The Existence of Quantum Computer

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Abstract

We extend an empirically grounded theory of the existence of quantum computer. The main question that we are considering is a question about the quantum computer's possibility of existence and creation. As empirical evidence, we use logic, which we show in cognitive perspective. For a definition of the computer, we use a formal definition of Turing machine. By formulating many definitions abstractly and phenomenologically we go around the areas of quantum physics, quantum computing and other quantum-related fields of science which could give an unambiguous answer to our question about the essence of quantum computer and which is developed so they can't. In many ways, it makes this theory about the existence of quantum computer universal for these areas, although less applied for them. We consider some corollary of the essences of quantum computer, including the possibility of quantum computer for the human. References to research of cognitive nature of logic suggest empirical basis which we follow in our theory.

1 Introduction

In light of improvement our knowledge on fields of quantum physics and popularization of computers, more and more often appear a question about the quantum computer's possibility of creation and existence. Unambiguous answer for this question would be fact of creation of such a device. However, without this fact, we have to be satisfied with hypotheses and theories about it.

The fact that question about the possibility of creation and existence of quantum computer could be solved theoretically should not contradict to the fact of the practical solutions of this issue. In other words, a practical implications of any theory can be approved as far as that theory approved in their proofs. Otherwise, in case of creation of the quantum computer before any theoretical foundation of its existence, we stay without possibility of any interaction with that object due to the inability to elementary determine the object of interaction.

In view of the fact that branches of science, that could give a clear answer to our question, still developed we have to resort to abstractions and phenomenological conclusions that can be ambiguous. At first glance, the abstract definitions are less conclusive and abstract theory less practical. This fair remark is true as far, as we consider abstractions out of their theories. At the same

time, abstractions are unambiguous while formed in profs that make up there's theories which subject to certain laws.

In our theory as such laws, we use logic. This allows us to make substantive conclusions about things whose existence is purely hypothetical along the way that we are perceived the laws of logic objectively from there cognitive nature. Thus, the theory of quantum computer's existence can be empirically justified without such kind of computer. It is unlikely and very controversial that flowerpot with tag "the quantum computer" find investment from Google.

Not less important subject that we are referring in the statements of our theory, namely its absence, is a faith, which is unnecessary in any scientific theory. That is enough only one term for the definition of which is necessary to make an act of faith to completely destroy any theory. The act of faith, as a subjective act for the ascetic, in relation to only one term made the whole theory depends from the existence of that ascetic. This subjective knowledge deprived from any opportunities to be clearly transmitted and received between two humans. For us this mean that if someone can imagine the possibility of quantum computer's existence, but can not imagine it in a way to unambiguously capable of perception, such a representation is deprived from any meaning. The judgment of a relevant way for expression of this knowledge we entrust to the reader for our opportunity to consider the act of existence and creation objectively.

2 Computer

Let us start with the definition of computer.

Definition 2.1. Any machine is a computer, if

1. a range of tasks calculated by the machine is not definite;
2. a user able to calculate any task by defining a calculation structure in terms of the computing machine (a computing terms);
3. the computing terms which operated by the machine and user remain constant.

Let us explain this definition.

By computing term, we mean any object which can represent the computation tasks (the task).

Case. Computing term could be an transistor which in the active state represent the calculation of the logical addition of 0 and 1. However, no matter how change the value of the computing term, computing term remains constant as a transistor.

By the constancy of computing term, we denote the property of each individual computing term be uniquely interpreted relative to the task at any moment of the calculation.

Case. If the transistor which is in an active state may be and may be not a result of the logical addition of 0 and 1, such transistor we define as a broken.

Remark. Here and below we use the term interpretation, but perhaps it would be better to use the term verification. The term interpretation seems to us more general relativity to correlation between two objects, because the true result of an verification is not possible without the true result of a primary interpretation.

By the calculation structure, we mean the algorithm, and by the calculation — user's interpretation of the task and the computing term.

Corollary 2.1. *Computing term is interpreted relativity to the task by defining calculation structure.*

Let us consider the concepts of the task and the solution.

By the task, we understand any statement which represented in the words that have inner relation.

Case. The task of calculating the square of two is the statement: "the number 4 is related to the square of the two" Statement consists of the words, relation of which is described by mathematics. At the same time, it is not an appropriate task: "the number 5 is related to the square of the two", because there is no relation between the words. It is not important for us what and how some relation is described. Determinative fact for defining the term "task" is a presence or absence of such relation.

By the solution, correspondingly, — any task which inner relation is interpreted by the user. Such a formal definition of the task and the solutions make them for us identical relatively to the calculation and the calculation structure.

Intuitively, we can formulate this as follows: every solution is a task, but not every task is a solution.

Finally, by "not definite" property, we mean property of an object that describes the absence of an unambiguous definition for this object. Correspondingly, the range of tasks, which are not definite, is a rang unambiguous definition of which is absence.

We entrust a search for empirical base for the validity of given above definitions and their consequences to the reader, in view of the redundancy of this search for the question about the existence of quantum computer. By this, we only aim to prevent the unnecessary inflation of definitions that are more likely proved by the reader even without any scientific representation of this base.

It will be true to said that the transistor does not a computing term and an as object called "a computing term" does not exist in nature which means that the theory built on such definitions is wrong. However, the objective perception of such a statement is extremely problematic, in view of the subjectivity of quotient existence of any object in nature. Any theory of the object turns out as a mistaken by any unmistakable theory about the same object. That claim scientific knowledge as a priori unmistakable.

Prove the consistency of the computer definition 2.1 by a process of elimination

Proposition 2.1. *Let there be given computer to which complied only conditions 1 and 2. Since the computing terms are not constant and computing terms represent a task, the ability to determine the calculation of the structure at some moment for the user is absent which contradict to given.*

Proposition 2.2. *Let there be given computer to which complied only conditions 2 and 3. Since the range of tasks is define and computing terms are constant, the ability calculation of any task for the user is absent which contradict to given.*

Proposition 2.3. *Let there be given computer to which complied only conditions 3 and 1. Since the user is not able to calculate any tasks and computing terms are constant, the range of the tasks is definite which contradict to given.*

Since all three proposition contradict to given, our definition of computer 2.1 is consistent.

3 Quantum Computer

Let's start with a definition of the quantum which we give as trivial generalization of any dictionary definition.

Definition 3.1. Quantum is any particle that stays at the same moment in opposite relation relativity to its context. Such a position of a particle we call a superposition.

Case. Schrödinger's cat is at the same time stay in opposite relation relativity to the existence of cats so this cat is in the superposition.

Case. Photon, which is defined in the movement and able to exist only indirectly, stays at the same time in opposite relationship to the particle's existence of the particle so this photon in superposition.

Correspondingly, for us the quantum computer is any computer computing terms of which are in a superposition.

Define the same, but more definitely.

Definition 3.2. Quantum computer is a machine if

1. for the machine is true three properties of the computer 2.1;
2. a computing terms of which are in a superposition.

To make the picture complete, we assume meaningless for definition 3.2 count of computing terms which are in a superposition.

Case. Computing terms in a superposition is a qubits. However, our theory are also valid for qutrit, ququadrit, etc.

Theorem 3.1. *The user define calculation structure of the task concurrently with the calculation of this tasks by the quantum computer.*

Prove this theorem.

Proof. Let there be given that user define calculation structure in machine computing terms while computing terms are in a superposition and machine is a computers under 2.1.

Since the position of computing terms in a superposition is a position of at the same moment position of opposite relation under 3.2 and computing term is interpreted relatively to the task under 2.1, then the computing terms position of at the same moment in opposite relation is also interpreted relatively to the task

Since the computing term are constant at any calculation moment under 2.1 and task is interpreted by the user, then computing terms in a superposition at any calculation moment is interpreted by the user also at any calculation moment.

Since the computing term is interpreted relativity to the task by defining calculation structure under corollary 2.1 and computing terms in a superposition is interpreted by the user at any calculation moment, then definition of the calculation structure by user happened also at any calculation moment. □

Intuitively, the result can be formulated like this: for unambiguously definition of something in a superposition it follows being in superposition in other case there is no way to unambiguously define something, which defining as something in a superposition, as something in a superposition.

Case. Again, photon is clearly defined by the human who consider it in the light of physics while putting in a superposition human nature and revealing physics' patterns regardless of personal conventions of being.

The question: "Can a human be in a superposition, to be and not to be at the same time?" we leave outside the scope of given theory. However, as an answer to the question: "Is Quantum Computer possible?" we have to unambiguously definite: yes or no. Machine in a superposition which concurrently is and is not at the same time we have seen as a pure abstraction.

Let's formulate some corollaries of the theorem and look at them.

Corollary 3.1. *The user of quantum computer is in a superposition and the definition of the calculation structure is a calculation moment for the quantum computer.*

In many ways, it is obvious consequence of the theorem 3.1. However, it leaves open the question: "Is it possible to set the task so in a superposition would be the task and not the user?" In fact, the answer to this question is our theory about the existence of quantum computer and its own form. The literal answer: yes, it's possible. This problem would be the same abstraction as an quantum computer for a human, and a process of setting this problem — the theory about existents of this task.

Corollary 3.2. *The quantum computer is possible in the form of a quantum machine.*

We have built our theory on the definition of a computer for which we use an expanded definition of the machine. This allows the possibility for quantum machine for which complied two of the three conditions of the computer and computing terms of which are in a superposition. At least, theoretically.

Corollary 3.3. *The essences of quantum machine strictly determine the range of tasks available for solving on this machine.*

This corollary follows from the corollary 3.2. It seems impossible, for the human the existence of machine that work and contradict to 2 and 3 properties of the computer definition 2.1. By process of elimination we can conclude that the quantum machine can only calculate strictly specific rang of tasks. It is likely that the calculation structure of such machine is the result of design solutions of such machine. For the rest, such applied questions are beyond the scope of this theory.

Corollary 3.4. *The existence of quantum computer is excluded for a human.*

This corollary is possible, because we take the view that human as a scientific object is material object. Since the object acquires the properties of matter in the context unambiguously to something, then absurd in the definition of this object is excluded. Accordingly, from the perspective of the scientific approach, the existence of quantum computer as is excluded for the human.

Corollary 3.5. *Only the quantum computer can communicate with another quantum computer.*

In other words, if a human caught in a space where quantum computer exist, that human also will have no opportunity to interact with it as if it materialized out of thin air by magic. This corollary removes the possibility of the existence of a certain interface or any other scalable possibilities between the human and the quantum computer.

It is possible to propose the following hypothesis against this corollary: it could possible that the human already has the quantum computer per se[1] so that the quantum computer as a machine is redundant, but if we build a quantum machine and connect it to the human, we get the same quantum computer which will have scalable possibilities and which will be an interface with other quantum computer. For example, the human brain may be represented as such object.

However, even if we have a quantum machine and can connect it with the brain, we also have to define a quantum computer for defining as something which connected. Let us say that science has researched all about the human brain as a quantum computer and can determine what the quantum computer is, due to the superposition nature of some parts of such machine, an opportunity for the human to establish an unambiguously interaction and not find themself in a superposition is missing from 3.1. We can assume, even if the brain is indeed the quantum computer under 3.2 to determine this fact it would be necessary to research a quantum computer to research which is required research the brain. Such situation cannot fail inspire the scientists involved in similar researches.

4 Work with references

One of the key definition in our theory is the determinations of computing and the definitions of the task, the solution and the algorithm which related with it. We define these adjectives as nomenclature and use formal. That is different from the popular practice in the areas of science where such terms used as a subject and could be developed. For example, in numbers theory, in game theory, optimal control theory etc. The works of the great mathematician Bourbaki have expressly formulated such approach.

We refer to his work "Theory of Sets" in all matters relating to the formal definitions of computation process. In effect, what we define as "a task" that Bourbaki define as "a proof" [1, Introduction, p. 7], as "a statement" - "a mathematical theory" [1, Chapter 1, p. 16]. We only assume all possible fullness of implication from this fact.

Equally important the definition of computer and, more specific, the definition of computing term. In this, we refer to the work of Alan Turing. Turing machine is described quite elementary and at the same time high-grade, that would give us an universal definition of the computer. Formally, we use as definition of "a computing term" that what Turing called "scanned square". [5, Computing machines, p. 231] from which we conclude phenomenological definition 2.1.

To define the quantum and the superposition, as mentioned above, we use the dictionary definition which we formulate as abstract as possible. That level

[1] essentially

of abstraction allows us to use the definition even from Wikipedia [6] without doubtful that this definition will change in due to development in physics and in quantum-related fields of science.

Finally, since we are use logic as a representation of empirical experience, it should be mentioned about the researches that postulate of logic from cognitive side. As these, we use the works of Giacomo Rizzolatt "Mirrors in the brain: How our minds share actions and emotions" [4] and George Lakoff "Women, fire, and dangerous things: What categories reveal about the mind" [2].

The first work presents the results of research of mirror neuron that we use when affirm the material basis of our logical experience. In the second book contain more general conclusions about the cognitive perception of the human and some applied examples of using their in the field of science, linguistics. This examples we as model of given research.

All of this allows us affirm that our theory of the existence of quantum computer is empirically based and free from speculation.

5 Conclusion

One argument against the telepathy, that has been suggested by Stanislaw Lem [3, Chapter 8. A Lampoon of Evolution. Extrasensory Phenomena], is "evolutionary". In few words, it goes like this: the number of people which have been experienced "telepathic phenomenon" is close to zero in comparison with the number of "experiments" which have been conducted by a natural evolution during the existence of the species over billions of years, and if it failed to "accumulate" signs of telepathy, it means — there was nothing to accumulate.

We can safely assume that the creation of quantum computer solve many problems of humanity at once, if not solve them at all. Starting from the creation of a completely open society which appeared as built without cryptography, ending with the creation of artificial intelligence which knows every answer before any question.

Keeping in mind these prospects, we might ask: if such a possibility would be actually exists, would be a human to do science, society, art, etc.? If such possibilities would be actually exists even in the form of a weak-weak, very dull hypothesis, solve all problems of humanity at once and by one object, would human not use it?

If that happened, the whole evolution of humanity would be reduced to the use of such opportunity so that no one could not have been unaware of such object. However, it is very difficult to find evidence for this, even if it actually possible. The statement that Einstein created "The theory of relativity" with some preconceptions about the way of using it is extremely speculative. Perhaps, it was no less speculative even for Einstein. What for, in principle, someone may need "The theory of some relativity", especially when this theory doesn't exist?!

Counterargument for this could be a statement that everything still is in the future and humanity is only now evolved enough for make the question about quantum computer. However, this argument should be used very carefully. The statement that human evolved enough for something implicitly assumes that each human is an exact copy of itself to affirm a general relation towards to something. This assertion seems unscientific. Even replacing the word "human" to "humanity" does not change the thing.

In addition, we cannot say that research in the field of quantum physics, in quantum computation and the other areas related to the quantum computer will be useless. Researches in cognitive human nature allow us to say that everyone views at the world in the same way, but the visible world is unique according to the personal experience of perception. The human could find useful any knowledge that science develops. It allows us to look at the future with great optimism, even without the quantum computer.

References

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