VERII)**

for Soprano and Piano

GRAVE

Poem by LEON VOLOVICI  
Music by SERBAN NICHIFOR

*Rubato, Quasi Improvisando*

$\text{♩} = 60$

*mf*

E retz al te ha si et da

*mp*

6

*mp*

mam E retz

10

al te ha si et da mam

Pno

♩ = 60

(6)

14

Pno

21

Piano score for measures 21-27. The score is written for piano (Pno) and features a treble and bass staff. The key signature is one flat (B-flat). The melody in the treble staff consists of eighth and quarter notes, while the bass staff provides a harmonic accompaniment with chords and moving lines. The measures are numbered 21 through 27.

28

Piano score for measures 28-33. The score is written for piano (Pno) and features a treble and bass staff. The key signature is one flat (B-flat). The melody in the treble staff includes some complex figures with ties and slurs, while the bass staff continues the accompaniment. The measures are numbered 28 through 33.

34

Handwritten musical score for measures 34-37. The system includes a treble clef staff, a grand staff (treble and bass clefs), and a piano (Pno) label. Measure 34 is empty. Measure 35 features a piano introduction with a 7-measure phrase in the right hand and a 3-measure phrase in the left hand. Measure 36 continues the piano introduction with a 9-measure phrase in the right hand and a 3-measure phrase in the left hand. Measure 37 concludes the piano introduction with a 7-measure phrase in the right hand and a 3-measure phrase in the left hand.

38

Handwritten musical score for measures 38-41. The system includes a treble clef staff, a grand staff (treble and bass clefs), and a piano (Pno) label. Measure 38 features a piano introduction with a 7-measure phrase in the right hand and a 3-measure phrase in the left hand. Measure 39 continues the piano introduction with a 9-measure phrase in the right hand and a 3-measure phrase in the left hand. Measure 40 concludes the piano introduction with a 7-measure phrase in the right hand and a 3-measure phrase in the left hand. Measure 41 features a piano introduction with a 7-measure phrase in the right hand and a 3-measure phrase in the left hand.



46

Pno

55

Pno

61  $\text{♩} = 60$

Pe toti i am pu-tea ui-ta Da ca a-e-rul in-

Pno

65 //

- mi - res - matal ve-rii n'ar fre - ma-ta de glasu-ni-le lor ras co - li-te de spai ma, da-ca

Pno

69

zi - du-ni-le in-ne - gri-te a-le ca-se - lor n'ar pas - tra um - bre le lor hai tu -

Pno

73

- i - te si pie - tre-le dru - mu - lui, pa-sii lor pre ci-pi - tati si so-va-i - tori

Pno

78

Da - ca frunze - le co - pa-ci - lor lu-cind de ro-ua

Pno

84

n'ar ras - fran - ge Pri-vi-ri-le lor blan-de si in - tre ba - toa re Da - ca ce - nul i

Pno

89

nalt al nop ti lor de iu ni e nu s'ar - bol ti de stri ga te sa cre si

Pno

92

fa ra na dej de

Pno

$\text{♩} = 64$

*ff*

94

94

Piano score for measures 94 and 95. The score is written for piano (Pno) and features a treble and bass staff. Measure 94 contains a series of chords in the right hand, with a '4' indicating a four-measure rest. Measure 95 continues the chordal texture. The bass staff features a triplet of eighth notes in measure 94 and a series of chords in measure 95. The label 'Pno' is positioned to the left of the piano part.

96

96

Piano score for measures 96 and 97. The score is written for piano (Pno) and features a treble and bass staff. Measure 96 contains a series of chords in the right hand, with a '4' indicating a four-measure rest. Measure 97 continues the chordal texture. The bass staff features a series of chords in measure 96 and a series of chords in measure 97. The label 'Pno' is positioned to the left of the piano part.

98

*ff*

*fff*

Pno

5/4

100 ♩ = 56 Sub. Lontano

*mp*

Pno

5/4

Dolce, quasi mormorando

104

In ro ti re a fa ra de sfar sit a a no tim pu ri lor fi e ca re va ra va a vea ca te va zi le si ca te va

Pno

106

nopti mon struos de fru moa se si de ne pa sa toa re

Pno



108  $\text{♩} = 140$  Sub. Agitato glissando

Cand vom alerga bezmetici pe strazi,

Pno

109

innebuniti de respiratia de gheata a vanatorilor de oameni,

Pno

110

cand vom blestama soarele si caldura deliranta a amiezii,

Pno

111

parfumul sufocant si buimac al florilor,

cand inchipuirea incendiata de sete

Pno

(simile)



113  $\text{♩} = 60$  Sub. Tempo I

ne va tortura cu nalucirea apelor de munte

Pno

*mf*

*mp*

Detailed description: This system contains measures 113, 114, and 115. Measure 113 features a vocal line with a triplet of eighth notes (F#, G, A) and a piano accompaniment. Measures 114 and 115 continue the piano accompaniment with various dynamics and articulations. The piano part includes triplets and slurs. Dynamics include *mf* and *mp*.

116

Pno

*mp*

Detailed description: This system contains measures 116, 117, and 118. Measure 116 features a piano accompaniment. Measures 117 and 118 continue the piano accompaniment with triplets and slurs. The piano part includes triplets and slurs. Dynamics include *mp*.

120

In fi e care va ra i a ce easizi plan sul

Pno

124

in dure rat al co pi i lor ne va sfrede li cre ie rul si ne va co plesi su fle tul

Pno

127

de vi no va ti a lu mii in fi e ca re va ra in a ce easi noap te sub lu mi na

Pno

130

ha lu ci nan ta a lu niu san ge le lor san ge le

Pno

132

lor va mai in fio ra fi re le de iar ba

Pno

I. v.

I. v.

137 *p*

iar ba tra nul a ce la va re ve ni la margi nea pa du ri sa ca u te tru pul

Pno

140

fi u lui sau si gla sul lui va ra su na li nis tit si grav in ga nand un can tec stra

Pno

145

vechi de in gro pa ciu ne

Pno

150  $\text{♩} = 60$

*p*

E retz al te ha si et da mam E retz al te ha si et da mam

*pp*

*pp*

154 *mp*

E retz al te ha si et da mam E retz al te ha si et da mam

*p*

*p*

The musical score is for a piano and voice piece. It consists of two systems of music, measures 150-154. The key signature has one flat (B-flat), and the time signature is 4/4. The tempo is marked as 60 beats per minute. The vocal line is in the upper staff, and the piano accompaniment is in the lower staff. The lyrics are 'E retz al te ha si et da mam'. The piano part includes triplets and dynamic markings like pp, p, and mp.



158  $\text{♩} = 64$

E retz al te ha si et da mam E retz al te ha si et da mam

Pno

162  $\text{♩} = 62$   $\text{♩} = 60$   $\text{♩} = 100$

E retz al te ha si et da mam

Pno

*p*

165  $\text{♩} = 110$   $\text{♩} = 120$   $\text{♩} = 130$

*mp*

E retz al te ha si al te ha

Pno

169  $\text{♩} = 140$

*mf*

si al te ha si et et da

Pno

172  $\text{♩} = 150$   $\text{♩} = 170$  *ossia 8↓*

*f* *ff*

mam A —

Pno

176  $\text{♩} = 120$   $\text{♩} = 100$   $\text{♩} = 60$

*fff* *fff* *p*

Pno

182

*mp*

E retz al te ha si et da

Pno

186

mam E retz

*p*

Pno

190

al te ha si et da mam A

Pno

193

E E retz M M

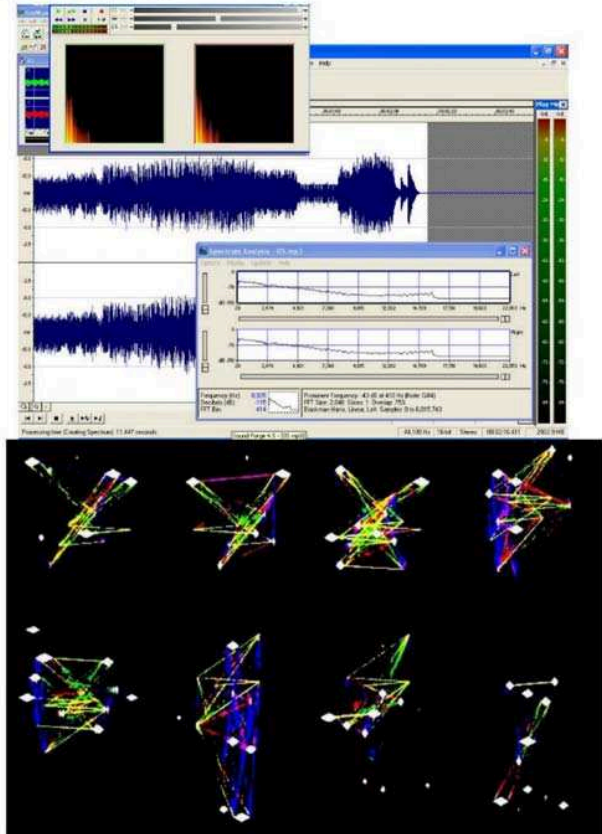
*p* *pp* *p*

Pno

Bucuresti,  
07-XII-2008

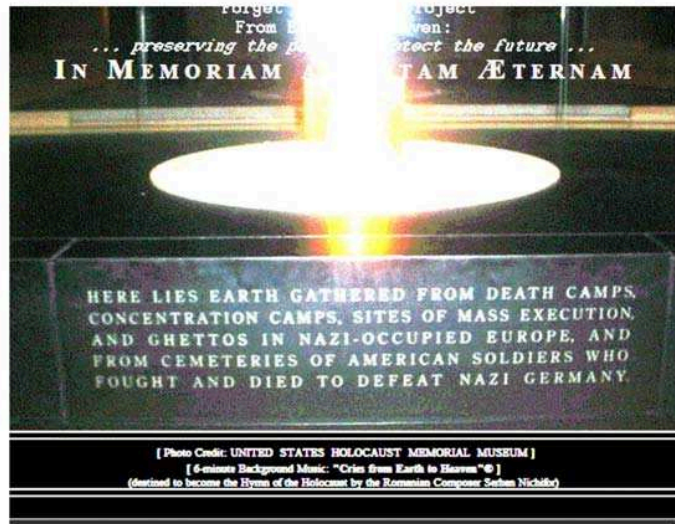
# LIANA ALEXANDRA: Variation 5 (Computer Music)

## Allegro



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## SERBAN NICHIFOR: Cries from Earth to Heaven



Moment of Silence and Remembrance  
in the Memory of Those Killed  
During the Holocaust

Holocaust Survivors and Remembrance

"Forget You Not" Project

From Earth to Heaven:

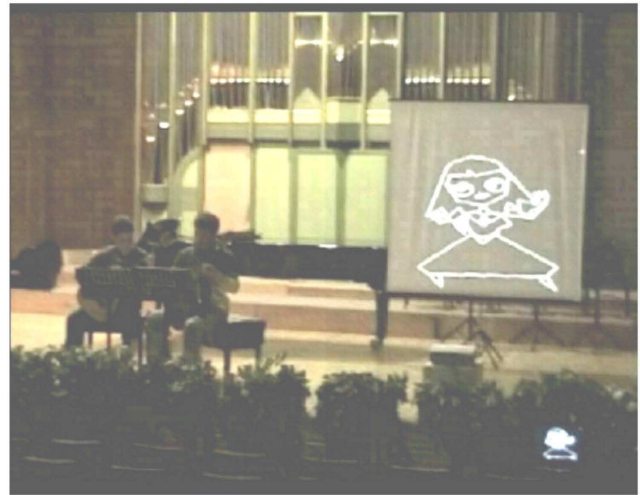
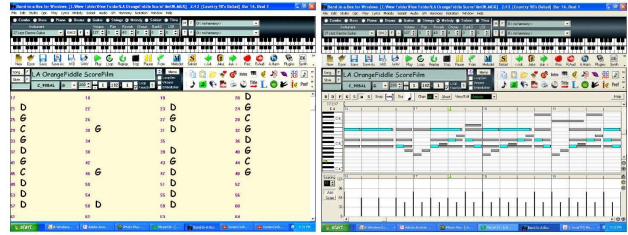
... preserving the past to protect the future ..

IN MEMORIAM AD VITAM AETERNAM

<http://isurvived.org/>



# LIANA ALEXANDRA: *Melody for Orange Fiddle*

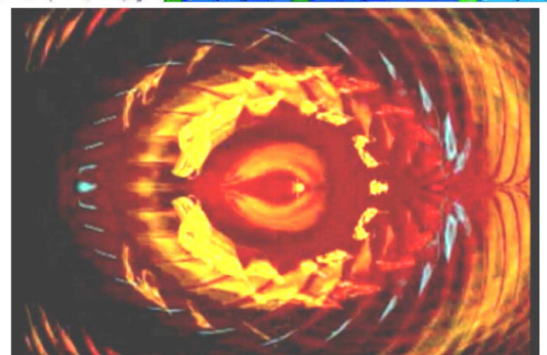
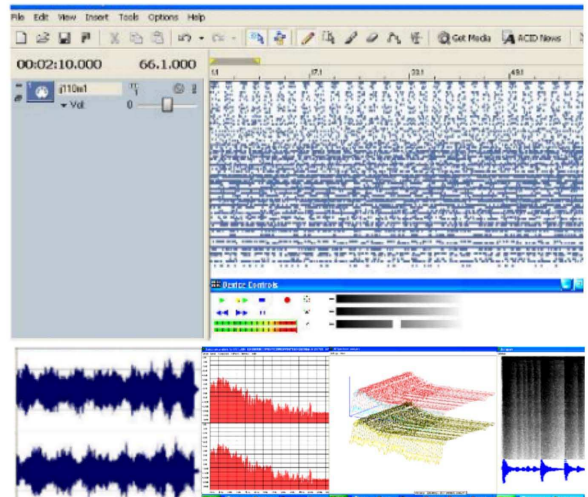


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*Video Chamber Music*

1

# SERBAN NICHIFOR: *Infinite Song*



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[www.geocities.com/serbannichifor/classic\\_blue.html](http://www.geocities.com/serbannichifor/classic_blue.html)  
[www.geocities.com/lianaalexandra/classic\\_blue.html](http://www.geocities.com/lianaalexandra/classic_blue.html)

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