

New Tool for a Musician

Irina B. Gorbunova

Abstract— The article is devoted to the problems of modern musical performance caused by the development of a number of new artistic trends associated with the evolution of music and its instruments, in which an increasing role today belongs to information technology in the arts, the invention of new musical electronic instruments, mediamusic, music computer technologies. The author shows the regularity of appearance of new electronic instruments, novelty and artistic expressiveness of non-traditional performing technologies and their aesthetic impact, reflects on the reasons for the cautious attitude towards them as a number of performing musicians and Philharmonic audience. The innovative musical and educational process at the present stage is connected with the use of music computer technologies (MCT) - an effective means to improve the quality of teaching musical art at all levels of the educational process, an effective element of which is an electronic musical instrument (EMI). The article deals with the regularities of the evolutionary process of musical instruments and features of EMI as a new tool that makes up the cultural content of a new stage in the formation of highly artistic musical culture. The article reveals the horizons of new forms of music performed both on the concert stage and in everyday life, the possibilities of creative potential development of both professional musicians and amateurs that have mastered new musical instruments of the digital age.

Keywords—electronic musical instrument, information technology in music, music computer technologies, musical creativity, musical culture

I. INTRODUCTION

Illumination of instrumental and technological aspects of performing and computer musical creativity on electronic musical instruments, questions of evolution and formation of performing arts on electronic musical instrument, the totality of their educational potential in the modern musical and educational space-today are the topics at the forefront of the problems of formation of new types of musical performing arts.

The process of entering any new tool has never been easy. For example, it is known that French educator Voltaire, who recognized only the harpsichord, skeptically nicknamed the piano "pan tool". Music historians, musicians-researchers studying the history of musical instruments, are well aware of the difficulties that were met on the way of "innovations" in this area. It took at least half a century to establish the piano in everyday practice, and even in the 20s of the XIX century, along with the "hammer" piano, his "predecessors"-clavichord and

harpsichord — were also widespread. The problem is as old as the world. We have seen that people faced it in the XVIII — XIX centuries, when the harpsichord with feathers gradually gave way to a new favorite—the piano with hammers. In fact, these are all different tools. And they sound differently. And they require a different performing approach, a different training. However, perhaps tomorrow the perfect electronic piano will become an everyday phenomenon, as it happened with the acoustic piano and the piano.

It should also be noted that in traditional musical culture we are accustomed to understanding a musical instrument as a specific physical object, with which it is possible to create (synthesize) musical sounds of a certain (characteristic) timbre. However, in the field of music computer technologies, in electronic music, the concept of "instrument" define a wider category of devices: "musical instrument" can be an external sound module with a keyboard, and its rake modification, and the sound module containing hundreds of thousands of "instruments" ("banks" of electronic instrumental sounds). In such a "musical instrument", originally containing tens of thousands of electronic musical "instruments", you can download them as many as you like (the choice depends only on the repertoire, the subtlety of the artist's musical perception (as well as the composer, the teacher, the student, the sound engineer, etc.), his needs and artistic and aesthetic taste). It can also be a module with synthesizer and sampler capabilities, and finally, a modern workstation, in fact, music computer with a musical keyboard having a DVD-ROM, "equipped" with the necessary software and hardware support.

II. HISTORICAL EVOLUTION OF MUSICAL INSTRUMENTS: ANTIQUITY AND MIDDLE AGES

The desire to search for and to find more and more colors of sounds, new timbre combinations of musical instruments, conditions and methods of expressive playing them is an indispensable factor in the development of the culture of mankind.

To begin with, we would like to consider the problem with the 'musician' of the primitive communal system. He is unlikely to be professional: after all, those who wanted could take part in "prehistoric music" (a song to celebrate successful hunting, a dance around the defeated sacrifice magic spells of the gods, etc.). Vocal shouts, primitive percussion instruments such as ratchets, tambourines, drums, and the feet tramp are, perhaps, the entire set of tools. In the jungles of Africa and South America and even in modern times there are primitive tribes, but hardly Mozart or Tchaikovsky (to introduce people of these

Irina B. Gorbunova. Department of Information Technology, Institute of Computer Science and Technological Education of the Herzen State Pedagogical University of Russia and Educational and Methodological Laboratory Music Computer Technologies of the Herzen State Pedagogical University of Russia, St. Petersburg

tribes to the masterpieces of those composers) would become the idols for their musical tastes.

In the states of Antiquity it was already possible to identify professional musicians, playing not only the diverse percussions (tambourines, gongs, crotales, etc.), but also some simple plucked string instruments, as well as various kinds of wind instruments, the distinctive feature of which is stretching as the factor of voice and sound. In those times, there also appeared polyphonic instruments such as psaltery, harps, auloi, but the ancient image still lacked the bowed instruments. It was in ancient Greece that the word 'orchestra' appeared meaning the orchestra pit, where choral and instrumental ensembles accompanying the stage performance should be located, rather than the orchestra itself in the current interpretation of this term. But the pursuit of timbral diversity maintenance of antique musical practice was already completely declared. New reign of Nero, included the invention of the water organ (probably the first primitive keyboards, wind instrument). That was in use not for a long time. Later, already in the Middle Ages in Christian temples there began building of wind bodies with keys at first being played with fists (before the keyboard of these instruments was invented).

III. HISTORICAL EVOLUTION OF MUSICAL INSTRUMENTS: FROM NINETEENTH CENTURY TO CONTEMPORARY TIMES

Professional interest in the invention and improvement of musical instruments and the desire to find new colours of sounds, and new timbral combinations of musical instruments, terms and techniques of expressive playing them brought to life a serious and mathematically precise science of instrumentology in the 19th century.

One of the properties of this fascinating and informative science is teaching about musical sound: about the ways of its extraction, about its acoustics, timbre properties, about the history of improving varieties of performing instruments. There is extensive scientific literature on instrumentation, as well as educational and methodical, designed to instill basic knowledge of this discipline in the middle and higher levels of our professional music education. However, we will try to understand the problems of instrumentation today to find out what prevents the active introduction and development of the educational process of learning to play the most modern and advanced musical instruments, in particular, electronic musical synthesizers – electronic musical instruments (EMI) [1]–[3] and music computers (MC) [4]–[7].

Obviously, first and foremost, you need to prove that EMI and MC form a new natural stage in the evolution of musical instruments.

During the times of Renaissance and Classicism a huge leap was made in the history of music and its professional performance. At this time great three – and – four – manual organs were being erected in Christian churches in Western Europe (the organ was considered even the king of instruments). Harpsichord, cembalo, virginals appeared as instruments of chamber music, in palaces and burger houses. Ingenious

composers (that often were also outstanding performers on these instruments) composed for them fadeless fine music which is still in current practice of many musicians of our days. It still caresses the ear of listeners that belong both to the church and the secular audience First of all, we should name the great Johann Sebastian Bach and his sons, the brilliant French Rameau and Couperin, the wonderful English virginalists William Byrd, John Bull, John Dowland, unforgettable Henry Purcell. At the same time, more advanced designs of string instruments were developed (varieties of deaf multi-string viols turned into amazing violins and violoncellos, woodwinds, in addition, to expanding their range, found the perfect mechanism for virtuoso technique).

Meanwhile, the masters of all keyboard instruments found opportunities to create (instead of harpsichord) the piano and hammer-action piano: larger in ambitus and volume, and owing to these results, the music of Haydn, Mozart, and Beethoven was written. The 'king' of music (organ) respectfully yielded the palm in writing musical works to the new 'king' of musical instruments – the piano. Of course, the piano is more compact, it fits in an apartment, it can be transferred and transported to different halls. On the other hand, it surpasses all previous inventions of concert and home instruments in terms of variety of shades and carcasses, dynamic contrasts, intimate trustworthiness, completeness and sonority of sound. The idols of virtuoso piano music were Liszt, Brahms, Robert and Clara Schumann, Anton Rubinstein, and at the turn of 19th – 20th centuries a new galaxy of brilliant pianists-composers enchanted with their art the minds of music fans. The great concert organ, however, also becomes an attribute of secular music, taking its place on the Philharmonic stage, but the viscous, somewhat tedious, "objective" sounding of the organ fistulas become less attractive in comparison with the new genres of solo performance on the piano, where it participates in both traditional and experimental ensemble forms.

Keyboard instruments (organ, harpsichord, piano, their varieties – piano, harmonium, electric organ), first of all, are remarkable for the fact that they have textured richness; they are able to be full-sounding orchestral. Therefore, composers need them most. There are photos and film footage, where Stravinsky and Prokofiev are composing their music, not even for the piano, and for a pianola. Now, in the 21st century, we see on television home studios of such well-known composers such as Karlheinz Stockhausen, Eduard Artemyev, Igor Korneluk, feature sets, EMI, MC sound monitors. This is a natural phenomenon. To ensure the musical accompaniment of any film by Nikita Mikhalkov, Artemyev does not necessarily need an orchestra (as Sergey Prokofiev and Dmitry Shostakovich did in their time): a full-fledged film phonogram is created in his home studio, and it sounds even more impressive in a wide-screen stereo cinema than if it were recorded in a studio of a dream factory.

But for some reason today, when offered a solo concert performer at EMI, musically educated audience does not demonstrate too much longing for such concerts (of course,

there are exceptions: for example, performances of Japanese Kitaro, with its eclectic, somewhat sweet sound fantasies). At the moment, a lot of concert music is performed by musicians on stage, tired of various modifications of electronic synthesizers, focusing mainly on pop genres. Apparently, the enlightened listener of our time is also waiting for the same kind of miracle as it was given to Liszt, Busoni, Horowitz, Paganini, Oistrakh, Richter, Rostropovich, etc., for whom he felt the power of not only a great virtuoso but also outstanding artists of the era. Of course, the listener gets full satisfaction when a miracle is born in front of him/her, not behind the closed doors of impenetrable sound laboratories. After all, today the master, who owns music computer technologies (MCT) [8]-[10], essentially removes from their work agenda the task of masterly fluency of fingers, the amount of sound, power and timbre variety of sounds that can be extracted by an electronic synthesizer (with these functions successfully copes sequencer EMI, whose computer memory can be infinitely filled). Finally, the "unexpected" timbre combinations can also be provided, thanks to the wonderful blanks in the EMI sequencer and the button pressed in time.

In the 80s and 90s of the last century the same electronic music concerts were arranged. So, for example, within a current Plenum of the Union of Composers of Russia such concert was organized. The audience in the cosy hall of the Moscow House of Composers was very small, about a third. On the stage there were two solid audio monitors (human scale – each) with stereo setup five meters away from one another. The authors of the compositions were sitting behind the players (or computers) somewhere at a side, at the back of the stage, and on it there was nobody but only music. Predominantly avant-garde tailoring, but not aggressively loud. There was a lot of interesting, unexpected, not devoid of logic mathematical sense. Then there was a concert of electronic music created in the famous IRCAM. The French in the mid-nineties gave their evening in the Grand Hall of the Leningrad Conservatory, on the perimeter of the hall at the level of the first tier there were sound monitors (not less than ten) hung at an equal distance from each other. In the stalls there was a number of different unknown equipment: computers, mixers, sound generators, amplifiers, and other equipment unknown to me. The equipment was served by a whole "platoon" of specialists. The hall was full, including tiers. The program consisted of solo performances of musicians (instrumentalists: a pianist, a clarinetist, and even an ensemble) accompanied by all ringing, rustling, iridescent stereo coming from the monitors. Then the French conquered our audience.

Apparently, live performers, live action on stage is the first condition of the audience's focused attention in the hall to the artistic process that the concert program promises. And, of course, not the last role is played by the artist's personality, his/her artistic authority, his/her creative success, on which depends the success of new forms of music, including public music on the synthesizer. Until now, the sound of the theremin performers invariably attracts the audience to the hall, although the program of concerts on the theremin consists mainly of

arrangements of classics for this instrument. Original works for theremin with all their musical content and technical invention have not yet touched the audience deeply. Probably, there haven't been the musical genius of this tool. However, the latest EMI require, obviously, more technical training, more imagination, more talent, so that the performer could captivate the contemporary sophisticated Philharmonic listener.

Every new phenomenon, usually acts first as the development in the bond 'old - new'. Once upon a time in the era of strict polyphonic writing geniuses of music, such as Josquin Desprez, Palestrina, Lasso, mainly manifested themselves as masters of choral polyphony a cappella, composing masses, motets and madrigals. At the same time they had a lot of well-known and unknown admirers and imitators who arranged their music for performance on organ, viola, guitar, and later on harpsichord, each time in their own way. It was not immediately that original instrumental works appeared a Virtuoso, mastering his instrument, initially borrowed familiar to listeners music, gradually offering new ones, composed by himself. So in the 20th century began the development of EMI, electric guitars, the voice of the singer began to sound with a microphone sound, and sometimes with the effects of timbre transformation through vocoder; there was the period of the creating tape music (which used the installation of specially processed sound recordings on tape). Now we are impatiently waiting for a splash of not only highly talented performance on EMI, but also the creation of brilliant works, believing how unusually original, lively and colorful they will sound on newly developed instruments.

If a primitive participant of a noisy musical action had only the desire to join the syncretic action, today the musician, who has received even a higher musical education, might find for himself/herself a very little of joy, if he/she intends to act as a soloist on the Philharmonic stage. Remember in the 90s the speech of the French rock musician Jean Michel Jarre himself on the podium, built on the Red Square in Moscow and tired of the equipment mostly unusual for Muscovites, producing loud sounds, blocking the noise of the crowd that filled the center of the capital. J.-M. Jarre ran on the stage from one instrument to another, thereby creating an atmosphere of energetic music. But then, there was nothing more than foreign shows, designed to entertain undemanding streets with audience. Today we reflect on other new realities of sounding space and evaluate its aesthetic impact in different ways.

There appeared inquisitive musicians who see sense of the profession in experimenting with sounds, dissect them, mix in various proportions, considering even silence "sound". Music computer and EMI are conformed narrowly directed to the task: to surprise, to amaze, tempo-acoustic findings. Such musicians have their own specific audience of "experts". Do they create Music? Are these findings born as "discoveries" in search of the artist's high revelation, depth of poetic content, in the transfer of socially significant, suffered thoughts? While the results of their searches are often random, cute "circus" fun or scary mysterious maze, but in fact have no connection with the actual artistic tasks. Recently in Petersburg also the Museum of sound has

recently been established in St. Petersburg. Let this Museum be saved and even from time to time exhibit works of "masters of sound", and assume that someday there will be a great artist-musician, who subject to these laboratory exhibits a significant topic of art. Perhaps, it is ...

And EMI meanwhile enriches orchestral compositions, bringing the contribution to timbre updating of contemporary music (Rodion Shchedrin and Alexander Chaikovsky, the IRCAM school about use of EMI) (see more in [11]–[13]). This process is interesting owing to the manifestations of transition from conceptually presented generalizations of studied (or predicted) musical phenomena to their practical concrete-figurative modeling [14]–[17], which directly brings musical-research activity with the artistic practice itself [18]–[23].

Of course, a bright performer on EMI coming on to the stage, is obliged to be not only the owner of a virtuosic keyboard technique, but a connoisseur of traditional instrumentality (knowing the rules of playing game each acoustic instrument, its registers and nuances), a scholar in the field of sounds of orchestral scores. New sounds, a composer, the Creator of the new musical concepts that would excite the audience of concert halls. When and where will this talent show up? It is necessary that there are a lot of them, because "... any musical machine closest to perfection, whether it is a Stradivarius violin or an electronic synthesizer, is useless until it is touched by a person who has musical skill and imagination" [24, p. 121]. Only in this case, from their environment a genius suddenly may stand out. It will make EMI (the new "music machine", qualitatively superior to the perfection of such pianos as Steinway, Bechstein, Blüthner, combined) instrument which by inheritance will go to the palm in the new generation evolutionary development of musical instruments. Consequently, after such a genius will arise the era of other music, but no less a genius than the one that we judge according to the works of Bach, Mozart, Beethoven, Tchaikovsky, Shostakovich. And, then, in the apartments instead of the "Red Octobers", "Gulls" and other musical furniture will take their place elegant and inexpensive, but the favorite audio devices for professional and amateur musicians.

IV. CONCLUSION

Any external sound module can be called the word "instrument", but this is wrong, because it already contains a few dozens of instruments, some instruments can be loaded into it further. What in this case is called "instrument"? This word is called a set of sampled and / or synthesized sounds and parameters for their playback, designed to be controlled via keyboard or MIDI interface. One sound module, external or embedded in the sound card, contains dozens or even hundreds of such sets, and if there is RAM, they can be loaded into it from an external drive. The "tools" that are loaded into memory, can be used as permanent memory. To control the tone of the sound (its modifications and even its creation) there are special frequency filters, based on "electronic resonators", raising or lowering the level of different sounds at the request of the

musician.

Thanks to the possibilities of EMI and MC, the sound (acoustic) space itself can be a musical instrument. The timbre side of the sound is known to have spatial characteristics of its reproduction and reflection (from the location of sound sources in physical space to the simulation of room acoustics. Josef Hofmann writes: "Your bad mood or a slight indisposition, even insensitive, puritanical harsh or too cold, skeptical audience – all this can be overcome, but the acoustic properties of the hall remaining the same from the beginning of your program to the end, and if they are not your good allies, then turn into an evil demon, mocking all of your efforts to create a noble-sounding picture" [25, p. 53].

Hardware, technical capabilities of modern EMI, presented in the stage musical art, as well as their software support create conditions for the realization of the idea, when the sound space can act as a musical instrument, which the musician has the ability to simulate with the help of his new musical instrument. Eduard Artemyev writes: "For me, the most powerful means of music is space. Early composers did not think about it, they depended on the acoustics of the hall. And it can be built, electronics made it possible. They say that the development of music has reached a deadlock: the scale of sounds is limited by temperament. But the mighty reserve of music-space, the composer can "compose": where, how, where to send the sound, where it will come" [26, p. 59]. Various aspects of the formation and development of musical instruments reveal the basic laws of the functioning of musical instruments as synthesizers of musical sound in all their diversity from the origins of their formation until the present stage of development of the process.

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Irina B. Gorbunova was born in Saint Petersburg (Leningrad). DipMus, Special Music Higher School of the St. Petersburg State Conservatory named after N.A. Rimsky-Korsakov; BSc in Computer Science: Information Technology, Computer Science and Multimedia, Leningrad State University, Ussurisk State Pedagogical University; MA in Education, the Herzen State Pedagogical University of Russia; PhD in Information Technology and Pedagogic Sciences, Pedagogical University of Russia, St. Petersburg, 1989;

Doctor degree: Doctor of Pedagogic Sciences and Information Technology, the Herzen State Pedagogical University of Russia, St. Petersburg, 1999. Dr. Gorbunova, Full Professor, PhD in Sc., Doctor of Pedagogic Sciences, Chief Researcher of the Educational and Methodological Laboratory *Music Computer Technologies* of the Herzen State Pedagogical University of Russia, St. Petersburg.

She was on a number of business trips abroad, among them working trip to the USA (1999); lecturing and giving research and practice seminars in Hungary (2003, 2005, 2017); business trip to the UK (2016); she was a member of the Jury of national and international competitions of musical creativity, including *Bridge of Friendship* (Dortmund, Germany, 2011), etc. Work experience; 1990 – 2010 - Associate Professor, Professor of the Department of Information Technology of the Herzen State Pedagogical University of Russia, St. Petersburg; 2010 - present - Full Professor of the

Department of Information Technology, Institute of Computer Science and Technological Education of the Herzen State Pedagogical University of Russia, St. Petersburg; 2002 – present - Chief Researcher of the Educational and Methodological Laboratory *Music Computer Technologies* of the Herzen State Pedagogical University of Russia, St. Petersburg. She has more than 300 scientific publications, among them are monographs *Music Computer Technologies: Historical-Theoretical and Practical Aspects*, St. Petersburg: Publ. house "SMIO Press" (2007, 560 pp.) and *Music Computer Technologies: The Problem of Modeling the Process of Musical Creativity*, compiled with participation of S. V. Chibirev, St. Petersburg: Publ. house of the Herzen State Pedagogical University of Russia (2012, 160 pp.); course book *Information Technology in Music*, vol. 1 – 4: vol. 1, *Architectonics of musical sound* (2009, 175 pp.), vol. 2, *Musical Synthesizers* (2010, 205 pp.), vol. 3, *Music Computer* (2011, 411 pp.), *Music, Mathematics and Computer Science*, vol. 4, compiled with participation of Mikhail S. Zalivadny (2013, 181 pp.), St. Petersburg: Publ. house of the Herzen State Pedagogical University of Russia. Her research activities include such directions as: MCT in professional music education (as a means to expand creative opportunities); MCT in general musical education (as one of the means of education); MCT as a means of rehabilitation of people with disabilities; MCT as the new direction in preparation of specialists of humanitarian and technological profile; MCT in the field of digital arts; MCT in information technology, psychoacoustics and musical acoustics; system of training arrangements and the art of performing skills on electronic musical instruments. Her circle of interests also includes the problems of interrelation of natural and technical sciences and humanities, as well as the possibilities of applying the results of such interrelation for the purposes of music education and upbringing. She also takes part in working out the specialized software for computer music devices and in application of this software in pedagogical processes. Her developments and researches also belong to the field of musical pedagogics and musicology, musical Informatics, computer modeling of processes of musical creativity, timbre programming, art of performing skills and arrangement on electronic musical instruments, creative work in the field of computer music, mathematical methods in musicology.

Prof. Dr. Gorbunova is Chairman of the Organizing Committee of the international research and practice conference *Contemporary Music Education*, Chairman of the Organizing Committee of the international research and practical conference *Music Computer Technologies in the System of Contemporary Education*. Dr. Gorbunova is a member of the Jury of national and international competitions of musical creative works, including *Electronic Palette* (Saint-Petersburg), *Music and Electronics* (Moscow), *Music of the XXI Century* (Moscow / Saint-Petersburg), International Festivals and Competitions *Musical Electronics and Multimedia* (Moscow / Saint-Petersburg), *Clarinet of the XXI Century* (Saint-Petersburg), *The World of Art without Borders* (Saint-Petersburg, Russia - Szeged, Hungary), *Bridge of Friendship* (Dortmund, Germany), All-Russian Competition of Electroacoustic Music *DEMO* (Saint-Petersburg). She is a member of Editorial Boards of International Journals: *Music Scholarship / Problemy Muzykal'noj Nauki* (SCOPUS), *The World of Science, Culture, Education / Mir Nauki, Kul'tury, Obrazovaniya*, Electronic international scientific journal of music and sound in electronic mass media, film, Internet, and multimedia *MEDIAMUSIC*. Prof. Dr. Gorbunova has developed first ever course in Music, called Music Computer Technologies, which has been offered under the Bachelors of Arts and Sciences (BASc), which in 2004 carried out student recruitment in different regions and educational institutions of Russia and she also leads post-graduate courses "Music Computer Technologies in Education" available under the MA in Music Education, since 2006. Prof. Dr. Gorbunova supervises a number of doctoral and post-doctoral students (more than 30) and lectures on Music Computer Technologies and Information Technology in Music. She supervises research in various directions, among them there are: *Theory and history of culture, Music Art, Information system and processes, Theory and methodology of professional education, Mathematical modelling, numerical methods and program systems, Theory and methods of education and upbringing (in Music, Informatics, natural sciences)*. The research results of Prof. Gorbunova were published in over 300 refereed publications including 48 books and 255 papers in journals and conference proceedings. Awards and honors: 2003 - Gold medal of the all-Russian Exhibition Centre (former VDNKh); 2005 - Silver medal of the all-Russian Exhibition Centre (former VDNKh); 2009 - Gold medal of the all-Russian Exhibition Centre

(former VDNKh); 2009 - Diploma of the winner in the nomination «New educational technologies in ICT environment» of the all-Russian creative contest of scientific-technical solutions, educational products and services in the field of Informatization of the innovative-educational complex «Music computer technologies in the system of modern education»; 2010 - Grand Prix of International Congress-exhibition «Global Education - Education Without Borders»; 2010 - Diploma of the 11th all-Russian forum «Educational environment - 2010» for the project «Digital educational resources «Music computer technologies in education» in nomination of «Creative Competition of scientific developments, innovative solutions and programs in the field of higher vocational education» and many others; 2011 - Laureate of the Prize of the Government «For Outstanding Achievements in the Field of Higher and Secondary Professional Education»; 2013 - Honorary Worker of Higher Professional Education of the Russian Federation.