On The Question Of The Relationship Of Ideas And The Particle Of Microworld On The Example Of A Musical Composition

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Introduction

Throughout the development of the history of science and philosophy, from antiquity to the present day, inquisitive minds ask question: “How does the world work?” Historically, it was peculiar to a person to ask such questions regardless of what era or time they rise to the light of day. The search for an answer leads either to confirmation of conjectures, or to the discovery of previously unknown laws of existence.

One of the most effective and proven solutions is the scientific approach, namely research, data collection and analysis.

In this article, we will try to carry out a specific analysis of the musical work, where the idea of deploying and carries a unique form of dualism inherent in the world of elementary particles.

And as a consequence, we expect to present convincing evidence that is able to some extent to answer the questions “How does the world work?” in the plane of art composition.

This naturally raises the question of what is an idea? Without pretending to the all-encompassing scientific way of cognizing the Idea as such, we nevertheless made an attempt to trace the history of this problem briefly in order to bring as closely as possible to the solution of the question of the existence of a connection between the ideas of the microcosm and the concepts and structure of musical compositions.

It is well known that man is an integral part of existing matter and his essence is those laws that operate at the levels of the macro and microcosmos. The human brain generates "Ideas", prototypes of what is still possible, is to be embodied in a 4-dimensional reality, where 3 dimensions: length, height, width + time, according to Einstein's Theory of Relativity, form a space-time continuum. This theory successfully describes the characteristics and properties of the microcosmos, which, however, is not at all true relative to the microcosmos, a system of interaction at the level of subatomic particles.
“Ideas” embody the prototypes of objects and concepts of reality, driving civilization and governing the institutions of social life support, culture, spirituality, ideas carry a semantic weight, thus filling and motivating the purpose of the personality's existence with a special meaning.

The connection between the “Idea” and the microworld is carried out through the manifestation of the laws of elementary particles and especially their influence on human thinking.

The concept of "Ideas" arose in the 5th-3rd centuries BC in the philosophical schools of Ancient Greece and India.

According to the philosophical system of Ancient Greece, ἴδεα - (from ancient Greek is type, form, prototype) is an intelligible and unchanging structure, the initial particles of matter that lie at the basis of everything. Democritus calls the initial particles of matter "indivisible forms". In the Greek language, the concept of form was sometimes expressed by means of a word meaning "view", "outline". For the word "kind", besides the term "eidos", there was also the term "Idea". The word "Idea" here did not mean "concept" or "thought" in the modern sense, but namely "view", "outline", "form". Democritus used this meaning of the word "idea" as a term meaning "indivisible forms" (atomos idea), or "atoms." Thus, the concept of "idea" and "atom" acquired a synonymous character, when one replaced the other. It is not surprising, therefore, that a special work of the philosopher on atoms (which has not come down to us) was called "On Ideas." At least that's the message of Sextus Empiricus.

In the doctrine of "atoms" ("ideas") Democritus is a materialist. What he calls "ideas" are bodily forms, or essences, they are immutable, but changeable things are composed of them. Atoms are infinite in number, they are particles of matter moving in infinite, empty space.

In ancient Greek philosophy, the idea is not a single thing, but a kind of some thing. Things of sensual reality exist because of ideas and ideas are their images. According to this system of views, the idea is the smallest indivisible unit of existence, the form of all that exists. Ideas are the origin of all things, all sensual
things whose properties are determined by the form that make up their atoms. The whole is the sum of the parts, i.e. The universe is discrete, and the disorderly motion of atoms, their accidental collisions, are the cause of everything.

For Plato and the neoplatonists, an idea or aidos is the ideal (comprehensible) eternal essence of a thing as opposed to the sensual and changeable (passing) things [1]. Ideas are disembodied, beyond the concrete things and phenomena. They constitute a special ideal world (the realm of ideas), which is the real reality, the transcendent world of true existence beyond sensual perception.

The main idea, born of the philosophy of the Hellenes, has fed many ideas over the centuries about understanding the structure of human thinking in Europe. Even with the decline of Antiquity and the fall of Rome, these expressed thoughts found resonance in the New World, in a world that was built on the postulates of Christianity, Islam and Judaism. In this world, the Idea was overgrown with new interpretations, where the beginning of thought came from the deity. For the New Era of the Reformation, the idea is a means and form of human cognition of reality. The problem field of the term included: the problem of the origin of ideas, the problem of the cognitive value of ideas, the problem of the relationship of ideas to the objective world.

By the beginning of the 20th century, the guesses of the natural philosophers of Ancient Greece were confirmed by a scientific experiment carried out by Ernest Rutherford. In 1911, Ernest Rutherford, after doing a series of experiments, came to the conclusion that an atom is a semblance of a planetary system in which electrons move along orbits around the heavy positively charged nucleus located in the center of the atom ("Rutherford's model of the atom").

Although the word atom in its original meaning meant a particle that is not divided into smaller parts, the scientific understanding is that it consists of smaller particles called subatomic particles.

According to the current model, the nucleus of an atom consists of positively charged protons and chargeless neutrons and is surrounded by negatively charged electrons.
However, the quantum mechanics does not allow the electrons to move around the nucleus according to any particular trajectories (the uncertainty of the electron's position in the atom can be comparable to the size of the atom itself) [2].

It seems that subatomic units, or electrons more specifically, are particles of a double nature, dual in their nature. In 1923, Louis de Broglie introduced the idea of the dual nature of matter, based on the assumption that particles also have wave properties inextricably linked to mass and energy. The movement of the particle Louis de Broglie compared with the spread of the wave, which in 1927 was experimentally confirmed by the study of diffraction of electrons in crystals.

Louis de Broglie's experience of the twin nature of micro particles - corpus-wave dualism - has fundamentally changed the way the world looks. Since all micro-objects (the term "particle" is retained) have both corpuscular and wave properties, it is obvious that any of these "particles" cannot be considered a part or a wave in the classical sense.

From the above, it is clear that the "Idea" and the microworld of subatomic particles are a kind of object of being, which cannot be accurately and universally described by modern methods.

The object is so fundamental that the manifestation of its corpus-wave nature is deployed in an outer, visible world. In this regard, we would like to touch upon the manifestation of these properties in the creative field, conditioned by the human mind, the thinking in the category of musical objects, and to show on the example of musical composition the idea of the dual nature of existence.

Ideas of interaction of musical composition and micro level at the present stage of development of the musical world is in the air.

Ideas of the new musical era were ideas about projection in the artistic space of music - structure of sound (height, duration, intensity and timber, as well as spectrum).

Spectral music, sonority, as later will be called these artistic phenomena, became the first methods in the history of music to create a composition based
exclusively on acoustics and spectral analysis of a sound. Composers have given special status to sound. While in the era of classicism, harmony and melody were aesthetics of musical thought, in spectral music these ideas are not present, the main thing is sound, discrete parameters of sound, use of microlevel data, sometimes even resort to physics of elementary particles. Such a musical composition puts sound as it is to the main path, be it noise or a certain tone.

The whole piece is growing up from a number of overtones born in the consequence of the deformation of the elastic body. Each of the pitches, having a prototype partial tone of the spectrum, and thus a simple physical wave, carries the idea of wave fluctuations [3, 4]. Wave vibrations build sound from the implicative and explicative orders [5].

The implicative order of sound indicates that its spectrum is made of separate sounds, so-called overtones (natural scale). In other words, the sound wave, in addition to the main tone, carries the low-audible tones that result from the process of vibration of the body, where the deformation is not only applied to the whole part of the body, but also at the same time distorts the half part, the third, the fourth, and the fifth parts of one physical object. Below is a note illustration of the first 16 tones of natural scale built from the sound "C".

![Note Illustration of the First 16 Tones of Natural Scale](image)

*Pic. 1. Overton’s row.*

Interestingly, the overtone row is in this order (Pic. 2.), which we see in the history of chronological development of musical styles [6]. The first three sounds of "C, c, g" are a folklore system based on the steady range of octave and fifth, what
you can now see in Australian Aboriginal music (drones on a didgeridoo), and in folk music, let's say the Middle East, where traditional music is built. At the levels of fourth and fifth, for example, Maqom music, the Church music of the Middle Ages also belongs to this order. Overtones "c1, e1, g1, b1" form a major seventh D7, used in the music of the Baroque era and Classicism. The next row of five whole tones "b1, c2, d2, e2, fis2" - forms a soundset characteristic of the Romantic era. Then there is a group of overtones of halftone and microtone sequences that closes the overtone row of the XX century era.

Thus, the structure of sound is a kind of interval system, on which, relying in a completely metaphysical way, composers of different eras created the music of their time. Going back to the title, how the ideas and micro-worlds of particles are connected, we are going to give you proof of this connection.

The Dutch composer Peter Adriaanz makes his compositions based on the nature of sound. This concept is based on such concepts as cent relationships, overtone rows, microtonality.

In his annotation to his essay "Waves 11 - 13 (No.39)," Peter quotes Hazrat Inayat Khan: "The mystery of sound is mystic; The harmony of life is a religion. Knowledge of vibrations is metaphysics, and analysis of the science of atoms and their harmonious grouping is art." [8].

Pic. 2. Overtone series and historical epochs.
Consider Waves 11 as an example.

Waves 11 (Picture 3) - written in March 2008 for the electro-acoustic orchestra LOOS. In this play, Peter uses two important elements of the form:
   a) Moving tones (part of sine)
   b) Regular, periodic entry of voices.

The Waves 11 score is divided into two instrumental groups + a separate party for eBow and a party that includes both fixed and free high-rise instruments.

The minimum number of performers must be at least 5, preferably of heterogeneous composition. The piece should be played as an interaction between long, frozen heights or sounds of static nature, clean and periodically repeated heights of microtonic nature. The composition is divided into two main instrumental groups.

**Group I (1-21st musical staff)**

Group I (fixed) consist of alternating pitches for 1.2, 3 or 4 performers playing on any instrument capable of microtonic intonation. The microtone gradation scale is placed in front of the staff, where decimal numbers indicate the number of deviations in cents. Each instrument follows its individual line, marked with a number above or under a staff. The microtonic deviations must be within the specified time range of not more than 15 seconds.

**Group II (22nd and 23rd staffs)**

Group II (Free Entries) functions as a "reference point" for Group I and consists of a "specified heights" gamut performed by any free instruments inactive in Group I. The available pitches are divided between fixed (for instruments that are incapable of microtonic intonation) and unfixed heights (for instruments on which microtonic intonation is possible).

The dynamics of Group II should always be below those of Group I.
E-Bow Piano (25th, 26th and 27th staffs)

The E-Bow must be executed simultaneously with the sound extracted by the keys. The batch is notated on two staffs, where the upper staff is for E-Bow and the lower staff is for the piano keys.

In fact, the composition of Waves 11 is probably one of the clearest examples of the Interval-Temporary interaction.

Waves 11 consist of minor second in middle registry divided into two scales of 10-cent dimension, in the range for des2 tone from 0-50 cents and for c2 sound from 60-90 cents. The alternating entries of the varying c2 and des2 tones are arranged as cross-forms, intersecting lines, converging at a point of pure unison.

Closely interacting with "Interval-time", the second important element of the composition is sine sinusoidal waves. These waves are presented in composition more to appropriately examine the relationships between microtone motion and time generalized in the form of a microtone counterpoint in a score, and to counterbalance alternating joints with something that could increase small beatings in sound.

The result was the construction of sine waves, which combines both functions, and moving, changing micro-pitches per unit of time and stationery, unchanging, micro-tone organization of pitches. Throughout the piece, these waves are divided into two alternating sine waves that move towards each other and diverge, or move in parallel in an upward or downward direction. Sines are set in a minor second from each other, moving at 10 cents in 15 seconds, gradually converging into one point. As can be seen from the analysis, sines are thus complimentary to "alternating" interventions in all respects: through acceleration (speed), expansion (register) and doubling (density) thus contribute to a clear picture of the interaction between the two parts, Groups I and II.
Pic. 3. Waves 11 score.
The 20th century, an understanding of the universe world picture, showed humanity that there were actually objects of two nature. Duality was so fundamental and simple that it was the basis of machine programming, which in the culture of modern mankind plays an integral role, and it is to be commended, at a time when Indian numeric have brought to science progress, the continuation of which is quite palpable at such a long-time distance. Surprisingly, the Indian philosophy points to the existence of both the clear light and hidden from it, being and non-being, in the same way was Chinese philosophy, where yin and yang represent all the same state, but the philosophy of the atomists has laid the foundation of worldview, through the ages-lived and received scientific side in the history of our time. Music, as art, somehow continues and carries within itself traces of discoveries of the time. As a purely human creature, the consequence of a special thought whose ideological field depends on time, music brings to the world the hidden phenomena that underlie human thinking and the art of composition successfully model the world of human feelings and the world of fundamental objects. The explicate order that we observe in the form of musical works, in the structure of them, tells about the time and age when and in what ideological conditions this essence was formed, which ignites the fire and carves it out of the hearts of men. Music remains a mystery, as is the human it does not exist. The music as a compositional unity is able to recognize and understand only human, attempt to explain the evolution of music function yet give birth to a dead end, where non-acquaintance as an event of horizon does not provide a clear understanding and vision of the role that endowed with the art of composition, honed and collected so many different methods and styles over the past history of civilization.
References


[6] The candidate of art history, associate professor I.S. Malmberg (The State conservatory of Uzbekistan) repeatedly drew attention to this in her lectures on the analysis of musical form.
