Q-space theory:
An attempt to unify physics

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Part A: Preview to Q-space.

Article 1: The intuition crisis of modern physics and the initial motivation for the development of Q-space.

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Quick index for new concepts

Along this article several new concepts will be presented. The following table includes only these new concepts and refers the reader directly to their definition in the article. If you encounter one of these new concepts, but forget its definition, use this table, in order to quickly navigate in the article and refresh your memory. The concepts in this table are ordered alphabetically.

New concepts	**Definition in:**	
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1.1 My quest.

This article is hopefully the first in a sequence, which will be published in the coming years. The whole sequence of articles will be called “Q-space. An attempt to unify physics”, and it is the outcome of my private efforts to reach a total understanding of physical reality. By “total understanding” I mean both analytic understanding and intuitive understanding. The great importance I relate to **intuitive** understanding and its definition will be one of the main issues discussed in **this** article.

During the years 2001-2004 I studied electrical engineering in Tel Aviv University. The syllabus of electrical engineering includes basic courses in quantum physics (as a preview for micro-technology). Like most students I found it difficult to accept many of the quantum physics ideas, which seemed to be so far from our intuition. Eventually most students around me simply accepted the mantra repeated by our lecturers saying that “the human intuition is not built to understand modern physics”. However I expanded my search and begun a “quest” for the **intuitive** understanding of the physical elements.

In the academic year 2004-2005 I requested to transfer to the faculty of physics. There I believed I could find a deeper physical understanding. Since some of the first year courses in physics were not in the syllabus of electrical engineering and were a demand for later courses, I had to begin from the first year of physics and I did so with joy.

The syllabus included a course in special relativity, and there again I found myself in front of lecturers explaining how the human mind cannot intuitively understand the analytic conclusions of relativity. Again I was not ready to give up so easily, so I spent most of the summer of 2005 trying to intuitively understand special relativity.

Eventually, during August 2005 I had what I believed to be a breakthrough. Using a revolutionary idea about the essence of space-time, I managed to achieve both intuitive and analytic understanding not only of special relativity, but also general relativity and basic quantum physics as far as I knew at the time. It seemed as if a unification of modern physics was suddenly in my reach!

I called the new idea “Q-space” (the reason for this name will be given later). As I began to write it down I understood that I was using geometric concepts, which haven’t yet been defined. In order to formulate “Q-space” properly I needed first to formulate a new geometry, which I simply named “Q-space geometry”. Q-space geometry itself was not based upon the so-called “real numbers”. I felt that I must redefine a new numeric system, hence invented the “intuitive numbers”, that hopefully will be presented in the following articles.

After the initial breakthrough of summer 2005 I temporarily quit my university studies. I wanted to devote my spare time solely for the verification and formulation of Q-space. For the last two years I have reviewed the relevant geometry and formulated “Q-space geometry” and “intuitive numbers”. When I applied kinematics

on Q-space, Lorenz's equations were immediately received from **energy** considerations.

I have also reviewed general relativity, and quantum physics, but in these domains my mathematical capabilities still need improvement. Hence it may take me several years to totally formulate them in terms of Q-space, **unless help will be offered to me**. However, I can say that in the intuitive level Q-space not only explains any physical result I am aware of, it actually predicts it from a totally different direction than that of modern physics.

Intuitive paradoxes like: length and time dilation/contraction, bent spaces with more than 2 dimensions, duality of light and mass, the tunnel effect, the non-deterministic nature of quantum physics and Bell's theorem are all **intuitively** natural in Q-space. In other words, once you understand Q-space's elements, you will be able to actually "see" why all the issues above are not paradoxes at all. They are actually the natural and most intuitive results of Q-space!

Q-space will not contradict "string theory", which is presently regarded as a candidate for the unification of physics. While developing Q-space I didn't intend to connect it with string theory, but when I tried to explain the nature of particles by Q-space, I understood how Q-space may regard particles (by approximation) as "strings".

Since I am presently not involved in the academy, I find it hard to publish my work in the usual way. I am using the Internet and other methods in order to spread out my theory and validate it. In order to make the articles accessible freely for anyone I constructed a special web site to contain them. Copies are also kept in the Israeli national library, in order to prevent academic theft (which history is full of).

When trying to explain my ideas to others, I find they are too revolutionary to be directly presented without preparation. **This article** explains the problems of modern physics in **my** eyes, and emphasizes the **intuition problems** overall. It shows how all the intuition problems can be pinpointed as originating from two basic problems.

Along this article we assume that the human mind **can** intuitively understand modern physics! This assumption is the motivation, which will bring us to some revolutionary conclusions later on. **This** article will not be finished with a solution to anything. It will merely point out where the **intuition problems** of modern physics are and what must be reviewed in order to reach a deeper and total understanding of physics.

Just before "diving" into this article and the following ones, I would like to remind you that this is "an **attempt** to unify physics". Although I strongly believe in Q-space, I am aware that theories constantly rise and fall. Only if Q-space will succeed in explaining all the known elements of physics, and will not be contradicted along the way, could it be regarded as a unification of physics. But even if Q-space **will** reach that state and be accepted by the mainstream physics community, we may never be sure it is the "truth". At the most it may be a guess that works. Anyway I am releasing a new idea out into the public domain and I am inviting you to check it and contribute to a new debate…

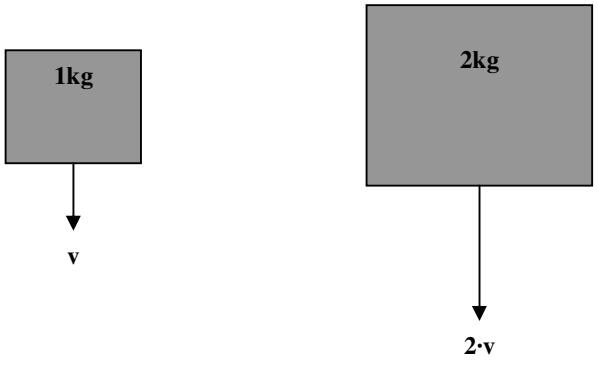
1.2 The physical intuition crisis.

"Q-space" is the outcome of my private attempts to reach a comprehensive **intuitive** understanding of the elements of physics, especially modern physics. I emphasized the word "**intuitive**", since it is hard to find a scientist these days that thinks the human mind is even able to intuitively understand modern physics! On the contrary, since the theories of relativity and quantum physics have been accepted (in the beginning of the 20th century), scientists seem to have lost their trust in intuition. Phrases such as "the human mind cannot understand the duality of light" or "our mind cannot comprehend a 3-dimentional bent space" or "in order to understand a system you must be external to it, thus we can never fully understand our universe", are commonly used.

Let us call a state as mentioned above, in which scientists stop believing in the ability of the human mind to comprehend with physical reality, "**physical intuition crisis**". Since the acceptance of relativity and quantum theories into the scientific main stream, physicists are truly experiencing an intuition crisis!

Actually, intuition has **failed** humanity many times in history. "Intuition" has, for example, led some people to believe that the earth is flat. I myself remember how I used to watch the sun set and rise at the age of 5 and believed it passes through a tunnel in the ground from west back to east during the night. Magellan[1] proved the earth to be round by circling it in the 1520's. But long before Magellan, the assumption that earth is round was well established based on simple geometrical observations.

Aristotle's[2] intuition led him to claim that the free-fall acceleration of a body is proportional to its weight. Heavier bodies allegedly fall faster. According to Aristotle, if we take a body weighing 1kg and a body weighing 2kg and drop them simultaneously from a high tower, then the 2kg body will encounter the ground first and its speed will be double of that of the 1kg body at the same moment in time. Prof. Yoram Kirsh mentions in his book "The universe of modern physics"[3], that tests show how most people **today** still think **intuitively** like Aristotle.

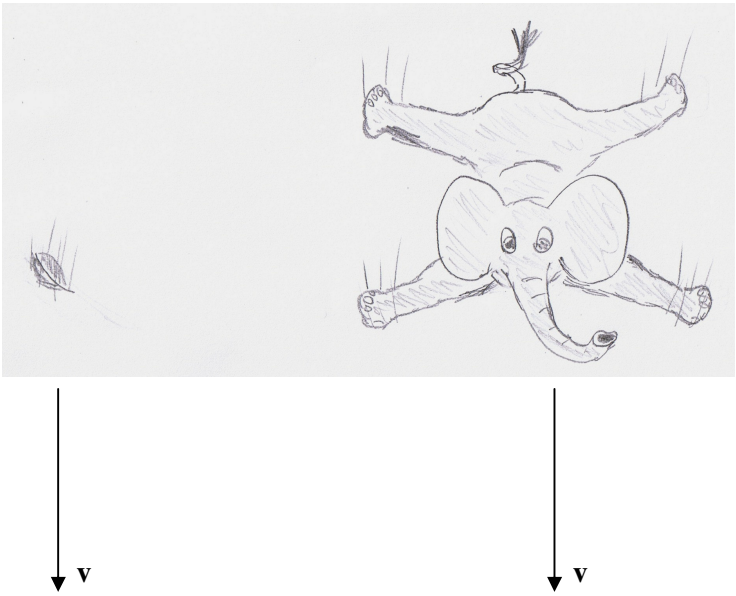


[1] Ferdinand Maggellan 1480 – 1521 a.c.
[2] Aristotle 384-322 b.c.
[3] Am oved publishers, Tel Aviv 2006.

At the end of the 16th century Galileo[4] proved this to be wrong. Both bodies will arrive on the ground at the same time and with the same speed (when we neglect the friction of the air). Galileo went further and claimed that every mass falls towards the earth with the same constant acceleration of 9.8 [meter/second^2]. This acceleration was called after him "g" and was strongly supported by experiments.

Indeed, the discoveries made by Galileo, Magellan and many others during the 16th -17th centuries, which are considered as the beginning of the "scientific revolution", show we cannot totally rely on our intuition to describe the world. **We must check our intuitive assumptions by scientific means**, meaning by physical and logical experiments.

However, I cannot say that the scientists at that time were experiencing an "**intuition crisis**". The discovery that the earth is round was completely consistent with the previously well-known geometrical reasoning, which was also very intuitive in its nature. Galileo's "g" acceleration could also intuitively be accepted, **since it was imaginable**. For example it is not beyond our mind's capability to imagine how a feather and an elephant will fall down to earth in the same acceleration through vacuum (in order to eliminate the friction with air). The last picture may **sound** peculiar, and certainly isn't coherent with our daily experience, but it **is** imaginable. Hence we can train our intuition to accept it. I think that the mind of most physicists is not bothered too much by the discovery of "g". On the other hand, they may spend their whole lives frustrated from their inability to clearly picture the elements of modern physics. This, more than all, implies that **Galileo's** discovery, unlike the elements of modern physics, **can** be intuitively accepted.



[4] Galileo Galilei 1564 – 1642 a.c.

There is a great difference between "**acceptance**" and "**understanding**" of a given phenomenon. Galileo's discovery of "g" was indeed accepted, since it was easy to verify it by simple experiments and it was rapidly beginning to have great practical use (especially for calculation of ballistic orbits for cannon balls). But **why is the free-fall acceleration always equal to g** (as far as scientists could measure in those days)**?!** Galileo or any other scientist of the 16th century could not answer this question. Galileo's "g" was accepted, but not truly understood! It was actually regarded for over a century as an axiom of nature.

Only when Newton[5] presented the "law of gravitation", at the end of the 17th century, was the free-fall acceleration understood. According to Newton, a force "F" is created between any two given masses "m_1" and "m_2" such that:

$$F = G \cdot \frac{m_1 \cdot m_2}{r^2}$$

Where "r" is the distance between the masses and "G" is a universal gravitational constant ($G = 6.67 \cdot 10^{-11}$ [$N \cdot m^2/kg^2$])

According to Newton's "second law": F = m·a (where "a" is acceleration). Thus, if we apply a force "F" on a body and we want to find the acceleration of the body, we must calculate F/m. Let us note the mass of some body in free-fall towards earth as "m_1" and earth's mass as "m_2". In the 16th-17th centuries all the experiments in free-fall acceleration were done in small distances from the ground (relative to earth's radius). Thus we may substitute the parameter "r" with earth's radius (earth's mean radius is 6,372,797 [m]).

When substituting all the given parameters we receive:

$$\frac{F}{m_1} = G \cdot \frac{m_2}{r^2} = 6.67 \cdot 10^{-11} \cdot \frac{5.9736 \cdot 10^{24}}{6{,}372{,}797^2} = 9.81[\frac{m}{\sec^2}] = g$$

Hence the free-fall acceleration of any mass close to earth's surface is Galileo's "g". **This is definitely an explanation.** Therefore if we accept Newton's law of gravitation we **can** say that **Galileo's "g" is <u>understood</u> as a private case of Newton's law of gravitation.**

Newton's law of gravitation is universal. It was believed to be valid anywhere in the universe. Actually Newton developed this law while trying to explain the kinematics of the planets in means of force. He didn't initially intend to explain Galileo's "g". The latter was only a side effect that contributed to base his new theory on solid grounds.

Of course now that "g" was understood (by Newton's law of gravitation), a new problem was created. The universal gravitational force became accepted as an axiom of nature. But it wasn't understood and no explanation to its source was given until Einstein's general relativity was introduced (only in the beginning of the 20th century).

[5] Issac Newton 1643 – 1728 a.c.

This is a classic example of how any logic theory always has limitations and must be based on certain axioms. The axioms, by their nature, cannot be explained, **thus cannot be understood**. At the most they can be accepted. When a new theory rises and **does** explain a certain axiom, it pushes our limits of understanding further, but it will still have its own limits and axioms.

I would now like to define some concepts, which will be used throughout my articles. The example of "g" will be used to emphasize their meanings:

Intuitive acceptance: The acceptance of a certain phenomenon based on an imaginable picture of it.

> Aristotle's claim that the free-fall speed of a body is proportional to its weight was intuitively accepted for over 18 centuries until it was proved to be wrong. We can easily imagine the picture of a heavier body falling faster than the lighter one. Therefore we can intuitively accept Aristotle's **mistaken** claim. On the other hand it is also possible to imagine the picture of two bodies with different weights falling at the same speed (remember the feather and the elephant?). Thus Galileo's **correct** claim can also be intuitively accepted.

Analytic acceptance: The acceptance of a given phenomenon based on experimental results and/or **scientific logic**. By "scientific logic" I mean an argument based on a given axiomatic system, which does not contradict any former experimental result.

> Galileo's "g" was analytically accepted in the 16^{th} century since it was based on experimental results. After Newton, it was also accepted since it was based on firm scientific logic (Newtonian physics).

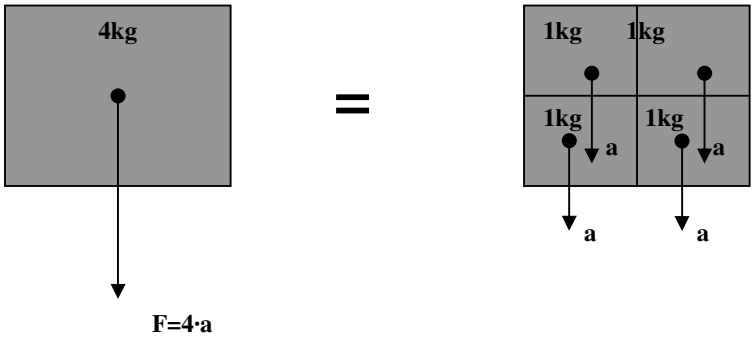
Analytic explanation: The explanation of a given phenomenon based on a scientific logic and not only on experimental results.

> The calculation of "g" based on Newton's law of gravitation is an analytic explanation of "g". Such an explanation assumes we first analytically accept Newton's second law and the law of gravitation; i.e. it is based on the scientific logic of Newtonian physics.

> In an axiomatic system, where a given phenomenon is analogous to a theorem, then the analytic explanation is analogous to the theorem's proof. If on the other hand the given phenomenon cannot be analoguous to a theorem. It can only be referred to as an axiom. Thus it cannot be analytically explained within the given axiomatic system. At the most it can be analytically accepted.

Intuitive explanation: The explanation of a given phenomenon based entirely on imaginable pictures, by means of **other** more fundamental phenomena, which have previously been intuitively accepted.

I claim that the concept "force" is intuitively acceptable, since we can easily imagine how a certain body is pushed or pulled and relate a corresponding vector to it. According to Newton's second law, F= ma; i.e. we may imagine that every unit of mass in the body is simply accelerated by "a" and interpret Newton's second law simply as a **definition** of force in terms of acceleration. If we relate a vector of acceleration "a" to every mass unit in the body, then we will receive a most intuitive concept of force as the sum of all these vectors. Notice also that acceleration is what we practically **feel** when force is applied on us.



Of course it would be much more comfortable to use a single vector. Therefore the notation of the single vector "F=ma" **will** be used and we may keep in mind its intuitive meaning.

If we intuitively accept the concept "**gravitational** force", then it is intuitively obvious that "g" is the acceleration, i.e the force per unit mass, of a body in free-fall close to earth's surface. Intuitively we can use the same process above and isolate an acceleration vector that will turn out to equal "g".

We have explained "g" based entirely on imaginable pictures, by the means of other more fundamental phenomena (force and acceleration), that have previously been intuitively accepted. Therefore we may claim that "g" has been intuitively explained.

The intuitive explanation of force via acceleration as given above may be satisfying for the example of free-fall but cannot be applied on every case where forces are involved. For example, if someone holds your right hand and pulls you to the right, while someone else is pulling you to the left through your left hand, then you may not accelerate at all. But you will certainly **feel** the force.

It would be in place here to mention that Newton himself, felt intuitively uncomfortable with the idea that gravitation involves "interaction from a distance". We cannot **see** what exactly pulls masses towards each other, thus the gravitational force is less intuitive than other forces. I believe Newton would have said that he does not

"**intuitively accept**" his gravitational force. For him it was merely an "**analytic explanation**" for the kinematics of the planets and interaction between masses separated by distance.

Analytic understanding: If we can **analytically** explain a given phenomenon, then we say that we have an "analytic understanding" of it.

For example, Newton's law of gravitation gave us an analytic understanding of "g", but not of gravitation itself.

Intuitive understanding; If we can **intuitively** explain a given phenomenon, then we say that we have an "intuitive understanding" of it.

For example, an intuitive acceptance of Newton's law of gravitation gave us an intuitive explanation of "g", therefore we intuitively understand "g", but not gravitation itself.

Intuition problem: If a certain phenomenon, concept or result in a given theory cannot be intuitively **accepted**, although it **can** be **analytically** accepted, then we would say that this phenomenon is an "intuition problem" of the given theory.

For Newton the law of gravitation was an "intuition problem" in his theory, since he didn't **intuitively** accept the idea of action from a distance.
In number theory the so-called "irrational numbers" have been analytically accepted since the time of ancient Greece, but still confuse many students, because they defy our intuition, thus they are an "intuition problem" of number theory.

Total acceptance: If a given phenomenon is both analytically and intuitively **accepted**, then we may say it is "totally accepted".

Total understanding: If a given phenomenon is both analytically and intuitively **understood**, then we may say it is "totally understood".

I believe that "total understanding" is the highest and most desirable level of understanding. However, one of the most important lessons of the "scientific revolution" is that **the laws of nature can be proved only by analytic measures**.

Galileo's experiments produced an **analytic** acceptance of "g". **An analytic acceptance alone** does describe physical reality under the circumstances of the given experiments, hence **can be regarded as a proof for the existence of a certain law of nature**. We can later check if the analytic acceptance is imaginable. As stated previously, we **can** imagine the picture of different masses (the feather and elephant) falling at the same speed, when friction is neglected. Hence the initial **analytic** acceptance **can** later be translated into the **intuitive** acceptance in the case of "g".

From the last paragraph it should be understood that an analytic acceptance is enough to prove a law of nature. An analytic **understanding** is even more than enough. But an **intuitive** acceptance or/and understanding is not only insufficient,

it may even mislead us! Therefore **why is an intuitive understanding or acceptance desired at all?**

First because most people, prior to their studies in university, **feel** they understand a given solution once they **intuitively** understand or accept it. An analytic explanation alone may leave us mentally unsatisfied, while an intuitive explanation alone **does** satisfy most people, although it can't be considered as a proof! Unfortunately, students in universities barely have the time to even **analytically** understand many issues under their studies. As time goes by they accept the "fact" that not everything, or actually hardly anything, can be **totally** understood. Analytic understanding becomes their only desire (because that is what is needed in order to pass the exams) and they forget their natural pre-academic intuitive desire.

Second, **and probably much more important scientifically**, a scientist motivated by intuition can "**see**" some general picture in his mind. Once the scientific problem is translated in to an intuitive picture, we can aim our efforts directly to the target, because we can **see** the target in our minds! The intuition **may** be false. In that case we may disprove our theory by aiming to the imaginary target. A disproof is by it self an accomplishment. On the other hand a scientist working without intuition is like a blindfolded man trying to hit a target. His success depends on luck, and he will probably work much harder to achieve results, if at all.

Hopefully, by now you are convinced that intuitive understanding **is** desirable and useful for solving scientific problems. But if you are familiar with modern physics you may have good reasons to believe that a **total** understanding (analytic **and** intuitive) of physics is impossible. The present "intuition crisis" seems to be based on solid grounds. Let us review the major intuition problems in modern physics in order to try and understand **why was intuition pushed aside in the 20th century?**

In the domain of relativity, we encounter concepts as "time dilation/ contraction", "length dilation/ contraction" and "bent space-time". An example of a 2-dimentional bent space is commonly given with a paper or some other sheet. Many times some kind of weight is put on a stretched sheet in order to embody how mass bends the 2-dimentional space. Such an embodiment **is** sensible, imaginable and intuitively acceptable. But trying to imagine a **3**-dimentional bent space in an analogue way seems to be impossible, not to mention that general relativity deals with a **4**-dimentional space-time! This perception of space has become a convention along the 20th century. Hence the conclusion that the human mind cannot perceive the world, as presented by general relativity, seemed inevitable. As for time and length dilation/contraction, I found no **intuitive** explanations at all.

In the domain of quantum physics, there is a bunch of intuition problems:

1. The non-deterministic nature of quantum physics: The equations of quantum physics do not enable us to determine the state of a given system in the future from its present state. We can only calculate future probabilities for states. Besides the

fact that this defies the previously deterministic scientific view, it seems to defy our common sense. How can the fundamental laws of nature be similar to those of a big lottery game? For many people this seems very difficult to accept. Einstein[6] is usually quoted in this context as saying "god does not play dice". However experiments have repeatedly confirmed this non-deterministic nature of our physical reality. It seems to be difficult to discard the above conclusion of quantum physics as a simple misinterpretation of the equations (which undoubtedly work).

2. The duality of light and particles: Light turns out to be both a particle ("photon") and an electromagnetic wave. Any entity having mass also turns out to hold both features of a particle and a wave. The intuition problem here is that we tend to think of particles as tiny rigid bodies. As such, they should have an accurate and single location in space at a given moment. On the other hand, we tend to think about waves as the transformation of some kind of disturbance through space. Waves spread out in all directions hence have the unique feature of superposition. So as for spatial features, waves and particles seem intuitively to be opposites. And yet quantum physics proves the contrary. Any particle is also a wave!

3. The tunnel effect: Particles in quantum physics may pass barriers in cases, which are intuitively impossible. Analogously to our daily experience, it would be like seeing someone pass to the other side of a wall without climbing on top of it (because he lacks the energy). Our simple intuition tells us this is possible only if the man passed through some tunnel in the wall. But the actual presence of such a tunnel hasn't yet been verified and the subject is still intuitively unsolved as far as I know.

I am sure that many additional intuition problems can be found in the domain of quantum physics. It is probably the most bizarre of all the present fields under scientific research and a source for many philosophical speculations. But the theory of "Q-space", which I intend to present, was originally developed to give solutions to the problems above. Along the way, I found that "Q-space" explains much more, and if it is a good guess of physical reality it should be expected to explain any physical phenomena, which now seems bizarre.

Just for clarification, I do **not** doubt relativity or quantum physics. Both theories are well established and backed up by many experiments and technological achievements. I merely emphasize that I found no explanations for these theories, which I could consider as **intuitive**.

[6] Albert Einstein 1879 – 1955 a.c.

So let's go back to the question "why was intuition pushed aside in the 20th century?". Because, at the least and as far as I know, no one managed to give firm intuitive explanations, which became a convention, to:

1. Length/time contraction/dilation.
2. Bent spaces (with more than 2 dimensions).
3. The non-deterministic nature of quantum physics.
4. The duality of light and mass.
5. The tunnel effect.

Another great problem of modern physics is the lack of a unified physical theory. We see that relativity works very well in macroscopic scales, but fails in microscopic scales, and quantum physics works very well for microscopic scales but fails in macroscopic scales. In other words they seem to complete one another. We would expect them both to be private cases of a greater unified theory. It simply seems too strange to think that two different sets of rules govern the same reality.

I **am** aware of the rising "string theory" and the claim that it may unify physics. Personally I even sympathize the ideas of string theory, although I can not yet cope with its math. But string theory hasn't yet brought a final solution, as far as I know. I intend to show in the future how string theory is an approximated theory of Q-space under certain circumstances. As such string theory's resolution is limited and it will not supply the final unification of physics, although it **is** a great step forward.

After reviewing the intuition problems of modern physics we now have to make a choice between two philosophical options:

a. There is no intuitive explanation for all the presented problems, hence the only way to proceed towards the unification of physics is analytically. We may even accept the idea that a complete theory is beyond our reach both intuitively **and** analytically.
b. We assume that an intuitive understanding of modern physics **is** possible, although it is totally unclear how at the moment. Furthermore, once we achieve an intuitive understanding we may **see** how to unify physics in a simple intuitive way. Of course the analytic understanding will follow.

As you can probably guess, I chose option b.

Once we have chosen option b, what is the next step? Well first of all we must know what to ask. A question like "why don't we intuitively understand…" will bring us nowhere. It is a negative question. It is like asking a child "why are you bad all the time?". The question states that the child is bad as a "fact" and leaves no hope. Similarly the first question states that we don't intuitively understand this and that as a fact, and doesn't point out were the solution may come from. Instead we should ask: **In order to intuitively understand the given problem what material must we review?** When we review the material pinpointed by this question, we will probably find "sub-problems" of the original one. Once all the sub-problems are intuitively understood and resolved, then the intuitive solution for the original one will appear together with the analytical explanation.

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In the next section we will begin this process. Surprisingly, we will find that all the major intuition problems of modern physics may be reduced to two intuitive sub-problems.

1.3 Pinpointing the intuition problems of modern physics.

Modern physics may have all kind of analytical problems when trying to explain certain experimental results, astronomic observations or when it is practically applied in certain technologies. But I claim that modern physics turns out to have only **one** major **intuitive** fault.

In special relativity, the intuition problem is how to deal with time and length dilation or contraction. When it is said that the human mind can't understand these phenomena, it is obvious that something in our perception of length and time is basically wrong or incomplete. Asking "Why is our perception of length and time wrong or incomplete?" is the "negative" question, which leads us nowhere. Instead we should ask: "what do we need to review in order to totally understand length and time?".

An immediate answer can be: "We need to review the **definitions** of length and time". In order to review the definitions of length and time we must review the elements of geometry.

In general relativity, we seem to have a problem to imagine any bent space-time including more than 2 dimensions. Here it is obvious that the problem lays in our inappropriate **space**-time conception. In this case the problem is **not** limited only to the concept of **length**-time as in special relativity, but to the **total** concept of "**space**-time", where length is included. A positive question can be: "What do we need to review in order to totally understand space-time?"

The answer here is direct: We have to review the whole geometric theory used in general relativity, not only the definitions of length and time within it!

In quantum physics, I mentioned 3 intuition problems in the last section:

1. The non-deterministic nature of quantum physics.
2. The duality of light and mass.
3. The tunnel effect.

Let us begin from **the duality of light and mass**. Assuming there is an intuitive explanation for this strange phenomenon, what must we review in order to intuitively understand it?
It may seem slightly difficult to answer this question directly. So let us reexamine what seems so strange to us. In our conventional intuition, a particle's location can be well determined in space and time, while a wave spreads out and isn't confined to a single location. We see the intuition problem is a problem of location in space-time! Now let us ask again: What do we need to review?

I believe the answer "we need to review our geometry" will again make sense.

The tunnel effect seems so strange to us, since we are thinking about particles in the classic way. Waves **can** pass barriers. For example think about a sound wave passing a wall. So by accepting the wave feature of the particle as an explanation for the tunnel effect, we reduce this problem back to the duality problem, which has already been dealt with.

The non-deterministic nature of quantum physics is different from all other problems stated above. I couldn't solely relate it to some kind of geometric misunderstanding, although I did have a strong feeling that if I first attended the geometric issue joint to all other problems, then this problem would also be solved.

Actually a semi-spiritual and yet intuitive explanation for the non-deterministic nature **is** available. If we assume particles to have "free-will" as for choice of location in time, then we may imagine how the wave function presents the probability of finding a particle at a given location when a certain "topography" is forced.

As an allegory think about a group of a million people living in some comfortable valley. Imagine that they are surrounded by high mountains and their only means of transportation is by foot. How many of them will try and cross the mountains?
I guess that most of them will stay in the comfortable valley. Sometimes some will climb a slight distance up the mountain just to get a better view of their valley, but the higher we go the fewer will attempt to climb. Several people may have a special adventurous nature and actually climb on top of the mountains and pass to the other side. The number of these people depends on the difficulty of the task.
We may measure the number of people that reach every height and create a function describing the probability that a random person from the valley will reach a certain height. This function will not be able to predict the action of a single man at all, but will have great accuracy predicting the action of the whole population. Such a function will resemble a wave function in quantum physics! Hence implying wave functions in quantum physics to be functions of free will!

The idea of particles having free will and even a "splinter of a soul" is actually very ancient and can be found in various religions including Judaism. It is also appealing for those who are seeking the origin of our own free will. But as physics is concerned it does not leave many places for further physical research, since it brings physics to a domain tangent to philosophy. This result is blessed, however there is still a lot of physical work yet to be done. Such physical work can be done if we refer again to the geometric problem. Furthermore, solving the geometric problem may influence this issue and reveal some other intuitive solution for the non-deterministic nature of quantum physics.

Conclusion:

If a total understanding of modern physics is possible, then a fault in our space-time conception is the source of the present intuition crisis. In order to find this fault we must review our geometry.

Furthermore, if the **same** misconception denies us from intuitively understanding **both** separated theories, which haven't yet been unified, does this imply how to find

the "**physical missing link**", which can unify all physics? In other words, will a total understanding of physical geometry lead us directly to the unification of physics?

Assumption: **Geometry is the intuition sub-problem of modern physics.**

The assumption above is by it self a strong motivation for reviewing **physical geometry**. By "physical geometry" I mean only the geometry applied in physics. In mathematics and other sciences we can find many types of "spaces" (that are also types of geometry), which do not necessarily have any connection to physical reality, although some of them **do** have great practical use and simplify computations. However it is unnecessary to review any geometry that isn't applied in a fundamental physical theory. Only in the **physical** geometry we will find our **physical** intuition problems.

In the following articles (that will hopefully be published in my web site within a few months) I will review the relevant issues of physical geometry and seek out its intuition problems. Only after we refine these problems out of the physical geometry will we be able to proceed.

1.4 Appendix: The highlights of Q-space.

As I mentioned in section 1.1, this article is intended to be the first in a long sequence that will gradually reveal the theory of Q-space. Editing and publishing the whole theory may take over a decade. While doing so I may be taking a personal risk. Scientists who understand the general idea of Q-space may precede me and publish (and get the credit) for articles in topics I haven't reached yet.

One solution for the "problem" above could be to wait until I edit the whole theory and only then publish it. Such a solution would postpone the publication of "Q-space" for many years, but seems safer. I **have** considered it, but finally rejected it. As you could have understood from this article, intuition is most important to me and in this case intuition told me to publish now.

The second solution I came up with is to reveal the highlights of Q-space in the first article. By doing so I hope to prevent any arguments in the future regarding the origin of certain theoretical ideas. Furthermore, it will open the door for free cooperation with other scientists, since I will feel safer. Such a cooperation may eventually help to accelerate the publication of the whole theory as a result of teamwork.

Therefore I will now specify the highlights of Q-space as far as I could do so in this early stage. I guess that many of the coming highlights will seem unclear, controversial and even contradict some well-established elements of modern physics. I guarantee they are all based on a firm axiomatic system and all apparent contradictions to present physics will be dealt with as I reach the relevant articles in the future.

These are the highlights:

1. An infinite discrete quantity can be created in a single action. I will name this quantity "Q" (this is the basis for "**Q**-space").

2. "Q" creates an infinite discrete dimension, which is the basis for a new number theory. I will name this theory "Intuitive number theory". Although discrete infinity has a theoretical existence in intuitive number theory, it will not have any practical use. Infinitesimal quantities and irrational quantities will be irrelevant in intuitive number theory. At the most we will speak about their approximations.

3. A new geometry called "Q-space geometry" will be based on "Q". All fundamental concepts of physical geometry will be redefined and the concept "length" will be dramatically changed. The flexibility of length as implied from relativity will suddenly become obvious. I will also show how we can create as much dimensions as we like from "Q" and reveal a way to intuitively understand bent spaces with any number of dimensions.

4. I will conclude from Q-space geometry that the whole physical universe can be one unity and yet every point in the universe has a special uniqueness. The different points and objects in the universe will be shown to be different "focuses" of the same unity. In other words the differences in our universe are no more than the different faces of the same thing. As much as this may sound spiritual more than physical at this point, it **will** be backed up by firm physical theory!

5. Once we will assume that "Q" is actually what we call "energy" we will see how Lorenz's equations appear immediately out of energy considerations! Suddenly the kinematics of special relativity and time/space dilation/contraction will become the most natural and intuitive conclusions! The initial connection between "spatial energy" to our presently used energy types will be established through the connection to kinetic energy in the preview to Lorenz's equations.

6. The speed of light will be discovered as the ratio between the energies of different dimensions. I will explain why we cannot directly detect any movement faster than light. But I will also explain how energy **is** transferred in faster than light "pseudo-speeds" and show how this may be connected to the tunnel effect!

7. Time will be understood as the energy supplier and the spatial dimensions as the energy consumers. The concept "time" will actually be divided into two sub-concepts: "source-time" and "personal-time". The source-time will be related to the energy supplier and the personal-time will actually be related to the excess energy that a receiving spatial dimension did not consume. The personal-time is what we intuitively call "time".

8. By diverting the supplied energy from one spatial dimension to the other we may change our location in space, but we can never actually go backwards in space. The illusion of going backwards is created only by relative motion.

9. Since the time dimension is the **only** energy supplier, it cannot divert its energy to any other energy supplier. Thus we cannot change our location in time as we can do in a spatial dimension. This determines the uniqueness of time in regard to all other dimensions. However it does not mean that time traveling is impossible.

10. Travelling faster in a straight line means consuming more energy and leaving less for personal time. Thus time seems to slow down and we receive the famous effects of special relativity.

11. **Space-time is energy** and together with Einstein's equation "$E=mc^2$" this will mean that all physical quantities in the universe are types of energy!!

12. Mass is created where energy is transferred from one spatial dimension to the other in a rotation. It will be evident from Q-space geometry why mass bends space-time.

13. Q-space will solve the problem of singularity in Lorenz's equations. It will be shown through energy considerations that light has no time at all! Travelling at the speed of light will simply mean transferring no energy at all to other dimensions. Thus mass could not travel at the speed of light because it is created (by its definition) only where energy is transferred in rotation between the dimensions.

14. Since "Q" is discrete, there is a bottom limit for the length of any one of the space-time dimensions. This will explain why **any** type of energy must be transferred in quantums.

15. The smallest mass possible in a given space will be called "point-mass". When many point masses at different speeds interact at close distances, they may be regarded approximately as a string. This is where Q-space will be tangent to string theory and will therefore connect to quantum physics.

16. Q-space will back up the theory of "parallel universes". Our physical reality will turn out to be one out of a practically infinite number of possibilities. However I will not claim that all the possibilities actually have physical existence, such as ours. Instead our universe is merely the possibility in our focus and not all possibilities are necessarily in anyone's focus.

17. The universe is built only from discrete periodic functions of "Q" and their superposition. It is created from beginning to end in a few actions. Any change of the universe may be done only through a change of the periodic functions, hence changing the past, present and future of the universe in one action. This means that the future cannot be changed without changing the past!

If the highlights above did not make much sense to you, don't panic. They were not meant to make sense at this point. They were merely written down as a means of personal protection against academic theft. Explaining their reason and proving them is the issue of Q-space and is expected to take many years. If you keep on reading the following articles, I believe that everything will eventually be clear.

I imagine that the things I have written in this section and the tone in which I did so may sound arrogant to some readers. If they do, this was not my intention. I should again remind that Q-space is an "**attempt** to unify physics". The responsibility and obligation to provide proof is totally mine and I don't expect anyone to automatically accept this theory. Furthermore, I may indeed be mistaken. Although I have constantly found only confirmations to my theory along the last two years, there may be many factors I am not yet aware of. If someone will provide me in the future some solid evidence against my theory, it is my obligation to admit my mistake and publish it in my web site. However **I request the critics to be patient and attack only the issues of the published articles**, since I declare here ahead of time that many of the allegedly contradictions to present physics in the above highlights **will** be solved later on.