THE PSYCHOENERGETIC WORKS OF W.A. TILLER: PSEUDOSCIENCE, OR IS IT?

A journey through the methodological landscape in order to find common ground for the descriptive and prescriptive approaches on science

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ABSTRACT

This thesis deals with the natural sciences. In it we shall see that the history of science teaches us that there exists no scientific method which on can follow to gain results and in fact, that the thing which we call the scientific method is nothing more than the inherent and fallible human problem solving ability. Together with the slow but constant evolution of the scientific enterprise, makes it impossible in principle to determine whether or not can be classified as a science. Furthermore, we shall learn that in using science as a classification, we are dealing with a vague predicate; a linguistic construction which depends on the context in which it is used and when the context is clear, there is no clear way to demarcate one end from the other. Most vague predicates are one dimensional; for example, hot versus cold which deals with temperature. In determining the nature of an object regarding its scientific status, a vast amount of intertwined dimensions must be considered. Therefore we will speak of a landscape. In relation to its nature I have named it the methodological landscape. In this thesis we explore the methodological landscape by using the work of Prof. William A. Tiller as an agent. I have chosen this work because of my personal interest in the work and its generally regarded controversial nature by the scientific community, where at the same time the work has been done by people with a well founded background in established science. By its controversy, we shall be better able to identify the nuances within the methodological landscape, because we don't take things for granted. By the people who work with it, we shall not encounter trivial errors through which we can easily discard the work as a science and lose our agent.

Firstly we shall establish a demarcation procedure with which to regard our object of study. After this we will study our object. In one sentence, the work of Prof. Tiller is an expansion of current science to include consciousness. Lastly, we investigate the place of our object of study within the methodological landscape, by combining the previous two results. We will find that most of the theoretical aspects which define a science are met, but that the most important factor misses: acceptance within the scientific community. The non-acceptance turns out to be for the greater part a sociological factor which is an intrinsic part of science.

The scientific nature of Tillers works stand or fall by the factuality of his data. By the prescriptive approach, there must be a serious investigation by the scientific community on this matter. However, the descriptive approach teaches us that we should not do this. For this is not the way we learn anything of the true nature of science. This thesis recognizes both the prescriptive (or normative) and descriptive approaches of looking at science and classifying what it is. It investigates them both and makes the first steps in finding a common ground of these two visions trough which they can be reconciled.

We find a common ground in the definition of scientific work. A descriptive definition would be to define scientific work as contributing in some way to that which the community classifies as science. A prescriptive definition as expanding the generally available and testable knowledge of everything which surrounds us. The problem lies in how to decide what is knowledge of the world around us and what is hot air. There is no way to decide this. The best we have is our combined efforts. The best of combined efforts we have at the moment is the general consensus of the scientific community as a whole. Now, as this is a human enterprise, it cannot be objective. Therefore it is of utmost importance that the ideals are held high, sought after and discussed. This is the common ground for the descriptive and prescriptive account of science.

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INTRODUCTION

In this thesis we will examine the psychoenergetic work of William Tiller in order to learn something about its "'scientific-ness." In the process, we anticipate to discover a lot of things about 'science' and thereby gain a more complete understanding of this phenomena. This thesis will deal only with the so called natural, or exact, sciences. It does not make any assumptions as to the applicability of the insights gained outside this phenomenon. For a better reading, often something like 'natural science' is abbreviated to 'science.'

The thesis is ordered in three sections. The first one deals with the question: what is science? The goal of this section is to obtain some kind of criterion or procedure through which we can reflect on the work of William Tiller and see whether or not we're dealing with science. In the second section we look into psychoenergetics as proposed by W.A. Tiller. We shall consider the background of the people involved, the philosophical ideas of Prof. Tiller regarding the subject matter, the reason why he names his work 'a second scale Copernican revolution.' Also we will look at the research which is done, some anomalous effects which have been encountered in the research and the theoretical framework which is build in order to deal with this matter. The final section deals with answering the main question of this thesis: is the psychoenergetic work of William Tiller science?

Each section is again divided in paragraphs (e.g. 1.6) which consists in what we shall name alineas (as, for example, this introduction consists of three alineas and this is the third and final alinea). A paragraph can be divided in sub-paragraphs (e.g. 1.4.2), which also consists of alineas. This is done in order to be better able to refer to a certain part of this thesis, to increase the pleasure of reading it.

SECTION 1 – WHAT IS SCIENCE AND WHAT ISN'T

1.1 INTRODUCTION – CREATIONISM

Creation science is the enterprise which seeks scientific proofs, and thereby scientific claims, for religious creation myths.[1] Some years ago the question whether or not creation science is a science, made it to the Arkansas court. Arkansas act 590 demanded that creationism be taught in the classroom next to evolution theory. On January 5, 1982 judge William Overton handed down his decision saying that creation science is not a science as it is defined in the act:[2]

> 'Creation science means the scientific evidences for creation and inferences from those evidences. Creation science includes the scientific evidences and related inferences that indicate:
>
> 1. Sudden creation of the universe, energy and life from nothing.
> 2. The insufficiency of mutation and natural selection in bringing about development of all living kinds from a single organism.
> 3. Changes only with fixed limits of originally created kinds of plants and animals.
> 4. Separate ancestry for man and apes.
> 5. Explanation of the earth's geology by catastrophism, including the occurrence of worldwide flood.
> 6. A relatively recent inception of the earth and living kinds.'

He made this decision, based on a set of criteria put together by the historian and philosopher of science Michael Ruse.[3] We will see these criteria in paragraph 1.4.5. But first we can ask ourselves: why would people have wanted to create this law? What's the big deal? Religion has to do with giving meaning to our existence, with spirituality. It deals with religious matters; matters of feeling, spirit or even God. These are subjective things, things without a possible objective answer. And then we have science; facts, knowledge gathered through careful experiment. Both are quite distinct from one another. Or are they? Let's look at the question again: why would people have wanted to create this law? I believe an answer to this last question can be given in two parts: education and the claims science seems to be able to make regarding truth – where we use the concept *truth* to mean giving: insight in the actual nature of physical reality.

The first part of the answer lies in education. With the teaching of creationism in science classes, either with or without evolution theory being taught next to it, the next generation grows up seeing creationism as a more or less plausible way of our actual past. 'It is taught at school, so it must be true. Why else would they teach it, right?' Now, is this any different from the religious teaching of the scripture in, say, the middle ages? Both science and religion have given and continue to give a certain insight, a certain trust, in how the world works, in what kind of world we live in; and they give this to a lot of people. Is science thereby, unwillingly or not, a new kind of church to which people turn to for questions about their existence? The label 'scientific' gives a factual value to something, which cannot be obtained any longer through the religions or anything else. Now, maybe the scientist is not seeking for truth, but it cannot be denied that one of the functions of science in our society is to provide 'truth.' We have already seen this in the previous section. Thus, at least part of the functions of science and religion really do merge. Science is, as religion is, to its deepest core, a human activity. Thereby, we cannot rule out the possibility that in answering our question, we find other motives apart from rational reason. So when seeking for an answer to our question, what is science, we must not confine ourselves to seek in rationality alone.

Second, there is of course the claim of truth which science, presumably, can make. That is, creation scientist find their enterprise a worthy one, because the label "scientific" gives the religious creation myths a factual basis; something which has historically happened as described in the scripture. Note that it is not my intention to value or judge this enterprise. What matters is whether or not there is, in principle, something unscientific about it: seeking scientific proof for scriptural facts? We're bound to say no. Because what do scientists do? They seek proof for theories. But of course! Here lies the crux, scientist do not only seek proof. They are also willing to abandon a theory when proven false. So here we have it: creation scientists are not scientists because they are not willing to abandon their theory. Of course, a creation scientist could react to this in a following manner: "You're right that it doesn't matter where someone finds his scientific inspiration! And although most people would say that it is unscientific to not deviate from one's theoretical basis, on what do they base this argument? There is nothing unscientific about sticking to one's basis. String theorists have been doing their research for more than ten years now, and what has this produced? It is the faith which we have in a theory, by which we decide whether or not to devote our attention to it." The following questions emerge from this argument: is there, in practice, more to the scientific enterprise than seeking proof? Is, or isn't it unscientific to sticking to one's basis? What is a scientific basis? Do string theorists stick to their basis as creation scientist do, or is there something else going on? Is it in the end faith, by which scientists hang on to their theories, or is it rational reason? We will treat these questions, and others, in this section.

Now that we have made a rough exploration of some of the issues involved when addressing the question of this section, we turn to a more structural and thorough examination of it. We begin with a dissection of science in order to obtain a transparent terminology. Following is a paragraph which addresses the insights of some of the key philosophers who have addressed our question. Next, we discuss what we have found in the previous paragraphs and try to put these things in perspective. In the last paragraph we must find a way in which we can address the main issue of this section: *what is science and what isn't?*

1.2 A DISSECTION OF SCIENCE

When we ask: what is science, we could mean three things. In asking the question we could refer to the issue whether or not a certain activity can be marked as science; which we do in this thesis. To answer this question we could seek for an all including and sufficient list of conditions; a criterion which includes all the activities which are science and excludes all that are not – a so-called demarcation criterion. Secondly the question could mean what does "science" consists of; which parts does it have, how do they interact, etc? Lastly, we could allude to a historical perspective on matter: when we look at the past, what is science? How did it evolve? What was science then and what is science now? What are the similarities and what are the differences? What do we learn from this? Naturally, these interpretations of the question relate to one another. One cannot answer one, without at least partially answering the other.

In this paragraph we take up the second interpretation and make a sketchy examination of the different parts which make up "science." We do this to obtain a common understanding of the terminology used throughout this thesis in order to avoid problems and discussion on terminology, for that is not the issue here. Note that there are no accepted definitions of a lot of what will be discussed next. The reason for this lies in the nature of that what is being described: an evolving human activity, not subjected to any rule but that what is accepted by the scientific community and society as its whole. To gain a bit of feeling about the nature of this kind of object of study, one could compare it to e.g. audio-visual media: films, documentaries, commercials, etc. Although the comparison is not perfect, both are evolving human activities, not subjected to any law, but that which is accepted by those who interact with it. Because of the nature of such an object, there is no lawfulness, in the empirical sense of the meaning. We can now begin to imagine the complexity of the problems involved when trying to define and describe the different parts of the exact sciences. There will always be a certain amount of arbitrariness in the definitions. Here lies a great deal of the trouble which we encounter when one objectively and absolutely tries to decide whether or not an activity can be marked as science; the problem which will get to know as the *demarcation problem*.

The word science originates from the Latin word *scientia*, which means knowledge. When talking about science, one can refer to both the knowledge itself, as the organization to acquire this knowledge.[4] This organization can be divided into the scientific community and the scientific method. The first being that part of the society which has set itself the goal to acquire knowledge about the natural world. The scientific community uses the scientific method to obtain this knowledge. The scientific method is a systematic way to acquire this knowledge (see figure 1).

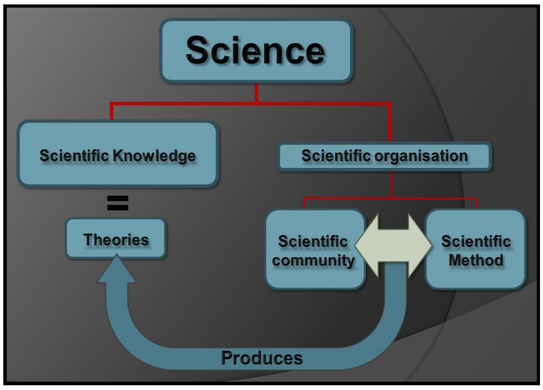

Figure 1; general outline of the structure of 'science'

The scientific method consists of the collection of data through observation and experimentation, and using this data to formulate and test hypotheses.[5] Hypotheses relate to theories. In general, a theory is a conglomeration of hypotheses, ideas and explanations. In the exact sciences, a theory is a more or less mathematical structure designed to explain a set of empirical observations. One must be able to derive theorems from theories through application of formal rules on the structure. Theorems can be translated to quantitative hypotheses (predictions), which can again be tested. This translation can range from trivial to highly sophisticated. But, as we define here, a theorem cannot be tested empirically. In the scientific method observation is the recording of data through appropriate instruments. This is closely related to a measurement, which is the process of obtaining the magnitude of a quantity. Note that an observation is the *recording* of quantities and a measurement the process of *obtaining* them, which is a subtle but important difference. An experiment is a carefully conducted measurement. The recorded data is used to investigate causal relationships between variables. In an experiment it is sometimes possible to obtain the data on these variables directly, but in most cases this is not possible and one must obtain the required variables by using known theories. The last is neither measurement nor observation. It is data analyzing and it this is done with the assumption that the theories used are accurate and proper descriptions of physical reality, which may not be the case. One must be careful to notice this difference when conducting experiments and drawing conclusions from them.

What we see here is that theories are part of the scientific method. But, the theories are also the *knowledge* which science produces. (Actually the concept of knowledge expands far beyond this boundary and is far more complex than this definition, but we'll leave it at that in this thesis.) Because theories are both the output of science and a part of the scientific method, they have a special status in relation to the question addressed in this section. From their central place in the scientific method, the theory is what the scientific method is all about. It are the theories which gain the "genuine truth"-status. That is, scientific knowledge is considered important, because it is produced by scientists using the scientific method. Thus, a great part of a theories' being scientific or not will be related to their correlation to the scientific method. However, the scientific method is an evolving construction of mind, which exists within the scientific community. The basis of a scientific theory are the causal laws in the formal language of mathematics, which summarize what has been measured. But a theory is more than just a summary of that what has been measured. Even if one tries to approach the sciences on a purely empiristic basis. Because even the most basic of relationships in physics involve some degree of human interpretation when one defines the variables. Therefore, in theories, there is always a human addition of abstract ideas about the mechanism behind the events which occur to us. Now, is there a limit to how many "human ideas" a theory may contain and does it matter where these ideas originate for it to be scientific? These are problems which have to be addressed in our demarcation criterion. The definitions and interactions as described above relate to the 'theory' of the *empirical cycle* as Carl Popper has described it. It is not the only dissection possible and it does not include everything science consists of.

For our present purpose, the analysis of the scientific method is sufficient. We now turn back to the scientific community. We do this, because we need to be able to find out whether belonging to the scientific community is important for being scientific or not. To be able to do this, we need to answer questions like: what does it mean to belong to the scientific community? Can you be part of it just satisfying a set of criteria, or must one be accepted by the community? The description which follows is the most basic one, without any nuances. It serves as a starting point from which to regard the scientific community. Later on we may find we need to adjust this view. In the discussion in paragraph 1.5 of this section and section three, we return to the questions asked.

The scientific community consists of the total body of scientists, their interactions and the relationships between them. It is usually divided into sub-groups: scientific "fields." Each field works on its particular subject within a much broader area; the sciences. Examples of sciences are physics, chemistry, biology, etc. Examples of scientific fields are astrophysics, meteorology, geochemistry etc. In the course *A History of Modern Physics* which is taught at Utrecht University, a scientific field is defined as having:

- a clearly described and defined field of research,
- a specialist education with associated qualifications,
- a group of people who associated themselves with the scientific field,
- an internal rewarding system and
- institutions such as associations, (sub) faculties, magazines, etc.[6]

When we look at this definition, we see that it is more of a guideline than something which can be used to include all that is a scientific field and exclude all that isn't. To be a *science*, something must incorporate more than one of these scientific fields. The division of the community in sciences and fields is just one way of doing it. The scientific community is a highly complex and evolving organ. A thorough analysis is far beyond the scope of this thesis. Apart from the science-field division and its definitions, one can look at the scientific community trough what its members do. According to Abraham Maslow one can distinguish at least the following nine functions within scientific work:[7]

1. seeking problems, asking questions, develop ideas and produce hypotheses
2. put to the test, explore, confirm and refute, investigate and test hypotheses, repeat and inspect earlier experiments, gather facts
3. organize, theorize, give structure, seek more and more inclusive generalizations
4. collect existing knowledge and history, functioning as a scholar
5. develop instruments, methods and techniques
6. administration, implementation and organization
7. publish and educate
8. develop applications for human usage
9. appreciate and enjoy knowledge

These functions, carried out by its members, result in the complex network we call the scientific community. We see that more people belong to the scientific community than just the scientists in the sense of researchers.

Leaving it at this, we are going to look at some of the communities properties. There is no official membership of the scientific community. Naturally, one must occupy himself with scientific work; that is, contribute in some way to that which the community classifies as science. Here lies a problem, the community does not, or maybe even cannot, agree on what is science and what isn't. Whether or not one is a part of the scientific community, therefore, becomes unclear. One can ask the question whether it is possible to be a scientist or do scientific work outside the community. I think it is, because being a part of the scientific community depends on being accepted by its other members. It is all about the recognition of one and another. Here lies a great strength of science: scientific objectivity, quality and morale is guarded by the community itself; via peer reviews, symposia and publications. Only that which is acknowledged will be taught. That which is taught will be used by the next generation and thereby survive from one generation to the next and evolve. But here lies also a weakness. For this mechanism has an inherent subjectivity, as the community exists of people. The subjectivity enters in the Kuhnian sense (see paragraph 1.4.2) that human beings can only look at the world through their own paradigm. Therefore, it is possible at a certain time that scientific work and potentially something important for the scientific enterprise is excluded by a part of the community. The subjectivity within the scientific community is also present in the ways in which someone accesses the community and how this person's status is determined: by his education, the acceptance and importance of his publications, status of his research, the status of other scientists and institutes with which this person is involved. Thus, being part of the scientific community certainly is something which indicates a certain scientific standard. But it is not an absolute necessity for something being scientific. This being said, it is the best we have and in no way I am trying to be negative about it.

1.3 SCIENCE IN HISTORICAL PERSPECTIVE

Must the past be taken into regard when deciding what is science and what isn't? Asking this question comes down to asking: should a demarcation criterion be descriptive or prescriptive? That is, should it be based on what has happened in the past and is happening in the present day scientific practice or should it be based on some kind of philosophical ideal? I believe it must be something of both. In this paragraph we look at a brief historical outline, so that we obtain an understanding of the origins and evolution of science.

Science evolved from the human desire to be able to understand the world around them. Since the beginning of science, many scientists and philosophers have struggled with the question: what is science? For our purpose it is accurate enough to say that the foundation of science as we know it was laid in the mid 16th century. There is a lot to say about this, but this is not the goal of this thesis. This so called scientific, or Copernican revolution was a shift from the classical-religious ideas to the beginning of what one could call modern-scientific thinking. Throughout this revolution were significant and crucial changes in both the methodology and insights in areas we now call physics, chemistry, astrology, mathematics and biology. An even more important aspect of this revolution was, I think, that it resulted in a wholly different way the world was viewed. The natural world again became something which humans could learn to understand, control and use. Some important contributions in this development were given by Galileï, Descartes and Huygens. One could say that this work culminated in the *Principia Mathematica Philosophiae Naturalis* by Isaac Newton, of which the first edition appeared in 1687. In the fourth edition of Newton's *principia* one finds four *Regulae philosophandi*; rules, according to Newton, which one must follow when doing "mathematical investigation of nature." These rules are, from a free translation:[8]

1. We should not allow more causes of natural phenomena than those who are right and sufficient to explain the observation. Because nature is simple and doesn't indulge in superfluous causes.
2. That is the reason why causes of equivalent phenomena are the same.
3. Those qualities of bodies which belong to the same extent to all bodies which we can observe should be considered as qualities of all bodies in general.
4. In experimental philosophy we should regard statements which have been inferred from the phenomena by induction as precisely or in good approximation true, despite the possibility of possible other hypotheses. We should do this, until new phenomena occur which either make a more precise formulation possible or reveal exceptional cases. We should follow this rule, so the reasoning trough induction isn't undone by hypotheses.

So in his work Newton is expressing himself explicitly about the way one should practice "experimental philosophy." These rules show clearly the empirical kind of "science" Newton had in mind. What they don't show is the mathematical and quantitative character of his work, which is also very important. Now we have made this slight digression into Newton's work, we continue our speeding through time. In the 18th century, the traditional areas of the natural sciences were clearly distinct from what we know nowadays. They were not characterized by the object of study. The areas in the natural sciences were characterized by method:

- Historical: knowledge of facts and to arrange and describe them.
- Mathematical: assigning of measure and number
- Philosophically: giving explanations of the natural world trough nature and cause.

This characterization applied to the study of nature became, respectively, natural history, merged mathematics and natural philosophy.[9] A further differentiation in these areas led to the up rise of the exact sciences as we are familiar with in our time. In the 19th century the development of the sciences characterized itself by institutionalization and professionalization. During the 20th century there was a further specialization of the sciences and the social importance grew trough technological applications, economy. Nowadays we could not imagine our society without them.

Apart from trying to understand the natural world, in this thesis, we have not yet seen an apparent uniting aspect of science in the history of science which could help us determine what is science and what isn't. I do not claim that such a thing does not exist. According to Kuyper, science, despite its aim for definitive results, never appears to assume a particular form. Instead it always remained susceptible for correction, expansion in width and depth, and for radical changes and revolutions.[10] Now, are there no properties of science, besides its aim and ever changing nature, which history of science teaches us are uniting? It will appear that history of science teaches us many other things about the nature of science. But before we turn to this, we first address the demarcation problem as it was raised by the philosophy of science. In the next paragraph we will deal with the answers given by five philosophers. In paragraph 1.5 we will have a discussion concerning the demarcation criterion based on all the insights gained thus far in which we try to answer the questions which were raised in this first section. When this is done, we turn to history's lessons.

1.4 A DEMARCATION CRITERION

The demarcation problem is about the how and where to draw the line between a science and something else. In this thesis this 'something else' is pseudoscience; something which presumes to be science, but isn't. In the previous paragraph, we have seen Newton's conditions for something to be science. In time, those conditions have been commented and these comments have been commented and so forth. Entire books have been filled with attempts to find an answer to the question what is science and what isn't.

One would expect science to differentiate itself from pseudoscience by 1) doing measurements, 2) the testing of these facts to hypotheses which are derived from theories and 3) taking an object standpoint with respect to the theories one uses; that is, theories are adjusted to the data. Anything that doesn't confirm to all of these requirements is pseudoscience. A good scientific theory then, is a theory which explains the most phenomena. It became clear that the answer isn't this obvious. We've already seen some of the difficulties which emerge when we examined whether or not creationism is science.

So, philosophers and scientist went looking for a demarcation criterion; an 'if and only if' statement to once and for all include all that is science and exclude all that isn't. In this paragraph we are going to look at some of the key philosophers who've addressed the demarcation problem. The three most known men are Popper, Kuhn and Lakatos. We will start by seeing what they have got to say about this. After this, we will continue and see some insights of later philosophers.

1.4.1 SIR KARL RAIMUND POPPER[11]

Karl Popper was an Austrian British philosopher. According to Popper, in deciding what is science and what isn't, it does not matter:

- whether a theory is *true,*
- whether a theory is acceptable,
- how exact or measurable a theory is,*
- or the importance matter of insights and ideas contained in a theory.

Popper writes, when he discusses astrology as a pseudoscience: 'there were a great many other theories of this pre-scientific or pseudoscientific character, some of them, unfortunately, as influential as the Marxist interpretation of history; for example, the racialist interpretation of history - another of those impressive and all-explanatory theories which act upon the weak minds like revelations.' Popper saw believe and ideology and not science in these theories. The reason for them being labeled as scientific, could be found in how this label was given at that time; trough justification. Justification is about proving something, often trough inductive and deductive reasoning and empiricism. Poppers philosophy was 'the first *non justificational philosophy of criticism* in the history of philosophy.'[12]

He named his philosophy *critical rationalism*. In short, it says that all that matters in order for a theory to be scientific or not, is whether or not a theory is able to be refuted. Using the terminology we have seen in paragraph 1.2: a theory can be refuted trough predictions in the form of hypotheses; 'conclusions which must be logically derivable from shared premises.' Popper named this falsification. Thus, in Poppers terminology: a theory is scientific if it falsifiable. The job of a scientist then, is seeking to falsify theories by obtaining hypotheses from a theory which states a priori which observations shall refuse it. Important to mention here is that Popper writes that it is not necessary for a theory to be falsifiable at this moment, because of e.g. equipment not yet able to test the hypotheses. A theory must be falsifiable *in principle* in order for it to be scientific.

We finish this part on Poppers philosophy with a small discussion concerning his ideas. Poppers philosophy has been criticized by many different people. There are some problems with a criterion based purely on falsification. Most important is the following: many currently accepted scientific theories are not practically falsifiable because they are not testable in isolation. Only by using other theories can one test such a theory. Doing an experiment in such a way, cannot absolutely refute the hypotheses, and thus the theory, which is tested. The scientist in question is free to dismiss the, perhaps less important, theory which is used to test the theory. As a simple illustration, a stone which suddenly falls skywards will not refute the theory of gravity. The scientist in question will not suddenly be looking for the cause why stones fell to the ground in all the other cases. No, he will do everything to explain this anomaly. This might not seem strange to us. Because the theory of gravity is true, right? But this is the problem. We cannot ever be certain a theory is true. So what the scientist actually does is protect the theory of gravity from refutation. According to Popper, this is not scientific behavior. The scientific approach would be to not be prejudiced and regard both options in an equal way. But, on the other hand, it is something which happens in scientific work and in practice scientists are often focused on providing evidence for a certain theory, they are not seeking to refute it. Induction

* Popper writes: 'This shows that it was not my doubting the *truth* of those other three theories which bothered me, but something else. Yet neither was it that I merely felt mathematical physics to be more *exact* than the sociological or psychological type of theory. Thus what worried me was neither the problem of truth, at that stage at least, nor the problem of exactness or measurability."[11] – from this text, it seems to me that Popper means: in that stage of development of my ideas. We will work with the information he presents in this paper, for the further development and aspects of Popper's full work far exceed the scope of this thesis.

then, is still a valid scientific procedure. Kuhn and Lakatos have noted these points and they have sought a way to see science which includes these practices.

1.4.2 THOMAS SAMUEL KUHN[13]

Thomas Kuhn was an American physicist and philosopher of science. He brought history and sociology into the debate. Kuhn writes: 'Poppers account of science does not fit the history of science. There is more to science and being scientific than falsifiability and testing.'

When we look at what actually happens, Kuhn says, we do not see a linear accumulation of knowledge in the sciences, but periodic revolutions. Kuhn named these periodic revolutions *paradigm shifts*. In a paradigm shift there is a sudden change of the concepts, assumptions, values and practices within a science. A period of paradigm shift is called *revolutionary science*. These paradigm shifts are between a so called prescientific period and normal science, or between two periods of this normal science. A *prescientific period* is a period in which there does not yet exist a general agreement on a paradigm between its practitioners. *Normal science*, are periods in which there is a central paradigm. In such a period there exists a puzzle solving tradition, for in these periods scientist try to expand the paradigm trough solving research puzzles. *Research puzzles* are constructive attempts to revise a theory. Such puzzles arise trough particular failure of a theory. That is, observations which do not correspond to what that theories predicts; *anomalies*. In such a case it is not the corpus of accepted scientific knowledge which is questioned, but the ability of the researcher which is challenged. Solutions are sought within this corpus. This gives rise to the day-to-day activities of "normal" scientists, which are relatively routine. Now, as the anomalies pile up and/or even the most brilliant members of the community have repeated failure, they will reach a critical mass. At this point the basis of the field is in jeopardy. When this happens, a period of *revolutionary science* starts. It is only in these periods that scientists act like philosophers in the way Popper describes. After this period there will be a new paradigm; a framework which explains all phenomena which the old paradigm explained plus its unexplained anomalies.

In his essay,[11] Popper denounces astrology as a science because it does not meet the falsification criterion. According to Kuhn, Popper is right to dismiss astrology as a science, but wrong on what grounds he does this, because we cannot understand science or the development of knowledge, by purely looking at the revolutionary periods. What Popper describes as genuine science, applies only to these revolutionary periods. But it is not in these extraordinary periods where we should seek a demarcation criterion. It is at the other side of the coin, which face is puzzle solving. In reaction to Poppers denunciation of astrology, Kuhn writes:

> 'Astrology cannot be barred from the sciences because of the form in which its predictions were cast [sufficiently vague to escape refutations]. Nor can it be barred because of the way its practitioners explained failure. In times of trouble [these methods] are also deployed in the exact sciences, fields like physics, chemistry and astronomy. (…) If demarcation exists (we must not, I think, seek a sharp or decisive one), it may lie just in that part of science which Sir Karl ignores. (…) In a sense, to turn Sir Karl's view on its head, it is precisely the abandonment of critical discourse that marks the transition to a science. (…) On this view, astrology is to be barred not because its forecast were not testable, but because only the most general and least testable ones could be derived from accepted theory. In short, though astrologers made testable predictions and recognized that these predictions sometimes failed, they did not and could not engage in the sorts of activities that normally characterize all recognized sciences.'

Thus, the reason for astrology not being a science is because no puzzle solving tradition is able to evolve from it.

Kuhn's has also argued that there is a fundamental incommensurability between paradigms.[14] That is, one cannot understand something from paradigm A trough the terminology of paradigm B. This has been interpreted as theory choice being fundamentally irrational. Because when concepts or theories from two paradigms cannot be compared directly, it is not possible to make a rational choice between the two. Kuhn opposes this interpretation of incommensurability in the essay '*Objectivity, Value Judgment, and Theory Choice*.' In this essay Kuhn selects five criteria which determine a good scientific theory. He notes that these are certainly not the only ones, but 'they are individually important and collectively sufficiently varied to indicate what is at stake:'

1. *Accuracy* – within its domain consequences deducible from a theory should be in demonstrated agreement with the results of existing experiments and observations.
2. *Consistency* – a theory should be consistent not only internally or with itself, but also with other currently accepted theories applicable to related aspects of nature.
3. *Scope* - a theory's consequences should extend far beyond particular observations, laws, or sub theories it was initially designed to explain.
4. *Simplicity* – Closely related to the previous point, a theory should be simple, bringing order to phenomena that in its absence would be individually isolated and, as a set, confused.
5. *Fruitfulness* – a somewhat less standard item, but one of special importance to actual scientific decisions – a theory should be fruitful of new research finding: it should, that is, disclose new phenomena or previously unnoted relationships among those already known.

These, together with a few others, give the shared basis for theory choice. Kuhn then shows us that there are two difficulties when one uses these criteria to choose between two rival theories. The first difficulty is that individually the criteria are *imprecise*: 'individuals may legitimately differ about their application to concrete cases.' The second difficulty is that the criteria have repeatedly proven to *conflict* to one another. 'Accuracy may, for example, dictate the choice of one theory, scope the choice of its competitor.' Kuhn concludes from this that when two scientists, fully committed to the same list of criteria, must choose between competing theories, they may nevertheless reach different conclusions. Therefore such criteria are not "objective." Kuhn suggests that such criteria of choice do not function as 'rules which determine choice, but as values which influence it.'

1.4.3 IMRE LAKATOS[15]

Imre Lakatos was a philosopher of mathematics and science. In the context of this thesis he is known for his methodology of *scientific research programs*. According to Lakatos when distinguishing knowledge from superstition, ideology or pseudoscience, it does not matter how many people believe a certain statement and how strong they do this. We have seen in history that people can have the most absurd believes. Neither does it matter how credible a statement is, or how much people understand it. A theory can be of great scientific value, even if no one believes or understands it. The objective scientific value of a theory lies beyond the states of the human mind which creates it. It lies in the objective support it has in facts. But all scientific theories are all equally improvable and even improbable, as Popper has shown us.[16] What then is the hallmark of science? Lakatos agrees with Popper that it is not trivial verification, since there are millions of them. 'It is no success for Newtonian theory that stones, when dropped, fall towards the earth.' However, Lakatos agrees with Kuhn that the hallmark of science neither lies in the falsifiability of a theory, for all of them grow in a sea of so called anomalies. But, Lakatos does not want to settle with the notion that scientific revolution would be an irrational change of commitment. Lakatos feels that if this would be so, there is no way to distinct science from pseudoscience, no way to distinct 'scientific progress from intellectual degeneration.' What Lakatos proposes is a methodology of research programs, which should solve these problems.

Lakatos says that 'the typical descriptive unit of great scientific achievements is not an isolated hypothesis but rather a research program.' Science is far more than trivial process of trial and error. In Lakatos' own words:

> 'Newtonian science, for instance, is not simply a set of four conjectures – the three laws of mechanics and the law of gravitation. These four laws constitute only the 'hard core' of the Newtonian programme. But this hard core is tenaciously protected from refutation by a vast 'protective belt' of auxiliary hypotheses. And even more importantly, the research programme also has a 'heuristic', that is, a powerful problem-solving mechanism, which, with the help of sophisticated mathematical techniques, digests anomalies and even turns them into positive evidence. (…) Each of [these research programs], at any stage of its development, has unsolved problems and undigested anomalies. All theories, in this sense, are born refuted and die refuted.'

See figure 1. Now, how can one distinguish a scientific research program from a pseudoscientific one? In a scientific research program, theory leads to the discovery of novel facts, unknown facts, or even contradicted ones by preceding or rival research programs; 'what really counts are dramatic, unexpected, stunning predictions, a few of them are enough to tilt the balance.' Pseudoscientific research programs are degenerative: 'theories are fabricated only to accommodate known facts.' Using this methodology, scientific revolutions arise when there are two rival research programs and the new one becomes progressive, while the older one becomes degenerative. Note that it is not unscientific to try and turn a degenerative program into a progressive program. Also, Lakatos states that one should be lenient towards a 'budding' research program. It can take decennia before such a program becomes empirically progressive. A theory is not put aside without a better one. Neither does critique refute a theory, important criticism is constructive. When we look in the history of science, Lakatos says, and see what has really happened, it shows that these refutations of Kuhn's and Popper's ideas are correct.

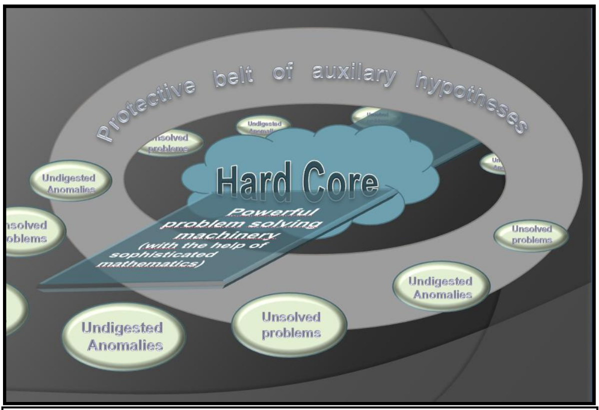

Figure 2. Structure of a scientific research program as Lakatos proposes

1.4.4 PAUL R. THAGARD[17]

Paul Thagard is professor of philosophy and director of the cognitive science program at the University of Waterloo. In his essay Thagard looks explicitly for the reason why astrology is a pseudoscience. He does this, because most philosophers agree on its being pseudoscientific, but not on the reason why this is so. Later on in the essay, he notices that the criterion he finds can also be used in general.

Thagard dismisses the idea that demarcation can be based only on testing; verification or falsification. He does not agree with Kuhn that astrology is a pseudoscience because it simply wouldn't be a paradigm-dominated discipline of problem solving. Thagard picks up Lakatos' concept of research programs and agrees with him that progress is needed for a genuine science. But he disagrees with Lakatos that a lack of success is enough to mark it as a pseudoscience. Thagard is of the opinion that a demarcation criterion should have both social and historical elements as logic ones. He sets up the following table:

Regarding theory	Regarding community	Regarding historical context
What is the structure of the theory?	Are the practitioners in agreement on the principles of the theory and how to go about solving problems which the theory faces?	What is the record of a theory over time (anomalies and successes)?
What are the prediction capabilities of the theory and what does it predict?	Are they concerned about explaining anomalies and comparing the success of their theory to the record of other theories?	Has it been challenged by another theory?
What and how does the theory explain?	Are the practitioners actively involved in attempts at confirming or disconfirming their theory?	
What problems does it solve?		
What is its Physical foundation?		

From it he proposes the following demarcation criterion:

> 'A theory or discipline which purports to be scientific is pseudoscientific if and only if:
> 1. it has been less progressive than alternative theories over a long time and faces many unsolved problems; but
> 2. the community of practitioners makes little attempt to develop the theory towards solutions of the problems, shows no concerns for attempts to evaluate the theory in relation to others, and is selective in considering confirmations and disconfirmations.'

By this criterion, a theory can be scientific at one time and pseudoscientific at another. This means that whether or not something can be labeled pseudoscience, depends on the attitude of its practitioners. Furthermore, it means that pseudoscience isn't an unchanging category: it can be science one time and pseudoscience the next, if a more progressive theory comes along and nothing happens within the discipline. Thagard notes that a theory or discipline can be thrown away before it can be marked as 'unscientific' by this criterion. As indeed has happened with astrology in the 18th century, because there was no other theory which could replace it. This is possible because a theory 'can be marked as an unpromising project, well before it can be marked as unscientific.' In his essay, Thagard does not tell us how this can be done.

In their commentary on Thagard's essay, Curd and Cover write that Thagard has changed his views because of objections to his demarcation principle.[18] In his book *Computational Philosophy of Science* (1988) Thagard weakens his criterion by saying that the difference between science and pseudoscience is a matter of degree rather than kind. But Thagard remains convinced that this difference of degree is usually large and obvious. He also introduces two new criteria for pseudoscience; properties which can point out a pseudoscience when there is no other theory which can replace it:

1. Pseudoscientific theories are often highly complex and riddled with ad hoc hypotheses.
2. Pseudoscientific reasoning is (often) based on resemblances. Instead of testing causal claims by looking for statistical correlations, pseudo scientists are often content to rest their believes on superficial analogies

1.4.5 MICHAEL RUSE[19]

Michael Ruse is a professor of biology and, as we have seen in the introduction, key witnesses for the plaintiff in the case against Arkansas act 590. Ruse tells us that it is simply not possible to give a neat definition with which one can distinguish science from pseudoscience. However, Ruse tells us, it is possible to give a list of features which define a science:

1. A science is guided by **natural law**. It is an empirical enterprise about the real world of sensation. Science seeks to understand this empirical world. More specifically, science looks for unbroken, blind, natural regularities. Bodies of science, therefore, known variously as "theories" or "paradigms" or "sets of models," are collections of laws.
2. A science has to **predict** and explain by reference to natural law. That is, these laws indicate, respectively, what is going to happen, or what has happened. A scientific explanation must show that what is being explained had to occur. The explanation excludes those things that did not happen.
3. A science is **testable** against the empirical world. It must have empirical support (**conformation**) and it must be open to possible refutation (**falsifiable**).
4. The conclusions of a scientist are **tentative**. In the end, he must be prepared to reject his theory.
5. A science must presuppose a certain professional **integrity** from its members. A scientist should not cheat or falsify data. He must not use any fallacy in the logic books to achieve his own ends. He must not use inappropriate or incomplete quotations or anything else that is intellectually dishonest.

Ruse says that, with these five points, he has listed the major characteristics of a science. Apart from these points Ruse mentions the urge for simplicity and unification which sciences have a tendency to. With this list one can see whether or not a certain enterprise could be marked as a scientific, one. Indeed, Ruse takes creationism and concludes that it fails on all points. Therefore it cannot be marked as a science.

Now, when we remember the issues which we have already seen above, we know that there is a lot to say about Ruses list. In a reaction to Ruse's essay Larry Laudan writes: 'The victory in the Arkansas case was hollow, for it was achieved only at the expense of perpetuating and canonizing a false stereotype of what science is and how it works.'[20] According to Laudan, the core issue in this matter should not be whether creationism satisfies some 'undemanding and highly controversial definitions of what is scientific.' However, judge Overton deemed the criteria worthy as base for his decision. In a defense, Ruse writes: 'the kinds of conclusions and strategies apparently favored by Laudan are simply not strong enough for legal purposes. (…) the U.S. Constitution does not bar the teaching of weak science. What it bars is the teaching of religion.'[21] We are not going to dwell on whether creationism is science, pseudoscience or religion and how this relates to legal matters. Sufficient to say that, although controversial and not really contributing to the exploration about science and how it works, Ruses list is something we might be able to use.

1.5 DISCUSSION – PROBLEM OF DEMARCATION

In this section we have seen some of the issues which arise when one tries to distinguish between science and non-science. We have dissected "science," had a small look at its history and examined some of the key philosophers who've addressed demarcation. At the end of this paragraph we must find some kind of a demarcation criterion. But first, let's try and see if we can answer the questions we've encountered in this first section by using what we have seen in paragraph 1.4 and see what we learn from this.

The philosophers we've looked at are Popper, Kuhn, Lakatos, Thagard and Ruse. In short, their views on the matter where:

1) *Popper* – a theory is scientific if it is, in principle, falsifiable. The job of a scientist, is seeking to falsify theories by obtaining hypotheses from a theory which state a priori which observations shall refuse it.

2) *Kuhn* – we must not seek a sharp or decisive demarcation criterion. All recognized sciences are characterized by a puzzle solving tradition. In order for something to apply as a science, a puzzle solving tradition must have, or at least be able to evolve from it. There are criteria by which we can determine whether a theory is a good scientific one. The problem in applying them is that they are imprecise and they can conflict. This results in us never being able to objectively determine which theory is the right one.

3) *Lakatos* – science is far more than a trivial process of trial and error. The typical descriptive unit of great scientific achievements is the research program; a hard core, protected by a vast belt of auxiliary hypotheses and powerful problem-solving machinery. Now, one marks a scientific research program from a pseudoscientific one by determining its progressiveness.

4) *Thagard* – A theory or discipline which purports to be scientific is pseudoscientific if it has been less progressive than alternative theories over a long time and faces many unsolved problems and, along with this, the community of practitioners makes little attempt to develop the theory towards solutions of the problems, shows no concerns for attempts to evaluate the theory in relation to others and is selective in considering confirmations and disconfirmations. When there is no other theory with which it can compete, one can recognize a pseudoscientific theory by a high complexity and ad hoc hypotheses. Also, pseudoscience is often content in basing reasoning on superficial analogies.

5) Ruse – it is not possible to give a neat definition by which we can distinguish science from pseudoscience. There are however defining features: 1) a science is guided by natural law; 2) it has to predict and explain by reference to this law; 3) it is testable against the empirical world (conformation and falsification); 4) it is tentative; and 5) it must presuppose a certain professional integrity from its members.

Now let's see if we can answer the question we have encountered throughout this section. Note that when I say things like 'Popper tells us … ,' I intend to say that I have deduced the answer from the treated material in paragraph 1.4. The first question we have encountered in paragraph 1.1 is:

a) Is there, in practice, more to the scientific enterprise than seeking proof?

1. Seeking proof has nothing to do with being scientific. Seeking to refute a theory is the path of the scientist.
2. Yes, seeking proof is only a part of the whole problem solving tradition.
3. Yes, the scientific enterprise is far more than just seeking proof. In the scientific enterprise there are competing, highly sophisticated, research programs which interact with each other in a complex manner.
4. Yes, seeking proof is but one of the logic elements by which we can recognize a science. Next to the logic elements there are also the historic and sociologic ones.
5. Yes, the scientific enterprise is not only about seeking proof, it is about seeking to understand the world around us.

Popper tells us that seeking proof does not even belong to the scientific enterprise. The four other philosophers we've treated don't agree and say that it is a part of it. Nevertheless, there is more to the scientific enterprise than only seeking proof. I believe that the difference between Popper and the others lies in the fact that Poppers philosophy is almost purely prescriptive and the other four are far more descriptive. Now, although there does seem to be some overlap in these four answers, there is no agreement about what this "more" exactly is. Later on, we must seek to unify these and other differences we encounter, in one common *demarcation criterion*, through which we can reflect on the psycho energetic work of professor Tiller.

b) Is, or isn't it unscientific to sticking to one's basis?

1. It is unscientific to the core. A scientist should abandon it, the moment it is refuted.
2. It is scientific, for it is in the periods when scientists stick to their (common) basis, where the activity takes place which we normally address by "science."
3. It is only unscientific when this research program is a degenerative - it makes no new predictions and theories are only made up to accommodate known facts - and one is not trying to turn it into a progressive program.
4. It is pseudoscientific if the basis has been less progressive than alternative theories over a long time and faces many unsolved problems and the community of practitioners makes little attempt to develop the theory towards solutions of the problems, shows no concerns for attempts to evaluate the theory in relation to others and is selective in considering confirmations and disconfirmations. Now, a basis can also be unscientific when there is no other with which it can compete. If this is so, it depends on the nature of the basis one is sticking to whether or not it is scientific.
5. It is unscientific if it is sticking to one's basis without any reserves. In the end, a scientist must always be willing to reject his theory.

Again it is Popper who is most explicit in his answer. Kuhn's answer is almost the opposite of Popper's. Although this is so, they reach the same conclusion about astrology being a pseudoscience. So it is rather likely that there is something in the astrologic enterprise which is not scientific, although we cannot say what, based on what we've seen in 1.4.1 and 1.4.2. Turning to Lakatos' answer; a research program is degenerative when its members do not try to turn it into a progressive program, in this case it is not science which they practice. Must we conclude that the cause of a programs unscientific-ness will always lie with its practitioners? I don't believe Lakatos would be in agreement with this. He does unfortunately not digress on the reason why a program may be degenerate. When we turn to Thagard's answer, we see that it is actually an elaboration of Lakatos'. He says we must consider the degeneracy/progressiveness of a program with alternative programs, although he does not tell us the length of 'long time' over which a program is allowed to be less progressive than alternatives. In addition to this, he sums up three ways in which practitioners could act in an unscientific manner. Even more than in Lakatos' answer, it becomes clear that there are two things we are talking about: pseudoscientific behavior, or activities and pseudoscientific programs. The cause of pseudoscientific behavior is clear; it is given explicitly in Thagard's answer. That of a program is not. Thagard's later criteria specify how one can recognize a pseudoscientific program if there is no alternative: it has a high complexity, ad hoc hypotheses and reasoning based on superficial analogies. These points are still quit vague, but at least it gives us a direction in which we can seek. Unfortunately Ruse's answer does not add anything to this discussion. It does not specify what 'without any reserves' or 'in the end' is. Application of his answer to a specific case is wholly at the mercy of the eloquence and skill of the one who uses it.

Now, in the answers above we have actually more or less implicitly assumed what these men saw as a scientific basis. As used in paragraph 1.1, a scientific basis is something like that what is taken for granted and which starts as a starting point the for scientific research. In the following question we cannot evade this matter and although this question has not been explicitly addressed in the texts, we might be able to distill a satisfying answer from the texts.

c) What is a scientific basis?

1. A falsifiable theory.
2. A paradigm.
3. A research program.
4. A research program.
5. *It is not possible to extract what Ruse sees as a scientific basis from 1.4.5.*

We see here three different answers. It is not the purpose of this text to select which is "the real one" neither whether or not it is actually there. We try to explore the landscape with which we are dealing with. Maybe it is possible to determine some kind of "hard" criterion, with which we can include all that is science and exclude all that isn't. But it becomes clear that there might not be such a thing. If this is so, it would be because "science," used in this manner - namely a classification - is a *vague predicate*; that is, a linguistic construction which depends on the context in which it used. Examples of these vague predicates are long vs. short, fast vs. slow, hard vs. soft and, in our case, science vs. pseudoscience. They are called vague because of their dependence on context, but also because of the gradual transition of one into the other. Thus, there is no clear demarcation between the two even when the context is clear and every demarcation one does make has an implicit arbitrariness. If science is a vague predicate, it will consequently not be possible to have a clear demarcation. From this point on, we shall treat the science vs. pseudoscience matter as if we are dealing with a vague predicate.

The other three vague predicates we have seen are dependent on one thing: e.g. long/short on length or fast/slow on speed. But because of the complexity of "science" it depends on many things. These "many things" are the landscape which we are exploring. Despite the gradual transition in the other examples of vague predicates, within a context, it isn't that hard, for example, to decide what is long and what is short most of the time. But because something being scientific or not depends on many things, it is very hard to determine which is what and one can easily get lost. Another issue arises through the following. In exploring our landscape, we automatically create the context in which to place the predicates *science* and *pseudoscience*. It is actually because of this automatic context creation, plus the complexity of this particular distinction, that the nature of it is distorted: people who deal with science have a general acquaintance with, and agreement on the landscape. Therefore there is a general agreement in the scientific world on what is science and what is pseudoscience for most of the enterprises which make a scientific claim. It is only when we look closer, as the philosophers have done which we have seen, that it becomes clear that the distinction isn't that easy or obvious. Again, this explicitly does not mean that a good amount of enterprises which make a scientific claim can't be said to be either classified as science or pseudoscience. When the context is set, it is most of the time quite apparent what is, for example, cold and what is hot; stick one finger in a glass of ice water and another in a boiling pan. This is the same for science, some things are really science and others are really pseudoscience. In relation to its nature, we shall call this landscape the *methodological landscape*.

We now return to our discussion regarding scientific basis. How do the three different answers relate to one another? Paragraph 1.4.1 doesn't say explicitly what a theory is. By the manner in which the word is used in this paragraph, we could say that a theory is some kind of framework which tries to explain phenomena. Combining this with the definitions we have seen in the dissection of science, we get: a theory in the exact sciences is an analytical structure consisting of hypotheses, ideas and explanations specifically designed to explain a set of empirical observations and how these observations relate to the phenomena in the natural world. Now, in order for such a structure to classify as genuinely scientific, according to Popper, its hypotheses must be falsifiable. When this is so, we can speak of a scientific basis. In paragraph 1.4.2 we have seen that Kuhn's paradigm was a framework which explains a set of phenomena. Then what is the difference between Poppers theory and Kuhn's Paradigm? In his book *The Structure of Scientific Revolutions*, Kuhn defines a paradigm as: that what is to be observed and scrutinized; the kind of questions that are supposed to be asked and probed for answers in relation to this subject; the manner in which these questions are to be structured; the manner in which the results of scientific investigations should be interpreted. Thus, a paradigm is more general. It encompasses theories, for example optics, mechanics, thermodynamics, etc. within, in this case, the "classic mechanical" paradigm. An example of a paradigm which is currently accepted is the standard model of physics. Lakatos' research program has been addressed sufficiently in paragraph 1.4.3. Its scope goes beyond that of a theory, but is less than the scope of a paradigm. A further comparison between the research program and theories plus paradigms is not possible, because the former is a wholly different beast. A further analysis of this problem goes beyond the scope of this thesis. I am not going to judge which of these answers is the right one and which one should use when speaking about a basis. The only thing which is important here is to be aware of the fact that there are different answers to this question. In this way, miscommunication can be avoided.

d) Do string theorists stick to their basis as creation scientist do, or is there something else going on?

First we must distinguish which are the bases in question. I think we can say that the basis of the string theorists is "the string theory", without saying what that is or are. Let us say that the story as presented in Genesis is the basis of the creation scientists. One difference between the two springs immediately to our attention: the structure of the basis in question. The story in Genesis is no more or less than that, a story. Again, I do not intent to either judge the value of Genesis or string theory for humanity. At this point, we are only trying to answer the question above. From Genesis, one can derive certain hypotheses to test the facts which are mentioned in it. (A few of which are listed in the definition of creation science in paragraph 1.1.) Creation scientist must draw from their general scientific knowledge in order to construct and test these hypotheses. In this sense, the story in Genesis is not a scientific theory. It is a possible history, which can be confirmed or disconfirmed by the scientific method and using scientific knowledge. String theory is a theory within the field of theoretical physics; maybe it is even a small field itself. It is exact, in the sense of which we have talked about it in the previous question. It is build upon the theories within *the standard model of physics* and has a highly sophisticated mathematical structure. It tries to unite the four fundamental forces of the standard model, as described by general relativity and quantum mechanics, in one unifying theory. It cannot be tested, because current equipment cannot yet reach the scales of energy in which its effects become "visible." This is all very concise, but it will serve for answering our question, namely: something else is going on. String theorists are working on an abstract mathematical structure, the string theory, they explore and expand it and try to fit it with the current theories and make predictions from it. Creation scientists are seeking empirical observations which verificate the story of Genesis. This is sufficient for answering the question. There is no point of going into the discussion whether either of these activities should be marked as scientific or not. Let's turn to the next question.

e) Is it in the end faith, by which scientists hang on to their theories, or is it rational reason?
Now this is a tricky one. From Popper, we could say that when one hangs on to a theory by faith, it should exclude one immediately from the scientific community. But this is a prescription and does not answer our question. All five of them would probably say that faith in a theory does not turn it into a scientific theory and I think we can all agree on this. But, apart from Popper, none of these man say that it is actually unscientific to, in the end, hang on to a theory by faith. Of course, this "in the end" must be defined and apart from that, it still doesn't answer our question. For, aside from some philosophers calling it unscientific or not, what do scientists do? Nothing of what we discussed so far addresses this question. So let us try to answer the question ourselves. I am inclined to answer yes, in the end it is faith by which scientist hang on to their theory. It cannot be rational reason alone, for two reasons. First, as Popper showed us, a theory can never be proven correct. Of course, by using certain criteria, as we have seen with Kuhn and Ruse, one can choose on a semi-rational basis. But, as Kuhn showed us, such criteria cannot be used on an absolute basis; they are like values. What they can do is show us what is certainly not scientific. They can also point out what is debatable, or what can certainly classify as science within the context of the values. What they can't say: "now this is the real science, this is what everybody should pursue." So, in the end they cannot tell us what we should do. This brings us to the second reason, which is even more basal: we are more than just rational beings. People cannot be motivated by rationality alone, scientists neither. In fact, I think that scientists' faith in their theories is where the mechanism lies why most scientists (which are engaged in their work) would pursue a certain scientific activity: because of things like interest, enthusiasm, passion, or, call it faith. Of course, one can place all kind of question marks and make a lot of nuances in this, but this first approach is certainly something to keep in mind when judging something to be science or pseudoscience.

These were the question we have encountered in paragraph 1.1. When we turn to the questions in 1.2, we find that the problems aren't address by the man we discussed in paragraph 1.4. We shall address the first two questions simultaneously:

f) Is there a limit to how many 'human ideas' a theory may contain, and, d*oes it matter where these ideas originate for a theory to be scientific?*
We are not going to look into all the nuances and interesting stuff which can be found when analyzing what "human ideas" might be. We use the following definition: a human idea in a theory which purports to be scientific is a concept which doesn't explicitly relate to a phenomenon which directly occurs to us. In answering the questions, I think we must be pragmatic. It does not matter at all where one has found his inspiration for his scientific work in order for a theory, which the scientist in question is working on, to be scientific. In principle it does not matter how many human ideas a theory contains. What most of the time does put a limit on the number of human ideas are Kuhnian values. In this case for example values like simplicity and (mathematical) elegance. The second alinea of paragraph 1.2 is about the scientific community. The following three question use the information in this paragraph.

g) What does it mean to belong to the scientific community?
We could answer the question in the following manner: belonging to the scientific community means that its other members acknowledge the person in question as one of them. Consequently this person is part of a greater whole and his work is treated in this manner; contribution to the vast amount of scientific knowledge.

h) Can you be part of the scientific community just by satisfying a set of criteria, or must one be accepted by the community?
One must be accepted by the community. Although a degree does give access to the community, it doesn't make you a part of it; a degree isn't enough. It is also not an absolute necessity, although it almost is. One would have to fight really hard to be taken seriously without a degree. Now you could start shouting and say that it is very unscientific to dismiss something, which is potentially a scientific contribution, based on someone not having a degree in the appropriate field. But this reaction has its roots in a very practical matter. Because of the complexity and extent of the things one must learn in order to actually contribute to the scientific enterprise, it would be very difficult to find your way in your field of work without the help of some kind of educational program. Not impossible, but very improbable and therefore such a person will have to prove himself.

i) Is it important to belong to the scientific community for your work being scientific or not?
In principle, no; one can do outstanding scientific work without belonging to the community. In practice though, it would be unlikely that the work in question is indeed scientific. Remember that we have seen in paragraph 1.2 that the community guards scientific objectivity, quality and morale. So in this sense, it is important. Now there are two ways in which I think it is possible that one's work is indeed scientific and the community does not acknowledge this person as a member. First, there can be a very brilliant solitary person, or group of persons, working on something, and, who don't care about sharing their findings. I think there will be very few of these persons, since you would not get paid, your name shall not be written in the analogies of history and you would not benefit humanity by sharing your work. This will exclude almost everyone. The second way in which this can happen: the scientific community could ignore your work, or even say that it is not scientific, although it actually is. Now, what are the ways in which this scenario could occur? First, as we have seen in the previous answer, some unknown person who doesn't have access to the community through a degree of some kind. Secondly, it can happen because the subject matter is not yet accepted by the community as something which can be dealt with scientifically. Since the community has members in the order of hundredths of thousands, both scenarios cannot possibly last long. If one is persistent, some members of the community are bound to pick up on the work at some point in time; although the amount of time may vary, of course, with things like complexity of the work and deviation from accepted theories.

These were the questions in paragraph 1.1 and 1.2, which had not yet been addressed. We have seen that Poppers philosophy is a prescription for the scientist. In addition to this, Popper is only talking about whether or not a *theory* classifies as science, not all the other things surrounding it. Kuhn's philosophy is a description of science as he saw it. Kuhn placed Poppers ideas in a larger framework. The ideas of Lakatos, Thagard and Ruse are not meant purely descriptive, but they are close to it.

In answering question c), we saw that it is natural to classify the demarcation of science vs. pseudoscience as a vague predicate; a linguistic construction which depends on the context in which it used. The demarcation context itself is implicitly present in everyone who deals with science. It is a highly complex product of mind, both in variables by which to place something within the demarcation context as the relations between these variables, and constantly subject to change. There is no one way of looking at this product of mind. Note, that, in the implicit presence of the context in almost anyone who deals with science, there lies a great strength of science. This strength manifests as capacity of self reflection and adaptability. The other side of the coin makes it a slow process which is partly blind of itself and of the possible courses it may take.

We also saw that the questions which were asked in paragraph 1.2 are not dealt with in paragraph 1.4, in which we discussed some of the more established theories concerning our subject. I believe the reason for this lies with the relative unfamiliarity in the subject matter. For it is certainly not the case, that there are no important things to find in this area.

Because there may be important things to find and to somewhat remedy our partial blindness, I think it is important for us to delve in yet another source of information; history itself, so we may gain further insight in what is science and what isn't. That is, when we look at the history of science, what is the actual nature of the scientific enterprise?

1.6 HISTORY'S LESSONS

In his accessible book *Diesels droom en Donders' bril* (eng: The dream of Diesel and the glasses of Donders) Prof. Bert Theunissen (history of science) presents different examples in the history of science to give an idea about how science works. In this paragraph we will speed through his book and sum the insights which are important for our question. Chapter 5 , 7 and 9 are left out, because these are not directly related with our subject matter. Perhaps an astonishing announcement in relation to what we have seen this far, Prof. Theunissen ends his introduction by declaring that there is no such thing as an infallible method to unravel nature; the scientific method. He writes: 'scientific research is a capricious process which doesn't proceed in accordance with set rules. Long have people thought that science was timeless: people change, science always remains what she is. This idea is outdated as well. Science is a part of our culture, and if the culture changes, so does science.'[22]

In the second chapter, we see an example of the "discovery" of penicillin. Alexander Fleming, research director of bacteriology at St. Mary's Hospital Medical School in London, has long been seen as the discoverer of the medicine. In the chapter we see the roles which he and other people had in the development of penicillin. The example illustrates that a discovery is not just one event, but a process. What's more, instead of one discoverer, there is a whole group of people involved with this process of discovery, who have played all kinds of different roles in it. It is clear that there is no recipe for making a discovery (else everybody would be doing it, Prof. Theunissen tells us) And when we're asking questions like: who made the discovery? Where did the discovery took place? What was the moment of discovery? We are asking the wrong questions. Of course moments of sudden insight, such as Fleming had when he saw a possible medical application of what later would be penicillin, are a factor in the process. But for such "eureka" moments to occur, a lot of factors have to be in tune exactly, which inserts a large factor of chance.[23]

The following quotation shows us the conclusion of chapter 3: 'Only the imaginary genius sees and understands. A scientist thinks about a problem, makes observations, forms a theory, tries to find support for the theory with observations, adjusts the theory, tackles unexpected observations with the theory, expands the theory, makes new observations… etcetera. And with each bit of knowledge that he obtains, he realizes how much he doesn't understand yet.'[24]

Chapter 4 deals with experiment and its relation to knowledge. When we speak about scientific knowledge, Prof. Theunissen says, we are referring to knowledge which is valid always and everywhere. Because of this character, scientific experiments need to be reproducible - always and everywhere. But doing measurements is not easy and repeating an experiment is only possible by approximation; there'll always be differences: in instrumentation, abilities of the researcher, local circumstances.[25] In order to illustrate this, he presents us the case of Joule and his experiment which measured the increase of temperature in a barrel of water as a function of kinetic energy. In our days, we say his findings are quite alright. (His data is a good approximation of what our best results are nowadays.) However, how should Joule contemporaries have decided that Joules result was a good one? Wasn't Joules result something which was only valid in his basement and with his instrumentation? Or weren't there many sourses of error and disturbance, which caused his results to be useless? Before the value of Joules experimental results could be determined, the results had to be found by others. Prof. Theunissen then shows us a modern day attempt at exact replication of Joule's experiment by the German historian of science, Otto Sibum in the 1990s. Sibum had to overcome some great difficulties before his results even closely matched Joules. The example shows us that there is a factor craftsmanship involved in scientific work. That, although a researcher is very careful and elaborate in his experimental journal, there are things which he doesn't describe. That it isn't always possible to explain how to do something and that sometimes, it is impossible to inspect whether or not someone is doing a good job – no one was allowed in the experimental space because that would result in too much fluctuation in temperature. 'To accept his results, you had to trust his abilities as an experimenter. No wonder many where skeptic.' Prof. Theunissen concludes the chapter with: 'To take away this skepticism, one can repeat the experiment, as Sibum did. But if you want you can always remain skeptic. You can't repeat an experiment everywhere on earth to see if it still is in agreement with the other places. In theory, something always could go wrong. But normally scientists have a strong confidence in the general validity of their results. In practice they are very content to repeat an experiment and have roughly the same outcome. That is hard enough.'[26] [27]

The sixth chapter deals with the reliability of experiment, a topic of great interest of us. In this chapter Prof. Theunissen presents examples of experiments concerning two phenomena: telepathy and gravity waves. In the sixties of the previous century the physicist Helmut Schmidt presented the results of his study in a prominent journal, which showed an outcome which would occur only once in ten billion times – the chance of these results being a coincidence negligible. In essence the study came down to this: four buttons and four lamps. When a subject would press a button, at random, one of the four lights would burn. The subject had to predict, beforehand, which light would burn and press the corresponding button. A number of subjects did the procedure twenty thousand times. You would expect a score of 25%, the score was 33%. A control experiment, in which a machine pressed the buttons, gave the expected 25%.[28] These results impressed a renowned critic of parapsychology, C.E.M. Hansel. A few years later, John Beloff and David Bate, two researchers, presented their results of an exact replication of Schmidt's experiment. The results were negative. For Hansel, now the matter was decided. At first, there was little to say about Schmidt's results. But now that another study couldn't confirm his results, one had to question Schmidt's experiment. In contradiction to Hansel, Beloff and Bate explained their own result to be the questionable one. That they couldn't get the outcome Schmidt had gotten was their flaw, not a refutation of Schmidt's results. What to think of this? For the most of us, Prof. Theunissen says, the judgment will depend on one's sentiments regarding telepathy. However, the experiments aren't conclusive.[29] One could say that there is no reason to be bothered, because parapsychology is a controversial field in which these issues arise constantly. Therefore the reason that we can't get solid answers, must be sought in parapsychology, not in the scientific approach. But, this is to easy, Prof. Theunissen tells us, for shouldn't the scientific approach help us discover how the world works, especially when we're dealing with phenomena which are hard to grasp? In this case we have an inconclusive result. What can we do? More experiments? We see in chapter six, that this didn't happen. Soon after, most physicist just didn't pay any attention to it anymore. Schmidt's result hadn't been refuted.[30]

Now, is this result that big a deal? Ok, the experiments in the telepathy-lamp case were inconclusive and we've seen that renouncing the whole matter because of the controversial nature of the field was too easy. But telepathy, parapsychology, that is hardly something we can call science right? Surely in real science these things don't occur. In the second part of chapter six, Prof. Theunissen shows us otherwise. As an illustration he uses the discussion surrounding Joseph Weber and his detector for gravity waves. Because of their nature, gravity waves are extremely hard to detect and haven't been "discovered" until this day. In 1969, Weber published the results of his experiments which, he stated, positively showed gravity waves. There were very few physicist which believed him. This wasn't because Weber's result weren't impressive, they were to impressive. It was expected from established theories that the effects of gravity waves would be quite small. Weber's result showed far more energy involved in gravity waves than the theories predicted. Of course, others started redoing the experiment to see the outcome and publish their results. What happened, Prof. Theunissen tells us, was that not only the work of Weber was put to the test, but also the experiments of all the researchers involved in the discussion. Each who tried to confirm or refute Weber's result, was subject to the same amount of criticism from colleagues as Weber. This wasn't just about technical details. Other issues also got involved: the experience, scientific reputation of the researcher in question, or the significance of the laboratory where this person worked. Even the intelligence and nationality of the researchers were put to question by some physicists.[31] Also in this case, the matter remained undecided. Prof. Theunissen shows us the vicious circle which arose: 'To determine whether or not gravity waves exist, you need a reliable experiment. But to know whether or not an experiment is reliable, you actually need to know beforehand what the outcome should be. The same can be said about the ability of the researcher: it is only when you know what the outcome should be, when you know whether or not the researcher in question did a good job. So in a personal judgment you're mostly led by what your expectations of the outcome of an experiment.'[32] Prof. Theunissen shows us what happened. The debate evaporated and after 1975 almost no one was willing to defend Weber. Most of the physicists remained skeptic, because they had been in the beginning. The research concerning gravity waves continued, but with other, more sensitive equipment. What happened in 1975, was not the influence of a decisive experiment but, as it appeared, the act of an influential physicist, Richard Gawin, which decided the matter. Other physicists who argued Weber's results, had been cautious in their conclusion in order not to jeopardize their reputation. Gawin gave a clear analysis and didn't doubt. He concluded that Weber's experiment was flawed and his results worthless. Prof. Theunissen now tells us that most of experiments do not results in such an extended discussion as with Weber's experiment, because most of the time scientists sort of know what to expect. 'But it is in the new or controversial areas, when uncertainty increases and this makes it much more difficult appraise results. So when the need for an experiment which provides certainty grows, the uncertainty of the experiments meaning grows as well. Scientific results alone aren't enough to come to a decision. In these cases previous experiences, personal belief and the authority of others are involved in the decision process. This are not solid criteria but personal and subjective. (…) There is no set procedure by which to value the outcome of an experiment. That remains the work of man.'[33]

The eighth chapter deals with test animals and their relation to instruments and animals outside the lab. The following quotation is of importance to us: 'In order to make an instrument, which physicists use, measure what you want to measure, you already need to know the phenomena in question. Electricity isn't discovered by someone with a voltmeter; it is only when you know electricity that you can make a voltmeter.'[34] So when we're dealing with new phenomena, as is possibly the case with Prof. Tiller, there are no instruments by which to measure them.

In the tenth chapter, Prof. Theunissen shows us that scientific theories do not arise in a vacuum. They bear the marks of the culture in which they are formed. Not only that, because science itself is a part of the culture, it has an influence on this culture. This interaction takes place in endless varieties. Sometimes this is hard to see, because scientists do their very best to produce knowledge which is independent of time and culture. But the culture-bound nature of science will at all times remain visible, albeit in a subtle way. 'In fifty or hundred years historians will have no trouble to 'place' our present-day knowledge of physics 'in time.' Prof. Theunissen ends the chapter with: 'That science is the work of man, neither makes scientific knowledge more nor less valid. What our theories are worth, must become evident from the data of experiments. But the collection and evaluation of this data is again the work of man. Whether or not we'll ever reach the truth? Maybe, but we'll never know for sure that we're there. What we do know is that knowledge, even true knowledge, will not exist without the work of man.'[35]

Chapter eleven is the final chapter. It sums up the insights gained in the previous chapters, evaluates them and answers the central question of the book: 'How does science work?' Flemings "lucky find" gave us the insight that conditions have to be just right, in order for a "discovery" to be possible. But such conditions aren't enough. Fleming also made a creative leap by seeing the possible medical application. 'Without creativity, no science and creativity knows no rules.' The example of the Darwin finches showed that observations do not automatically lead to knowledge. Observations gain their meaning only in an interaction with theory, that is, they are induced observations which have to be interpreted. The fourth chapter dealt with experiments. It showed us that working with instruments can be an art in itself. In devising experiments a great amount of knowledge and craftsmanship is needed. Chapter 6 showed us that the outcome of an experiment isn't evaluated in isolation, but in comparison with existing knowledge. When the result opposes established knowledge, it is the experiment that is questioned.[36] It also showed us that scientific knowledge is the outcome of a discussion. Now, must we take this knowledge seriously, Prof. Theunissen asks. His answer: 'yes, certainly, for there is no better. Scientists can't guaranty the validity of their knowledge. Even when they are right, they can't know for sure, for there is no method to tests this.' Then what do scientists do offer? '[They] offer the best of their abilities and knowhow of that moment. Their discussions show that, when in doubt, they do not over hasten their conclusions. They accurately check each part of their tests (…) [and] argue on the cutting edge to come to an agreement. Anyone who wants more than agreement amongst scientists must denounce his confidence in science.' But note, Prof. Theunissen warns, that scientists are but men. They can make mistakes, apply improper arguments or make things appear better than they are.[37] The eight dealt with scientific instruments versus test animals and showed us that in order to build a measurement instrument, one has to know the phenomena in question. In the tenth chapter, Prof. Theunissen shows us that scientific theories do not arise in a vacuum, but bear the marks of the culture in which they are formed. Culture and science are subtly and intricately woven together. Prof. Theunissen concludes that a recipe which leads with certainty to the desired truth couldn't be found in the examples he presented. The scientific process is to unpredictable to be captured in a cookbook- like manner.[38] There is no infallible scientific method. Even more, says Prof. Theunissen, the way in which anyone solves their daily problems doesn't differ essentially from the way scientists solve their problem. 'In fact, the so called scientific method is just a pretty name for the fallible problem solving ability of man. (…) Of course there is a difference between my everyday fiddling and scientific research. The scientist is an expert, a specialist, who has made answering the questions of nature his profession. He deals with issues in a systematic manner and tries to avoid premature conclusions. (…)he has had a focused training. Through his experience he knows the tricks of the trade.'[39]

1.7 A DEMARCATION PROCEDURE – WHAT IS SCIENCE AND WHAT ISN'T

Now that we have built this relatively firm basis, let us try to obtain some kind of working hypotheses or plan with which we can consider the work of professor Tiller.

In the beginning of paragraph 1.4, we went looking for a demarcation criterion; an *if and only if*-statement to once and for all include all that is science and exclude all that isn't. We found in paragraph 1.4 and 1.5 that such a thing does not exist. In paragraph 1.5 we saw that the reason for this is that science used in this way is a *vague predicate*; a linguistic construction which depends on the context in which it used and which has no clear demarcation even when the context is clear. The context of this demarcation is created by our explorations of the methodological landscape. A landscape with which most people have some familiarity and therefore take it for granted. All the insights of the philosophers which we have seen are important, because they show us a part of this landscape. We would deceit ourselves by simply dismissing an important realization, without a thorough investigation on the reason why. For, we may assume that all of these men are excellent philosophers, with highly developed ideas in their area of research. If it would be as straight forward as some idea just being wrong, they would have seen it themselves. So I think we can assume that within all of these theories and ideas there is something which we can use. The problem is how to combine and where to use them.

When we answered the questions in paragraph 1.5, we have seen that there seems to be a general agreement about certain things. It is in these matters where the philosophers agree where we might find a basis to which something must adhere, in order for it to be scientific. On other matter the answers differ. In these cases, it is quite likely that we are dealing with nuances which are placed. This is not necessarily so, but certainly something to keep in mind and use when we try to place the work of professor Tiller in the landscape.

The first thing to do is determine whether or not it is appropriate to subject the object in question to the demarcation. Therefore it, be it a theory, person, or something else, must at least aspire to be scientific. Naturally our object is of such nature that it does, for it would be very dull if it didn't, but it is good do this explicitly.

Next we must set our terminology straight. For in the second section we will use the terminology which Prof. Tiller uses, because this also can give us an insight as to it place in the landscape. When we have an understanding between the terminology which we set up in 1.2 and Prof. Tiller's, we can avoid discussions which at their base are nothing but a misunderstanding and add nothing to our insight. We do this by using paragraph 1.2 to partition all that we have seen in section 2 in accordance with this paragraph.

When this is done, we can "scan" the object for its scientific-ness at first sight. That is, does it fit the general picture? The list which Ruse has proposed could be of use for this. For I do not believe we can use the list to do anything more specific, because it simply isn't clear enough. We have already encountered this problem in the previous paragraph. On top of this, there might be a lot to say about its statements. I think that, based on what we have treated thus far, this list cannot be used to determine whether or not something can be classified as a "science." Its outcome is at the mercy of the eloquence and skill of its user. The points we are going to discuss to determine its scientific-ness at first sight are:

1. *Natural law* – a science is guided by natural law. It is an empirical enterprise about the real world of sensation. Science seeks to understand this empirical world. More specifically, science looks for unbroken, blind, natural regularities. Bodies of science, therefore, known variously as 'theories' or 'paradigms' or 'sets of models', are collections of laws.
2. *Prediction* – a science has to predict and explain by reference to natural law. That is, these laws indicate, respectively, what is going to happen, or what has happened. A scientific explanation must show that what is being explained had to occur. The explanation excludes those things that did not happen.
3. *Testable* – a science is testable against the empirical world. It must have empirical support (conformation) and it must be open to possible refutation (falsifiable).
4. *Tentativeness* – the conclusions of a scientist are tentative. In the end, he must be prepared to reject his theory.
5. *Integrity* – a science must presuppose a certain professional integrity from its members. A scientist should not cheat or falsify data. He must not achieve any fallacy in the logic books to achieve his own ends. He must not use inappropriate or incomplete quotations or anything else that is intellectually dishonest.

We can also use the things which we have said at the beginning of paragraph 1.4: to be a scientist, one must do research; seek knowledge using the scientific method. A scientific theory is an analytic structure designed to explain a set of empirical observations. This "test" can only show us in which general part of the landscape we must seek.

Because we have not found a demarcation criterion, probably the next sensible thing do is set up a list of Kuhnian values. For there is little doubt that such "criteria" may be used in the way Kuhn described. They cannot tell us whether something is absolutely scientific, but they can give us a very good indication about it being scientific or not. Or, actually, with it, we can see the place of the subject in question within the landscape. The values Kuhn listed apply to a theory, which is quite a limitation:

1. *Accuracy* – within its domain consequences deducible from a theory should be in demonstrated agreement with the results of existing experiments and observations.
2. *Consistency* – a theory should be consistent not only internally or with itself, but also with other currently accepted theories applicable to related aspects of nature.
3. *Scope* - a theory's consequences should extend far beyond particular observations, laws, or sub theories it was initially designed to explain.
4. *Simplicity* – Closely related to the previous point, a theory should be simple, bringing order to phenomena that in its absence would be individually isolated and, as a set, confused.
5. *Fruitfulness* – a somewhat less standard item, but one of special importance to actual scientific decisions – a theory should be fruitful of new research finding: it should, that is, disclose new phenomena or previously unnoted relationships among those already known.

There are also a couple of other things which might be good to take into consideration:

6. *Reproducibility* – the theory makes predictions that can be tested by any observer, with trials extending indefinitely into the future.
7. *Falsifiability* – possibility of a theory to produce hypotheses which make it possible to refute it.
8. *Correctable and dynamic* – can a theory be subject to modification as new observations are made.

We do not yet know what kind of conclusions we are able to draw when we have finished with this step. Therefore, we will continue the set up of our plan as if we have learned quite a bit about our subjects place within the landscape, but us not being able to draw any conclusions yet.

We will then continue the process by comparing the work of professor Tiller to what we have seen in each paragraph of this section and have a discussion about the insights gained through this. By using paragraph 1.4 we can evaluate the work of professor Tiller through the eyes and the insights of the philosophers we have seen in that paragraph. Via paragraph 1.3 we can place it in historical perspective and maybe see if there is something new going on. Paragraph 1.6 can be used to see how Prof. Tillers work fits the general picture of science which has been shown to us by Prof. Theunissen.

When we have done this, we might find we need to place further nuances and have a discussion on certain points. We shall finish the third section with a conclusion.

On a final note, we have not explored the whole methodological landscape, if that is even possible. We might come across matters which have not yet been addressed in this section. We shall have to deal with these problems in section 3.

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SECTION 2 – THE PSYCHOENERGETICS OF W.A. TILLER

2.1 INTRODUCTION

In this section we will have a fairly thorough investigation of the work of professor Tiller, so that we will be able to place it within the methodological landscape. We will look at its social and historical context, see its development, its experiments, and theories. We will have a look at the background of the people who are involved in this work; in particular professor William Tiller. We shall also look at the ideas of professor Tiller on science, the place of his work within and its relation to science and his motivations. I have not found any secondary sources and will primarily use information from the book *'Psychoenergetic Science: A Second Copernican-Scale Revolution.'*[1] I have chosen this source because Prof. Tiller advised me in an email this book would give a complete outline of his work at the current date without becoming to general. Next to this book, Prof. Tiller has written three other books on the subject matter. In the appendix I have attached a complete list of his publications concerning establishment science as well as the publications on his other work.

I have chosen to maintain a static approach per subject in this section. These are: the backgrounds of the people involved, professor Tiller on science, paradigm, experiments and theory. This last subject gives discusses the source material which we use in this section. Because of the static approach, we lose some touch with the historical development of and interaction between the subjects. Despite this disadvantage, I think that, by using this approach, we will gain a lot in clarity about the work and its different parts. -

Sometimes I shall quote larger pieces of text from the book. I have done this to create the possibility to gain a feel for what kind of man we are dealing with. The smaller quotations have most of the time been made because I am not able to explain what Prof. Tiller means in less, or the same amount of words. For the readability I have incorporated the quotations within the larger text and kept the number of references as small as possible.

2.2 BACKGROUNDS

We will begin by looking at the backgrounds of the people which are involved in this work.

2.2.1 WILLIAM A. TILLER[2]

The following biographical information is mostly given by William Tiller himself in the book *psychoenergetics.* A paragraph dedicated to this purpose gave the most extensive and complete insight to what he has done and how he has developed until now. Some of the general dates have been confirmed with another biography.[3] Almost no information about Prof. Tiller can be found on the internet within sources of institutes which are accepted by the scientific community; apart from a name, photo, title, department and email-address on Stanford's website.[4] Also, there is no date of birth within absolute sources readily accessible. An archive posted on the 7th of August 2009 written by Suzanne Jacobson states that he is nearly 80.[5] When there is no reference in the quotations which follow, they are found in the designated paragraph of the book.[2]

William Tiller was a college student studying Engineering Physics at the University of Toronto from 1948 to 1952. He writes that already at this time he had an avocational interest in what was then called paranormal or parapsychology, which to him 'felt like a future science that was not presently understood.' From 1955 to 1964 he worked in Pittsburgh for Westinghouse Research Laboratories as a Materials Physicist, where he eventually managed a group of approximately 15 to 20 scientists and technicians and wrote about 60 scientific papers which were published in peer-reviewed journals and books. He writes that he thought of himself as a scientist-businessman at this time. Westinghouse wanted him to follow an upward path to senior management. Instead he accepted an offer from Stanford University in 1964.[3] Around this time William Tiller set upon a path to become a daily meditator. He writes that he took 'meditation as a duck to water.' In this time he developed a subtle guidance from and sense of communion with consciousness in the "unseen" domains of reality. He also learned 'to rapidly oscillate between a state of being sharply focussed on a technical item or particular interest and on a state of being open, receptive and loving to everything present in the environment at that moment.' He writes that this has greatly aided him when he became chairman of the Materials Science Department at Stanford in 1966.

At the end of the 1960's, William was awarded a sabbatical leave from Stanford and a Guggenheim Fellowship for a year's stay at Oxford University. His plan of work for his stay at Oxford was disturbed by the book *Psychic Discoveries Behind the Iron Curtain* by Ostrander and Schroeder, which he had bought for an airplane reading. He writes that the 'half-decade of personal and avocational exploration of this general topic area had prepared [him for] the reality and viability of such psychoenergetic phenomena but not the scope and richness of the Rusian technical explorations.' He could not conceive 'how the universe might be constructed to allow this crazy-seeming kind of "stuff" to naturally coexist with the orderly scientific phenomena' which he dealt with in his Stanford laboratories. He writes: 'At some deep level of self, I knew that the described phenomena were largely truthful, just as I always seemed to know intuitively in my establishment science pursuits, where the answers lay.' He went looking for an answer to the questions: '*How might our universe be constructed so that a natural expansion of our conventional scientific construct would allow this strange class of psychoenergetic phenomena to become both sane and rational within a larger conceptual framework?'* and *'What assumed rigid constraints of our conventional worldview could really be relaxed to allow these two sets of experimental data to comfortably coexist?'* After six months he had developed a working hypothesis which seemed quite radical, but which could also prove out to be 'useful, testable and possibly even correct.' We shall not deal with this first-stage model.

Prof. Tiller writes that he had, by this time, reached 'the irrevocable conclusion that it was extremely important for both future humanity and future science that some competent investigator make a long-term commitment to both experimentally and theoretically investigate psychoenergetic phenomena from a well-grounded scientific perspective 'so as to begin weaving the foundational threads for the second rung of our ladder of understanding.' He writes that he decided to lead a dual-path life where on the one hand he would continue as a conventional professor at Stanford and on the other begin an 'avocational life-path of serious research in the area of psychoenergetic studies.' To have the time to do this, he gave up his 'professional power positions':

- Chairmanship position in his Stanford department (1966-1977[4])
- U.S. government committee memberships
- Technical society's committee memberships.

He filled the block of extra time with:

- the continued experiential development of self via "inner" practices,
- theoretical modelling of a multidimensional universe that allowed both conventional science and psychoenergetic science to easily coexist,
- design and conduct experiments to both test the theory and push the envelope of our understanding.

He notes that all of these practices where of equal importance. With it, he aimed to 'build a robust and reliable bridge of scientific understanding that would, on one end, seamlessly join with conventional scientific understating; would straightforwardly project through the various subtle domains of reality in the middle; and would be firmly planted in the bedrock of spirit at the other end.' Tiller notes that he was opposed in this by most of his Stanford colleagues. He writes: 'They thought I had make a crazy choice and had somehow become unscientific and heretic. Mostly, they wished I was at some other university so that the stigma of association would not fall on them.' In the 1970's, Prof. Tiller continues, he lectured widely on the topics of both psychoenergetics and conventional materials science. In this time, he also became the founding director of:

- The Academy of Parapsychology and Medicine
- The Institute of Noetic Sciences and
- The California Institute for Human Science.

Prof. Tiller had expected that the larger scientific community would continue to respect him, and might even begin to read his psychoenergetic papers, as long as he continued his 'laudatory work in establishment science' with his students. But this did not happen. He writes: 'for [the scientific community], I had betrayed the craft. (…) I had become an outsider and, although still a card-carrying member of the establishment club, I had lost cache with the club, salary increases did not continue and my laboratory space slowly dwindled.'

William Tiller has (at least) written the following books:

- *The Science of Crystallization: Microscopic Interfacial Phenomena* in 1991
- *The Science of Crystallization: Macroscopic Phenomena and Defect Generation* in 1992
- *Science and Human Transformation: Subtle Energies, Intentionality & Consciousness* in 1997
- *Conscious Acts of Creation: The Emergence of a New Physics* in 2001 with W.E. Dibble and M.J. Kohane
- *Some Science Adventures with Real Magic* in 2005 with W.E. Dibble and J.G. Fandel
- *Psychoenergetic Science: A Second Copernican-Scale Revolution* in 2007

About the experiments of his psychoenergetic research, he writes: 'The initial experiments started at Stanford on January 1, 1997 and they were then moved to the Minnesota facility between June and September, 1997. I stopped my monthly visits to that facility in January 2000 and focused my attention on both building the Payson laboratory and on writing a book [*Conscious acts of creation*] on our almost three years of psychoenergetics research results in the Minnesota facility (about $1.7 million of my Minnesota benefactor's money had been devoted to that research – good research is expensive to conduct). In about June 2000, Walter Dibble joined me in the Payson lab which was, by then, IIED-conditioned. We had no research funds to proceed in any robust fashion at that point; however, in September of that year, the secretary to my Minnesota benefactor, "Buck" Charlson, called me and said that Buck wanted me to call him. When I did so, he told me: "during meditation last weekend, the universe indicated to my intuition that I should give you some more money for your research so I am putting $1.0 million in your Ditron account." Halleluiah, we were solvent again! Of this money, which I carefully spent over the next three to four years, about $0.3 million joined with the Samueli $0.3 million to fully fund this replication experiment. The full results of that work were published in 2005[(connotation-removed)] about a year after Mr. Charson died (on good Friday 2004). With some research funds in hand, Walter and I reached out to Greg Fandel, Walter's research assistant during the Minnesota period of the work, and he joined us in Payson (Spring, 2001).'

'We sought for and found research funding (~$0.3 million) to partially conduct [the] replication experiment at four external sites from the Samueli Institute for Information Biology. They requested that, besides the Payson site, each of the four remote sites have a control site located within 2 to 20 miles of each active site.'

'The first part [of the replication step of the research] involved building a new laboratory in Payson, Arizona to continue our IIED research in order to show that we could do it again at another location.'

This concludes our exploration of the background of William Tiller.

2.2.2 WALTER E. DIBBLE

'Dr. Dibble received his Ph.D. in Geochemistry at Stanford University in 1980 and did post-doctoral studies with William Tiller in the department of Materials Science and Engineering until 1982. He worked in industry in engineering geology until 1997 when again he worked with Dr. Tiller as a visiting scholar at Stanford. Since then he has been employed at Ditron, LLC and the William A. Tiller Foundation for New Science conducting experiments using intention imprinted electronic devices. Fields of specialization include aqueous geochemistry, crystal growth, engineering geology and subtle energy research. He has published several scientific papers in the field of geochemistry and more recently in the newly emerging field of subtle energy.' (via http://tiller.org/)
Main experimentalists; Ph.D. Geochemist from Stanford University.[6] This is the only biographical information I found on dr. W.E. Dibble.

2.2.3 MICHAEL KOHANE

Ph.D.[7] Main experimentalists; Ph.D. Biologist from Australia.[6] This is the only biographical information I found on dr. M. Kohane.

2.3 PROFESSOR TILLER ON SCIENCE

In chapter two of the book *Psychoenergetic Science: A Second Copernican-Scale Revolution* Prof. Tiller is explicitly writing about his ideas regarding science and also about his experiences with it. In this paragraph we will look at the larger part of the chapter. I am not going to portray the whole content, since Prof. Tiller speaks about many things. I will try to stick to the matters which are directly related to the body of science as depicted in the previous section. Prof. Tiller starts the chapter by a short description from what science has evolved. He continues on why do we do science and how our perception of things influences it. After this he sets out what he sees as the pathways to scientific understanding; which, at least relates to, or is the scientific method. He then speaks about the ideal of science, that it has fallen and the causes of this. We will finish with Prof. Tillers views on how a scientist can react to psychoenergetic work. Each of the following sub-paragraphs gives a short summary of what Prof. Tiller has written:

2.3.1 ON THE ORIGINS AND DEVELOPMENT OF SCIENCE (IN THE WESTERN WORLD)[8]

'The acquiring of knowledge can be divided in two broad ways: the first is the human inner path of revelation, the second the path of 'logic applied to external observations of nature.' Before the emergence of the established religious institutes, these paths 'might have been pictured as two loosely intertwining and meandering rivers of thought.' Afterwards, these institutes 'dominated human experience, human thought and the human worldview' for a long time. 'Here the priests took role as privileged dispensers of knowledge to the human populace' and both paths were 'submerged and exploited (..) in the human behaviour called religion.' This lasted until approximately the 16th century, when, trough the Copernican Revolution, the classical mechanics paradigm was born. And through it, the pathway of Logos emerged from the religious institutes and transformed into the pathway of science; which was in serious opposition to the pathway of religion. Humanity came to see the scientists as the new priests, because of the many experimental validations and technologies which emerged from scientific concepts; 'They became the ultimate dispensers of knowledge and the "in the box" space-time dogmatists of the modern world."

2.3.2 WHY WE DO SCIENCE[9]

We do science, because we want 'to understand the milieu' in which we find ourselves. We want 'to engineer and reliably control or cooperatively modulate as much of' our 'environment as possible to sustain, enrich and propagate' our lives. 'Following this path, the goal of science is to gain a reliable description of all natural phenomena so as to allow accurate prediction (within appropriate limits) of nature's behaviour as a function of an ever-changing environment. As such, science is incapable of providing us with absolute truth. Rather it provides relative knowledge, internally self-consistent knowledge, about the relationships between different phenomena.'

2.3.3 PERCEPTION AND SCIENCE[10]

We perceive events through our sensory system. Only that which we call the five physical senses are well developed in our overall sensory system. The data stream which we perceive is filtered and selectively amplified by our mindset and believe structure. Thus we have no way of perceiving 'the pure information which is inherent in this basic input data stream.' Designated instruments help us to gain access to 'a more objective perspective of these events.' These instruments were designed on the basis of our understanding at that time and may therefore 'have only a limited access to the total information spectrum for these events occurring in nature. In particular, these instruments only respond to positive energies and velocities less than that of electromagnetic light in physical vacuum.'

2.3.4 THE SCIENTIFIC METHOD[11]

'Over the course of the past 4-5 centuries, we have learned how to conduct true scientific investigations, first under the rubric of classical mechanics and, more recently, quantum mechanics.' In short, the method is this:

1. Consider some phenomenon as a black box.
2. Apply a spectrum of an appropriate input stimulus.
3. Determine the output responses
4. Deduce information about the most probable behaviour of the "box" in this spectrum, through correlation of the input stimulus spectrum and output responses.
5. Speculate on models of nature that would qualitatively reproduce such a spectrum of responses; there will be many possibilities
6. Quantify the models; this will greatly reduces the viable candidates.
7. Design 'critical test experiments for sensitively discriminating between the models' in 6.

The model can never, and will never, describe the actual nature of the box; it can only simulate idealized nature. Because, at any point in time, 'we have limited cognitive awareness concerning all of the possible' experimental variables and material parameters ('each having an unlimited range of magnitude'), 'a limited array of experimental equipment of the probe stimuli type available with significant accuracy and limited patience and financial resources available for endless data gathering.'

In the area of physics, total number of variables and parameters, call it *z*, in the phenomena which are put under consideration is generally small most of the time; generally four. Let's say that ten data points must be gathered along each variable and parameter in order to have a good level of theoretical testing. In this case some 10.000 data points are necessary. So, as *z* increases, the number of necessary data points increases dramatically; for biology *z* of a phenomenon can be in the order of 50, which results in 10^{50} data points to obtain the same level of theoretical modelling and testing as a phenomenon in physics! In general, one can gather some 10 data points per day. It would take a thousand persons some 10^{40} years, about four times the age of the universe, to complete this work. In order to do practical research in such a field, the number of data points must initially be shrunk to something like two or three. Of course, the capabilities for the theoretical modelling become very low. One of the things which can be done with such research is to explore the initial box and search for some way to divide it in a number of sub-boxes which can be treated individually. Say we find a way to divide our biological system in ten separate boxes. Each box would have a *z* of about five, resulting in $10x10^5$ data points which are necessary to explore the full box; this would take the same amount of people just some three years.

This method 'has been very fruitful for an evolving humanity and it provides meaningful but relative truth concerning this aspect of nature.' But 'over time, people tend to become attached to the theoretical model that has been fashioned to fit idealized nature. This attachment can become so strong that a rather rigid mindset can develop in the scientific community concerning it and it becomes the scientific worldview or paradigm for an overly extended period of time. However, periodically in time, the prevailing paradigm is unable to accommodate some new sets of experimental observations so pressure begins to develop,' which eventually leads to a paradigm shift.

2.3.5 THE FALLEN IDEAL[12]

In science, truth lies in 'the carefully gathered experimental data. Premature or erroneous interpretations of that data is where one can go wrong. Confronted by new experimental data, no matter how seemingly bizarre and impossible it appears to be based upon the current paradigm, worldview or model held by establishment science, it needs to be studied seriously and examined critically to discover what new and previously unknown, variables of nature are coming into play to possibly account for this new data. Of course, in the long run, such experimental data needs to be replicated by others (following the proper protocols) before one can claim true understanding and full membership in the large body of natural phenomena discovered by science to date.'

'Unfortunately, this ideal (...) is not the usual practice for any of today's research disciplines. (...) Establishment scientists don't read seemingly anomalous (bizarre to them) experimental data. This occurs somewhat because of personal time priorities but mostly because editors of front-line journals do not send such manuscripts to their reviewers. Usually they just return them to their authors with a statement like "*I am rejecting your manuscript because I am sure our readership is not interested in such material*". (...) However, in spite of the unwillingness to look at such data, many of the establishment scientists are willing to "spout of" with very derogatory opinions concerning such data – without ever having seriously looked at it. Such behaviour is called scientism which is a corruption of the scientific craft.'

This is a human sociological problem, which cannot be changed in any simple matter. It involves many causative factors. The following factors (which relate directly to some aspect of science as we talked about in section 1) are discussed by Prof. Tiller:

1. Time and sociological pressure: 'Scientists are mostly just like normal folks but with much more specialized education and training. Thus, they also operate somewhat on a herd instinct, want security and are not particularly courageous except in areas where they have a great deal of knowledge. Most of them are followers rather than leaders, are quite subject to peer pressure and very protective of their hard-won professional reputations (...). Most work very hard, are very busy keeping up with digesting all the important literature in their particular field of expertise, carrying out their personal research, finding the necessary funding to continue and expand this research, writing scientific papers and books, trying to get these published, making presentations at scientific meetings to their peers in order to sustain and enhance their professional reputations and serving on professional, governmental and university committees. All of these things, plus being a spouse and parent, are necessary activities in the life of a successful scientist in today's world.'
2. No place within the establishment institutes: 'top-ranked universities have a reputation to protect so they vie for the best scholars, researchers, students, teachers and staff that their money and reputation and local environmental quality can buy. (...) Their reputations attract high quality students, foundation, philanthropist and government money plus financial donations from a wide variety of alumni. They must afford to present a collective image to the world as a successful, leading edge, establishment type, creative organization in order to continue to attract such students and moneys.'

3. The government, which is a major funding source for research, has shifted their funding from “seed corn” types of research to more practical applications. This happened in the 1970’s and has not changed until this day. ‘The psychoenergetics research of the “remote viewing type”, funded by various U.S. intelligence gathering agencies in the 1970’s and 1980’s at Stanford Research International, is one of the few exceptions.’

Scientism is somewhat diminished through the availability to publish data on the internet and to self-publish books.

2.3.6 HOW A SCIENTIST CAN REACT TO THIS WORK[13]

According to Prof. Tiller, there appear to be three categories of how a scientist react to his work:

1. The largest group exhibits the boggle effect: ‘any presentation of [data from a psychoenergetic experiment which is not unequivocally zero] will cause their eyes to roll and glaze over just before their conscious brain shuts down.’
2. A second group do not have this boggle effect, so long as the effect sizes are small. ‘This group is entrained with the need for very careful controls and statistical design of experiments to wean out and discriminate small effect size results from the statistical noise zone of the experiment. Of course, this is a very important procedure (…). However, the downside here (…) is that they often can become so entrained by their day-to-day protocols that they cannot mentally accept large effect size psychoenergetic results that do not seem to obey their carefully constructed protocol rules.’
3. The last group never has this boggle effect, ‘no matter how large the results and effect size of the experiment being conducted. For them, key experimental protocols need to be such that the dominant physics principles operating in the experiment are sufficient to manifest data signal amplitudes of magnitude strongly above the noise (large effect sizes).’

This ends our tour through Prof. Tillers views about science and his work. In the third section we shall return to them and compare them to what we have seen in section 1.

2.4 COPERNICAL SCALE REVOLUTION – A NECESSARY PARADIGMSHIFT?

The book and the DVD are called: Psychoenergetic Science: A Second Copernican-Scale Revolution. It is called like this, because Prof. Tiller believes that a major shift must occur in how we see the world and ourselves in order for humanity to accept and fully grasp the scope psychoenergetic phenomena and its implications. He tells us that a shift will occur, because the research his group has done shows that there exist phenomena outside our current space-time based paradigm which are very real.

The Copernican Revolution was a paradigm shift in the 17th century, from the geocentric to the heliocentric view. In it, we learned to trust empirical observations before religious revelation. This led to the exact sciences and which was, in Prof. Tillers terminology, an emergence of the Path of logos from the pathway of religion. It is said to have begun the great shift from trust in religious authority figures to trust in the self. The term Copernican Revolution was used as a metaphor by Emmanuel Kant to explain the effect in epistemology of his new transcendental philosophy.[14] In the article *Legal Modernism* David Luban derives four different sides of the metaphor usage by Kant from different aspects of the Copernican Revolution as it is understood in the history of science, and its wider impact on thought:

1. a sense of uprootedness within cosmology,
2. a way of representing the path of reason and Enlightenment,
3. mistrust of common sense as a guide to truth,
4. a world-picture based on scientific laws rather than narratives.[15]

I believe that, apart from the last aspect, this tells us rather well what Prof. Tiller is aiming at, when he says that psychoenergetics is a second-scale Copernican revolution. In the preface of the book, he writes: 'My intuitive hypothesis is that this new, second Copernican-type revolution will, in terms of scale, be at least as significant for the progress of humanity as the first one!'[16] Seen in this way, a Copernican revolution is a huge paradigm shift, measured by his impact of change and what it is changing. The latest paradigm shift in physics occurred a century ago with the rise of quantum mechanics and relativity. According to Prof. Tiller, this was not a Copernican scale revolution: 'Although this was a major change in our worldview, it was much smaller than that created by the Copernican revolution.'[16] So, giving psychoenergetics this label is quite a statement.

In the following paragraphs we will see some of the experiments and theories of this "new" science and perhaps see the up-rootedness which it creates within the way science, and we, picture the universe. But before we do that, let us look at something which has not yet been answered. In paragraph 2.2 we saw that Prof. Tiller has searched for assumed rigid constraints of our conventional worldview, the current paradigm, which could be relaxed to allow both the experimental data of established science and psychoenergetic phenomena to comfortably coexist. The answer that Prof. Tiller has found is that in science, there exists the un-stated assumption that 'no human qualities of consciousness, intention, emotion, mind or spirit can significantly influence a well-designed target experiment in physical reality.' If this could somehow be false, then indeed a door to a whole new area would be opened.

2.5 EXPERIMENTS

We have seen in paragraph 2.2 how Prof. Tiller came in touch with psychoenergetic phenomena and research. In the 1990's he set out to 'meaningfully prove or disprove the (above) unstated assumption.' In the book Prof. Tiller writes that has will not speak about a great many experiments which were done and restrict his attention to the basic experiments. We shall explore them in this paragraph. I will endeavor to be as complete and concise as possible. Everything that is written in this paragraph is said, done or found by Prof. Tiller et al., or a reflection of this, unless specifically stated otherwise. We will discuss the experiments in section 3. The four main experiments are about changing something in the physical world via the application of human consciousness in the form of a specific intention. In short:

- Increase the pH of water by 1.0 pH units, without the addition of chemicals;
- Decrease the pH of the same type of water, without the addition of chemicals;
- Significantly increase the *in vitro* thermodynamic activity of the liver enzyme, alkaline phosphatase;
- Significantly decrease the development time of the fruit fly, from the larval stage to the adult stage, by increasing the *in vivo* [ATP]/[ADP] ratio of the energy storage molecule, adenosine triphosphate [ATP] to its chemical precursor [ADP] in fruit fly larvae.

2.5.2 OVERALL PROCEDURE TO INTRODUCE CONSCIOUSNESS INTO THE EXPERIMENT[16]

Prof. Tiller used a two staged process via a surrogate host to introduce consciousness in the experiment. This host is a simple electronic circuit housed in a plastic box (7''x3''x1''; for further details, see appendix), called UED (unimprinted electrical device). The procedure started by placing the UED on a tabletop, plugging it in his power converter, which was then plugged in the wall. Now the device was turned on. Four well qualified meditators, of which Prof. Tiller was one, sat around the UED and went into a deep meditative state. When a signal was given, they closed their eyes and mentally connected with each other, the unseen universe and the UED. Then they 'mentally cleansed the environment in order to create a "sacred space" around the device in which the specific intention was to be placed. When the environment felt calm, coherent, clean, peaceful and bathed in light,' Prof. Tiller would read the specific intention which he had written beforehand. Each member was allowed his to visualize it in his or her own way. After some 15 minutes, when everything felt “right”, Prof. Tiller would say: ‘So be it, thy will be done,’ after which they would abruptly release their focus on the device, but stay in ‘the deep coherent state.’ When this was done, Prof. Tiller would read an additional intention statement with which to seal the primary intention in the device ‘without any unnecessary wasteful leakage of the key information during either use or storage.’ After this procedure, the device was labelled an IIED (intention imprinted electrical device). Prof. Tiller would say “So be it, thy will be done” for a second time to finish. With this, everything was released and the persons would come out of meditation. They would talk about ‘any special experiences, feel the device to detect any new condition or state (if we were able) and decide if the procedure had gone well or not.’ Prof. Tiller writes that most of the time this procedure was done a second time, ‘just to be sure.’ With pauses in between, when four devices were imprinted on a day with two different intention, it was ‘a very full day for us and we were tired. Although our goal is to be as perfect a channel as possible for energies from the “unseen” domains to flow through us and into the device on the tabletop, it still required a clear mind, a sustained focus and emotion-enhanced committed intent on our parts.’ The book tells us that devices were successfully imprinted with two, four and six meditators.

2.5.2 WORKING HYPOTHESES

When Prof. Tiller conducted his research, he had working hypotheses; ideas about the world which aren’t yet held as truth, but taken as a starting position from which one operates. The most obvious is the initial model which he came up with in Oxford. I show here a few of the ones I came across, in order for us to gain a better feeling for the way he sees the world and his place in it:

- *Prof. Tiller about his initial model:* ‘Probably the most important part of this conceptual structure is that it was (…) well beyond spacetime. (…) Think of nature as a richly-detailed construct that is vibrating, radiating and absorbing energy/consciousness on many distinct bands of reality and that we can cognitively access only one of these bands at our present level of evolution. This is the well-known electromagnetic band of reality. We are largely blind to the rest. Thus, coming to understand nature in all its glory (all its bands) required that we construct a “ladder of understanding” with many rungs that we must carefully fashion. For the past ~400 years, we have carefully constructed the intertwining threads of the bottom rung of this “ladder of understanding” wherein human consciousness is not an important variable relative to the operational physics involved at this aspect of nature’s manifest expressions.’[19]
- *Hypotheses regarding the information imprinting process:* ‘the “unseen” domain does the heavy lifting in this cooperative process between dimensions; a necessary component to the overall creation event of converting a seemingly inanimate UED host device to a seemingly dynamic and intelligent IIED.’[20]
- ‘Some time ago, I defined “subtle energies” as all those unique kinds of energies functioning in humans and nature beyond those already accepted as being associated with the four fundamental forces […] by today’s establishment science.’[21]

At first sight I perceived a definite sense of mysticism or spirituality in these hypotheses. Note that it is important not to judge this; not in a negative, nor in a positive way. We’re just going to take these as facts concerning the subject of our investigation and see what this tells us about his place in the landscape.

2.5.3 EXPERIMENTS

Together with Michael Kohane and Walter Dibble, Prof. Tiller has set up ‘four unique and carefully designed target experiments (...) in a group of individual laboratories at a single site in Minnesota about 30 miles from Minneapolis.’ We are going to look at these four experiments and will start with an early experiment. The first alinea of each of the following sub-paragraphs gives a description of the experiment, if it applies the intention statement is stated. If necessary, brief theoretical information surrounding the experiment is given, after which we look at the experimental methods, when specified in the book. We continue with the results of the experiment and finish with experiment-specific conclusion. In 2.5.4 we will finish this fifth paragraph with the conclusions and comments Prof. Tiller made regarding these experiments.

2.5.3.1 AN EARLY EXPERIMENT[22]

To see whether there was an actual isolation, a UED and IIED were placed some 100 meters apart with both of them turned off. The result of this: after about four or five days the UED had turned into an effective IIED. Prof. Tiller does not tell how this was determined. It could have been "felt", but this is subjective. Also, it could have been placed in the experiment and appear to influence it. I cannot think of another way in which they could have determined whether or not the UED/IIED device contained the information in the form of an intention imprint. Prof. Tiller writes about this result: 'At first, I was horrified because the information sealing step of the process was not working. We were losing our "control" (the UED) and we wouldn't be able to do careful experiments with the IIED because of such rapid imprint information leakage from the IIEDs.' This initial shock was replaced by excitement when they reflected on what could have happened. Because the circuits where not powered in any way, they concluded that this information transfer process could not have occurred via electromagnetic photons. Since there was an information transfer, there must have been some other, unknown, mechanism which transferred the information.

Later on, they found a way to increase the lifetime of an intention imprint to some three to six months. Prof. Tiller had hypothesized that 'electromagnetic energies may constitute one natural leakage mechanism for the IIED's intention imprint information to drain away.' Thus the IIED was wrapped in aluminium foil, 'to block the passage of optical and higher frequency photons.' Then it was placed in a small electrically grounded faraday cage, 'to effectively block gigaHertz, microwave and radiowave electromagnetic frequencies down to [approximately] 1000 Hertz.'

A slight digression is in order here. The above information is all written in one page of the book. I find it odd that both the conclusion about a new kind of information transfer mechanism, outside electromagnetic photons, and the effective shielding of this very information by that through which the information isn't said to be transferred are written on the same page. I see the following possibilities, without assigning a probability to them: 1) Prof. Tiller has missed this contradiction. 2) Prof. Tiller knows the apparent contradiction, but has intentionally put this there. 3) There is additional information which Prof. Tiller assumes to be generally known, and which I have missed, which would solve the contradiction. In section 3 we will further discuss this matter and see what we might learn from this.

2.5.3.2 THE FIRST WATER STUDY; + 1.0 PH UNIT[23]

We shall immediately go to the intention statement which was used with the preparation of the IIED. The used intention statement is:

> *'To activate the indwelling consciousness of this experimental space in order to condition it to a significant higher electromagnetic gauge symmetry state. The special tuning for this state is to be such that the IIED increases (decreases) the Ph of the experimental water, in equilibrium with air, by one full pH unit compared to the control; i.e. to decrease (increase) the hydrogen ion, H^+ thermodynamic activity of this water by a factor of ten.'*[24]

'From a conventional theoretical perspective, the pH of pure water in equilibrium with air is largely determined by the carbon dioxide concentration in the air and, as [this] concentration rises, the water becomes more acidic. This air CO_2 content is a given and thus the equilibrium

CO_2 content of water is given, thermodynamically from the air content times a factor less than one depending on the temperature, [Prof. Tiller gives a plot of this relation; Fig. 3.7 in the book], and on the thermodynamic free energy for change, ΔG^0_{co2}, of a CO_2 molecule from air to water. Thus, if the (...) IIED-effect were to operate only at our normal electric atom/molecule level of physical reality, it could do so only by increasing (...) the magnitude of ΔG^0_{co2} (...).'

Prof. Tiller states that the studied water was contained in 'a 250 ml polyethylene jar into which a temperature probe and a pH-electrode [were] immersed.' The cap of the jar had holes in it, so the water/air equilibrium could be maintained. They used a probe which measured a voltage difference which reacted linearly to a linear change to pH. The output of the meter is periodically sampled and send to a computer for storage. The measurement equipment has an accuracy of ±0.01 pH.

They found that in the first day or so, the pH of the water came in local equilibrium with the probe; in the graph of pH as a function of time, a declining pH value from the initial value to the calculated equilibrium range using established theories. Now, conventionally, one would expect the pH to stay within this range. This is not what Prof. Tiller et al. have found. Their data showed a robust departure from their calculated thermodynamic equilibrium range, always in the intended direction. The pH value slowly changed over three to five days, to plateau at a value between, approximately, 0.8 pH to 1.2 pH above the conventional expected range. They found this result for water with initial pH, ranging from 2 ph to 12 pH.

On a final note, Prof. Tiller tells us that this measurement was also done with litmus paper, which is not very accurate, but is 'an analogue type of measurement in the information sense.' Here they found that it did not show the behavior which the digital measurement equipment had showed. According to the litmus paper, the pH just stayed within the thermodynamic equilibrium range.

2.5.3.3 THE SECOND WATER STUDY; - 1.0 PH UNIT[23]

The same kind of results as in 2.5.3.2 were found. The change in the above text is in the obvious way; decrease becomes increase and vice versa, etc.

2.5.3.4 IN VITRO ALP STUDY[25]

This study is discussed in pages 60 to 63 of the book. Because the information in the book is presented so compactly, we will see in this sub-paragraph almost a replication of these pages. I could not avoid this, were I to give an accurate picture of what Prof. Tiller has written. The enzyme alkaline phosphatase (ALP) is present in 'nearly all tissues of the body, especially at or in the cell membranes and at particularly high levels in intestinal epithelium, kidney tubules, bone liver and placenta.' In preparing the UED, the following intention statement was used:

> *To activate the indwelling consciousness of this experimental space in order to condition it to a significantly higher EM gauge symmetry state. The special tuning for this state is to be such that the IIED increases, by a significant factor (as much as possible without damaging the enzyme), the thermodynamic activity coefficient of the enzyme ALP. This activity coefficient increase is to occur relative to the same type of experiment with a UED.*[24]

'In this study, the ALP was derived from porcine kidney.' 'The study involves four different treatments (...) at the same temperature and humidity and carried out simultaneously in an incubator at 4^0 Centigrade.' When one looks at the apparatus arrangement, one sees that the experiment has built in controls. The first variant of the group is labelled 'the core (C) treatment system, which is just an empty quartz tube that will eventually contain a quantity of the enzyme, ALP. This tube rests in a beaker of pure water. The second variant of this group is the core system inside an electrically grounded faraday cage (F). The third variant of this group is the same as the second but containing a plugged-in, unimprinted device (d, o) and the fourth variant is also the same as the second variant but containing a plugged-in IIED (d, j). It should be noted that all the [faraday cages] were internally lined with aluminium foil. All four experimental treatments (...) were located adjacent to each other in the incubator (with ~6" gaps between the walls of the adjacent faraday cages). Such an arrangement allows one to compare C with F, F with d, o and d, o with d, j. For C with F, one can assess the effect of broad-band, ambient EMFs on ALP activity. For F with d, o, one can assess the effect of low electric power (less than 1 micro-watt) EM in the 1 to 10 megahertz frequency range on ALP activity. For d, o with d, j, one can assess the effect of the intention imprinting process on ALP activity since both devices output the same ~1 microwatt of total electromagnetic power in the MHz range.'

'The most widely used substrate for assaying the thermodynamic activity of ALP is 4-NPP (4-nitrophenyl phosphate). This is a colourless ester but 4-nitrophenyl (4=NP), which is the chemical product of this enzyme reaction, is yellow in collar at the pH of the reaction.

Thus, the enzyme reactivity can be followed continuously by observing the rate of increase of yellow colour spectrophotometrically.' They measured the ALP activity via 'a dry-slide operation that provides accurate results with small volume samples in 2 to 5 minutes,' a system from Johnson & Johnson.†

The following experimental procedure was used: they took the faraday cages for the d, o and d, j variant of the group prior some 120 days prior to the experiment, not yet containing the core treatment and switched on the UED and IIED. 'Then the core treatment was added to each [faraday cage] plus as a control for an additional [two] days. Finally, the ALP was added to each quartz tube (...) for exactly 30 minutes. Immediately thereafter the ALP activity was assayed using the J & J system described earlier. They were assayed in the order (d, o), (d, j), (F) and (C) at the same time during any one day. The ALP dilutions were 100 µl of stock ALP solution plus either 150 ml or 200 ml of pure water. There were [seven] replicate assays per treatment for each dilution with the data being collected over two consecutive days.'

They found the following results. The ALP thermodynamic activity of (d, j) is greater than (F), (F) greater than (C) greater than (d, o). 'From ANOVA statistical analysis, one finds that (d, j) was significantly greater than both (1) (d, o) at $p<0.000$ and (2) (C) at $p<0.005$ (…) and finally (…) (F) was significantly greater than (C) with $p<0.011$;' $p=0.001$ meaning a chance of one in a thousand that the event could occur at random.

'From these results, it is important to note that:

(1) Just putting (C) into an electrically-grounded Faraday cage to screen out the broad-band ambient, environmental electromagnetic fields increased the ALP activity by ~10%. This indicates that such background EM radiation is a significant thermodynamic stressor for the enzyme ALP even at what we humans think is a relatively weak intensity;

(2) Just putting the activated UED with its less than 1 microwatt of microwave power, into F reduces the thermodynamic activity of ALP by more than 10%. Thus ALP is especially sensitive in the microwave region;

(3) just exchanging the IIED for the UED, having the same microwave electric power output but also having an intention imprint such as to increase the ALP activity, increases the net ALP thermodynamic activity by about 15%; and

(4) this all occurred with just 30 minutes of exposure of the ALP to these unique treatment fields.'

2.5.3.5 IN VIVO FRUIT FLY STUDY[26]

In this fourth study, Prof. Tiller et al. sought to test the unstated assumption of science with respect to a living system; they used the fruit fly. The used intention statement is:

† Vitros Chemistry Products. Ortho-Clinical Diagnostics. Johnson & Johnson. 100 Indigo Creek Drive, Rochester, NU 14626, USA.

To activate the indwelling consciousness of this experimental space in order to condition it to a significant higher EM gauge symmetry state. The special tuning for this state is to be such that the IIED synergistically influences
(1) the availability of oxygen, protons and ADP (adenosine diphosphate),
(2) the thermodynamic activity of the available concentration of NAD (nicotinamide adenine dinucleotide) and
(3) the thermodynamic activity of available enzymes, dehydrogenase and ATP-synthase in the cellular mitochondria of the fruit fly larvae so that the production of ATP (adenosine triphosphate) is significantly increased (as much as possible without harming the life function of the larvae) and thus the larval development time to the adult fly stage is significantly reduced relative to that with a control device.[24]

The experimental set up is comparable with the set up of the *in vitro* study; the four variants, labelled (C), (F), (d, o) and (d, j), which were set up side-by-side. Here circular Faraday cages were used. The core treatment in this case were six silica vials containing 30 larvae and 'non stressful food.' The experiment took place in an 18^{o}C, 55% relative humidity room. The larvae were 0 to 4 hours old, counted by hand and then transferred to a vial. 'For each experiment, all vials were established within 3 hours (...).' 'Exposure of the vials to the devices in the [Faraday cages] was as follows: either the UED or the IIED was placed in the centre of a cage and vials were placed around its perimeter. The device was then turned on for a specific time period, then turned off and removed from the cage. Then the larval development proceeded until the adults were both collected and weighted. The surviving adult weight was calculated for each vial as the total weight divided by the number of flies surviving. (...) the larval development time is given as the time taken for half of the surviving adults to emerge, $\tau_{1/2}$, and is easily evaluated by visual observation. The [ATP]/[ADP] ratio required sacrificing the adult flies by preparing homogenates (ground-up organisms via the use of a centrifuge). The energy assay used high performance liquid chromatography (HPLC) to measure changes in the levels of ATP, ADP and AMP (trimer, dimer and monomer) present in the sample (...). We assessed the frequency effects of the devices output radiation using exposure periods of four hours to one life cycle. The total study involved approximately 10,000 larvae and 7,000 adult flies assessed over an 8 month period.'

The study showed that there was a high correlation between the larval development time and [ATP]/[ADP] ratio, which 'provides substantial evidence that a strong relationship exists between physical energetic and physical fitness in fruit flies (high [ATP]/[ADP] leads to low $\tau_{1/2}$).' The larval development time of the (d, j) variant is smaller than the (d, o) variant at the $p<0.001$ level of significance. It stands out that the larval development time of (F) is smaller than (d, j). Prof. Tiller does not directly address this or gives an explanation. He does address the following, and we can find an answer for the previous matter. 'The unexpected finding that (F)<(C) at $p<0.001$ and that (F)<<(d, o) at $p<0.0001$ illustrates that both random ambient EMFs and specific microwave EMFs are significant thermodynamic stressors for fruit flies.'

2.5.4 PROF. TILLERS CONCLUSION AND COMMENTS[27]

Prof. Tiller concludes that the unstated assumption of science is false. Noting that these experiments don't tell us whether or not the assumption was factual in the past, but it isn't for the late 20th and early 21st century.

Regarding the experiments, Prof. Tiller writes: 'From the water studies, we noted that the digital equipment registered robust changes in pH, always in the direction intended by the IIED and almost always to the magnitude specified by the particular IIED. However, for an analog measurement system, no such changes occurred. Mostly, for the two biological studies, digital measurement systems were utilized so one might speculate that it is only the instrumentation that changed and not the actual chemistry of the system. However, for the fruit fly study, both the [ATP]/[ADP]-data (gathered using a digital measurement system) and the $\tau_{1/2}$-data (gathered via a non-digital measurement) were highly correlated with each other. So real changes at the chemical level must have occurred. Something unique has occurred here at an information level that needs to be further explored by others in the future.' Regarding the measurement of the pH of water with the litmus paper, Prof. Tiller writes: 'From this small bit of data, one might speculate that human consciousness can robustly influence digital experimental measurement equipment but not analogue measurement equipment.'

They have found that three distinct types of experimental behavior can be seen, when measuring some property Q. The first type of behavior is what science has investigated for the last 400 years. As a function of exposure time to an activated IIED, two other states can be reached. The fist has been labeled *Conventional* Physics, the respective following types have been named *Transitional* Physics and *New* Physics. In the Conventional Physics area, Tiller et al. detected almost no change from the value provided by the theoretical physics with which we are familiar. In the Transitional Physics area, 'significant non-linear changes' in the measured value 'begin to appear and always in the direction specified by the intention imprint for the IIED.' When the IIED is removed in the Transitional Physics area the measured value slowly drops back to the 'conventional' value. The amount of time this last isn't stated. When the IIED is present for a period longer than a certain threshold, if the IIED is removed thereafter, a measurement of the property Q remains at the intended value without a seeming decay. A space which is brought to either Transitional Physics or New Physics, is labeled an IIED conditioned space.

Prof. Tiller closes the chapter with the following, interesting, remark: 'these experimental results are so important for humanity that many in this book's readership, who have the requisite training, should attempt to replicate our results following our protocols.'

2.6 REPLICATION OF EXPERIMENTS; INFORMATION ENTANGLEMENT[28]

As a next and final step, they sought to replicate their experimental findings. This step consisted of continuing the IIED research at another site and replication of IIED research by others. The continuation of the IIED research at another location was done to see if the results could be obtained again at another location. The replication of the research by others was done, obviously, to see whether or not equivalent results could be obtained by people outside Tiller's group. The replication by others was to be done far from both the Payson and Minnesota site and was allowed to be done 'provided that [the Tiller group] supplied the IIED's. [They] did it this way because [they] were not certain that the "unseen" would cooperate as well with the UED imprinting process for all the remote site owners as they had for [them].'

The Payson site, see paragraph 2.2, was build for the purpose of the continued research. This site would also serve as one of the sites were the replication study would be held. The experiment we have seen in paragraph 2.3.2 was chosen for this replication study, 'because it was the simplest and cheapest.' As we have seen in paragraph 2.2, the Samueli Institute provided part of the funding for replication at other sites. In agreement with the Samueli Institute, four locations were selected. One in Kansas and another in Missouri were chosen by William Tiller, in which he knew the people. One in Baltimore and another in Bethesda were chosen by the Samueli Institute, in which they knew the people. The institute 'requested that, beside the Payson site, each of the (...) four sites have a control site located within 2 to 20 miles of each active site.' So there were five sites, each with his own control site. All of them were visited by Walter Dibble and William Tiller 'to help set up and demonstrate the proper use of equipment.' The same equipment and set up were used as the study described in paragraph 2.3.2.

The Payson site was ready on November 1, 2001, the Kansas and Missouri sites followed in December 1, 2001. The Baltimore and Bethesda 'didn't start until ~spring,2002.' At these sites, the pH, water temperature and air temperature would be continuously measured, with a sample interval of one or three minutes. The Payson laboratory, with its surface of some 1000 square feet, was conditioned with an overall IIED 'using a completely new type of intention statement:'

> *'To activate the indwelling consciousness of the Payson laboratory in order to 'condition' it to a significantly higher electromagnetic symmetry state. The special tuning characteristic of this state is to be specifically such that any psychoenergetic experiment subsequently conducted in this IIED-conditioned space would be significantly benefited.'*

Because of the "experimenter effect", which we have seen in 2.6.4, they choose to collect the data 'to a two-week basis in order to minimize [this effect].' Prof. Tiller gives the following protocol which would be followed by all the replication sites:

(1) 'Replace the water in the pH-vessel with fresh water,
(2) Recalibrate the pH-electrode at that time,
(3) No intermediate human visits to the apparatus and
(4) At the two-week point, make a disk of the pH(t), T_W(t) and T_A(t) data streams for mailing to the Payson lab for analysis and start again with (1).'

When this part of the experiment was done, 'the IIED was removed from that space, wrapped in aluminium foil and stored in an electrically-grounded Faraday cage. Measurements continued for a subsequent six weeks in order to see if any significant change occurred in the state of "space-conditioning" signatures.'

2.6.1 EXPERIMENTAL FINDINGS AND CONCLUSIONS – INFORMATION ENTANGLEMENT

Prof. Tiller divides the study in three phases, we shall follow this division:

Phase 1; some three months before the IIED was introduced at the Payson site, 'a broad range of pH-measurements' were done. At this time, the Payson location was already IIED-conditioned through the device which intention statement we have seen above. These measurement showed behaviour which would be expected through our current theoretical knowledge of the pH of water; dependence on temperature and CO_2 concentration of the air surrounding the water. The data William Tiller presents, can be seen in figure 3. We see the pH drop down from its initial value to the theoretically expected equilibrium range and, with a damped oscillating motion, remain in the highest part of this range. Note that the pH measurements appear to have lasted for a month, and not 2 weeks, as indicated above. The IIED was introduced July 25, 2001. Less than a month later, they found the pH increase as seen in figure 3. In this book, Prof. Tiller doesn't present us with a thorough analysis of the data, but, on sight, it seems a linear combination of the "classic" drop-down-and-damped-oscillation behavior and an declining exponential curve. We can see that with each monthly cycle, the pH increase increases steadily, 'until it achieved ΔpH ~ 1.0pH units increase during the period' August 15, 2001 to March 27, 2002. Now, 'after this particular IIED was removed to storage, a completely new type of pH-behavior appeared that is schematically illustrated in *[figure X+1(pg. 96)].*Here, we noted that the ΔpH-value very slowly decayed (over months) back to zero with time, overshot zero to large negative values and then very slowly oscillated to zero in an asymptotic manner over many months (something like a weakly-damped mechanical or electrical system).' Prof. Tiller hypothesizes that this behavior might has its cause in the overall IIED conditioning of the Payson lab and that the behavior tells us something of the basic nature of a conditioned space. The same kind of behavior as found in the Payson lab, was found in Kansas and Missouri. In telling this,

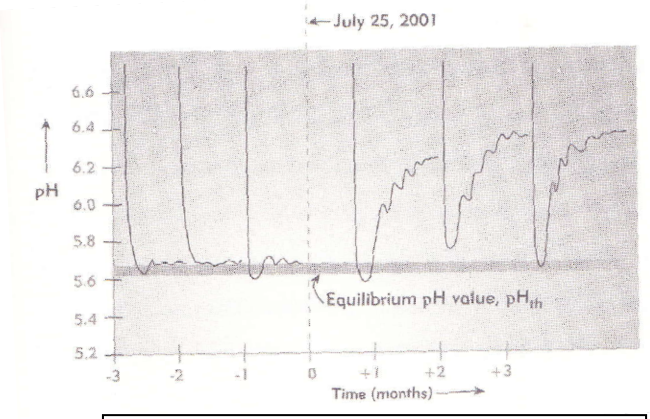

Figure 3. Experimental data on information entanglement, as presented on pag. 95 of the book.

Prof. Tiller presents a plot of the pH as a function of time and an, almost perfect, fit of a the functional form

$$pH = pH_0 + \Delta pH\left(1 - e^{-\beta t}\right), \qquad (3)$$

with, in this case, pH_0=5.73, ΔpH=0.86 and β=0.0127. 'Perhaps the most remarkable finding of this study,' Prof. Tiller tells us: 'was that at the three control sites for [the Payson, Kansas and Missouri sites], where no IIED was ever present, the time-dependent behavior of the measured pH was almost identical to that found for these three IIED sites.' He does not tell us if there is a correlation between the values for pH_0, ΔpH and β between the IIED site and its respective control site. But it is a remarkable result nonetheless, from which they 'conclude that some unique information entanglement process exists between these IIED-sites and their control-sites some 2 to 20 miles distant.'

Phase 2; In the next phase, they sought to test this hypotheses. To do this, they used the Baltimore and Bethesda locations, which didn't had an IIED present, as control sites for the other three sites. These experimental and control sites were some 1500 to 2000 miles apart from each other. The experimental procedure which we have seen on pg. 46 was introduced in Baltimore and Bethesda to start the experiment. The data Prof. Tiller presents shows us that the ΔpH of the first cycle was approximately 0.5 pH for Baltimore and 0.6 pH for Bethesda. In five months data gathering ΔpH for Baltimore varied, approximately, between 0.3 ph and 0.9 pH, with an approximate average of 0.6 pH. For Bethesda ΔpH varied between 0.2 pH and 0.6 pH with an average of 0.4 pH. The pH(t) was of an exponential nature. Prof. Tiller notes that somewhat different values for ΔpH and β were needed to fit pH(t) for each site, from which we might deduce that each site had his own, particular, values for ΔpH and β which were found with each pH measurement.

Phase 3; In the third phase, Prof. Tiller present the results found of a replication study at a location near London and Milan. In the beginning of 2003 Tillers group was contacted, individually, by 'a small group of young technical man' from these locations, with the interest of reproducing some of the IIED research. Separately, they were suggested to do the experiment we have seen in 2.3.2. 'They would purchase and assemble the necessary equipment following our instructions. Then, they would run one or two-weak cycle change, base-line experiments following our protocols without an IIED for [approximately] 3 months and then we would send them an IIED for further experimentation. The U.K group started continuous experiments by mid-March, 2003, in the home of one of their group. The Italian group started (…) mid-September in a rented basement.' Prof. Tiller presents data which shows that, for London, in the first cycle ΔpH was about 0.4 pH and for the final cycle it was about 1 pH. For Italy, the first cycle showed a ΔpH of about 1 pH, the second cycle a ΔpH of about 1.7, where it would stay. No IIED had ever been present at these sites and has never been for this experiment. The data shows 7 data points for the London site, in about 98 days, 7 two week cycles. The data points don't seem to be ordered in a 2-weekly fashion; the cause of this is unknown to me. The data shows 14 data points for the Italy site, in approximately 150 days, about 10 and a half 2 week cycles. It is difficult to see in the graph that Prof. Tiller present, but it seems that the data isn't distributed in an evenly fashion over time. Again, the cause of this is unknown to us. Prof. Tiller tells us that the pH(t) curves showed a 'well-defined exponential curve with time for both sites but with a different (ΔpH, β) characteristics (…).' A final concluding hypothesis that Prof. Tiller makes from this is that 'for [the] remote sites that were below ground ([Minnesota control] and Italy), the ΔpH-values both achieved levels of ~1.7 while those at ground level ([Payson], [Kansas] and [Missouri] IIED sites), achieved ΔpH~1.0 (the intention target) and those at ~3 stories above ground level ([Baltimore] and [Bethesda]), achieved only ΔpH~0.8. One might weakly speculate (on very little data) that the type of energy involved in this information entanglement process prefers to travel through the ground rather than through the air while normal electromagnetic waves prefer to travel through the air than through the ground.' He doesn't mention the London site. This site had a final ΔpH of about 0.6 pH, so it would be interesting to learn its position relative to the ground. Aside from this, Prof. Tiller doesn't tells us why the London site only ran for some three and a half months and the Italian for some 5 and a half months.

2.7 ANOMALOUS BEHAVIOUR IN CONDITIONED SPACES[29]

Prof. Tiller discusses four property measurement behaviours of a conditioned space which aren't seen in the Conventional area. In order to understand this, he tries to establish a base from which he can show that we must speak of two levels of physical reality. It is the coupling between these two levels where Prof. Tiller seeks the origin of the anomalous behaviour. The first level is the level with which we are scientifically familiar with and the second level is a level which is hitherto unexplored by science. Prof. Tiller proposes that it is this level in which human consciousness, intention, emotion, mind or spirit can have a significant influence. Hereby learning and understanding some of the physics associated with a space which is, at least partially, coupled to this other level of physical reality. He has found the following four anomalous behaviours:

1. A significant change in the pH of water in a container when a DC magnet is placed under the container with its north pole up relative to the south pole up.
2. Commonly observed oscillations in, what he calls properties, such as air temperature, water temperature, water pH and water electrical conductivity, with an approximate frequency range between 0.01 Hz and 0.001 Hz.
3. 'Strongly correlated property-oscillation behaviour' which 'appears to be readily transferred from one IIED-conditioned locale to another IIED-conditioned locale ~25 to ~135 feet away but not to an unconditioned locale at any separation distance.'
4. Substantial changes in the measured values of experiments in a conditioned space when persons enter such a room.

We shall discuss these phenomena, see how or why they differ from what one would expect from conventional science, see what Prof. Tiller has done to test integrity of these observations and what he has concluded from them.

2.7.1 A MAGNETIC POLARITY EFFECT

Prof. Tiller et al. have measured a difference in the pH of a container of water, with the only difference being the north-pole of a ceramic DC magnet pointing upwards or downwards. They have found differences of -0.15 pH, +0.6pH, +1.5 pH, etc; where the difference is defined as

$$\Delta pH_S^N = pH(\text{South-pole up}) - pH(\text{North-pole up}). \qquad (1)$$

Though most of the time, 'the South-pole upwards increases the water's pH while the North-pole upwards decreases it,' this was not always the case.

Such a polarity effect is not to exist according to our current knowledge, because as far as we know, there are only magnetic dipoles, no monopoles. The polarity effect shouldn't be there because, 'the magnetic energy [of a magnetic dipole] is proportional to the square of the magnetic field strength so it doesn't matter whether the North-pole points upwards or downwards, the magnetic energy is the same and the magnetic force is the same.' Of course in addition to this, normally, one wouldn't expect and doesn't see the pH changing at all in the presence of a magnetic field.

They were therefore 'inevitably' led to the conclusion that, in some way, a space which is conditioned by an IIED grants measurement instruments access to magnetic monopoles. They knew that over the past four to five decades, billions of dollars were spent around the world in the search for magnetic monopoles, by very competent scientists, and in vain. 'However, one expects on the basis of symmetry in nature that [magnetic monopoles] should be there and, from an exotic theoretical physics perspective, they are predicted to exist at a higher electromagnetic symmetry state in nature than our normal electric atom/molecule symmetry state. Thus one can only conclude that, from our normal electric atom/molecule level of physical reality, magnetic monopoles are not instrumentally accessible.' From this, they came up with the following notion: *the electromagnetic symmetry state in an IIED-conditioned space is raised sufficiently for magnetic monopoles to exist.*

2.7.2 OSCILLATIONS IN THE MEASURED VALUES OF MATERIAL PROPERTIES

In this paragraph we will see Prof. Tillers investigations on the oscillation of pH, water temperature and air temperature. The data of the water studies showed lawful (i.e. repeating) oscillations in the measured values of the pH, water temperature and air temperature. The presence of colloidal size zinc carbonate ($ZnCO_3$) particles in the water appeared to enhance the oscillations in pH and water temperature. The oscillations in pH and water temperature were about 25 times larger than the instrumental measurement accuracy. The relative oscillations in air temperature were far larger; '~3°C with our instrumental measurement accuracy of 0.01°C to 0.001°C.' Primarily because of this, they decided to investigate these oscillations in detail. Prof. Tiller describes three phases of this investigation:

In phase one, they have set up a Faraday cage containing a water vessel for pH and T_W (water temperature) measurement in an IIED-condition laboratory, placed thermistors to measure T_A (air temperature) in the water vessel, north and south of the water vessel in the Faraday cage, and at 6 inch interval string through the room into the hall (it is not clear whether or not they closed the door). They found that when they Fourier transformed the oscillations which were measured by the thermistors, the obtained amplitude spectra of the different spatial locations had the same fundamental frequency with four harmonics. The fundamental frequency of the data shown in the book is 46.5 minutes. The pH and water temperature spectral data have also been obtained through a Fourier transformation. Both proved to oscillate with a fundamental frequency of 36.6 minutes, which was different from the T_A oscillations, with three harmonics visible. Prof. Tiller enthusiastically remarks: 'This is extremely anomalous and it tells us that something is coherently pumping this entire laboratory space and all the measurements therein!'

In phase 2, they ruled out Bénard convection as a possible explanation of such behaviour, by placing powerful fans in this room. 'It is well known that if one introduces forced convection (via a fan, say) into a room where cellular, natural convection of the Bénard-type is occurring, the forced convection will dominate and homogenize the air so that such temperature oscillations will disappear.' This forced convection did change the pattern of T_A oscillations, but did not eliminate them. Prof. Tiller concluded that the phenomenon did not rise due to cellular convection of air.

In phase 3, they removed the Faraday cage containing the water vessel to see if the oscillations would continue. They decayed, but not in seconds to minutes, but in days to weeks. They were labelled 'phantom oscillations.' They also found that they could perturb the oscillations by placing a large natural quartz crystal were the Faraday cage used to be. When the crystal was placed with its crystallographic c-axis pointing upwards, the amplitude of the oscillations increased by approximately 5% and their decay rate decreased by a factor of approximately 5, but no change in the detailed wave shape occurred. Now, if the crystal was placed with its c-axis horizontal al pointing along the line of the thermistors, the T_A oscillations inverted immediately, their amplitude decrease by, approximately, a factor of 5 while the frequency increased by a factor between 3 and 5.

From these three phases, they concluded that it could not have something to do with air. They even took it a step further by saying that the oscillations 'were not arising from the electric atom/molecule level of physical reality but from some other, completely unique, level of physical reality. Combining this deduction with the DC magnetic field polarity effect, we hypothesise that the phenomena are arising from the vacuum level of physical reality which occupies the space between the fundamental particles that make up the electric atoms and molecules.'

2.7.3 COMMUNICATION OVER DISTANCE

Prof. Tiller et al. found a non-local communication of pH oscillations of water between two IIED-conditioned rooms. In this study, they used four locations; three at some 100 feet distance from one another and one at approximately 900 feet. Two of those were IIED-conditioned, the other two were not. In each of these rooms a pH monitor vessel was placed. In one of the two IIED-conditioned rooms, pH oscillations were generated. Now, exactly at this time, synchronized oscillations appeared in the water vessel of the other IIED-conditioned room, but not at the two sites which weren't IIED-conditioned. This same behaviour occurred when the water vessels were enclosed by individual electrically grounded faraday cages.

'From the foregoing, one can deduce that the energy involved in this non-local pH-oscillation correlation is (1) not electromagnetism and (2) is not associated just with the electric atom/molecule level of physical reality but requires IIED-coupling between this level and the physical vacuum (…) level of physical reality.'

2.7.4 AN IIED-CONDITIONED SPACE AS A DETECTOR[30]

In their 'early Minnesota experiments' William Tiller et al. found that 'close bodily presence of the experimenter influences the magnitude of the measurement.' In the book he presents two data plots, one of pH measurements in two Payson labs (labelled P_1 and P_4) and another of a pH and water temperature measurement which were done in the second Payson lab (labelled P_4). In discussing these plots, Prof. Tiller tells us: 'at sites P_1 and P_4 (...) the drops in pH occurred every time the raw data was computer- accessed to make these plots. [The second data plot] shows a strong negative correlation between the diurnal T_W-variations and the measured pH at site P_4. However, this strong inverse correlation occurs only when people entered the space. One notes that, over the weekend when no human entered the lab, no pH-drops occurred (even when diurnal T_W-oscillations were present).

A full exploration of this study would go too far at this time. Suffice it to say, that Prof. Tiller et al. have done experiments in an IIED-conditioned space, 'monitoring four simple physical chemistry tests of water' while an 'world-class expert in advanced kinesiological' techniques treated 'humans with severe, chronic physiological imbalances.' They have found that 'the pH monitors change in concert with each other during a treatment weekend, even though they are well-separated from each other' and only connected via the wall outlets-line-voltage. Air temperature changes 'correlate with detailed pH-changes during this time period. It should be emphasized, here, that simultaneous measurement of [the water temperature] did not show fluctuations that can account for these pH-excursions occurring in concert with the [air temperature] changes.'

2.7.5 CONCLUSIONS

Prof. Tiller tells us in his conclusion: 'In an IIED-conditioned space, the property measurement instrumentation expands its normal capabilities to reveal the following data representation:

$$Q_M(t) = Q_{P1} + \alpha_{eff} Q_{P2}. \qquad (2)$$

Here, Q_M is the total magnitude of the measurement, Q_{P1} is the normal value associated with the electric atom/molecule level of physical reality, Q_{P2} is the magnitude associated with the activated vacuum level of physical reality and α_{eff} is the coupling coefficient connecting these two levels of physical reality. When $\alpha_{eff} \sim 0$, this level second unique level of physical reality is instrumentally invisible to us. When α_{eff} is between ~0.1 and 1.0, this second unique level of physical reality becomes instrumentally accessible to us.'

2.8 THEORY – A BROADER REFERENCE FRAME

As we have seen in paragraph 2.2, Prof. Tiller started searching for 'a rigorous framework for scientifically understanding [the] class of [psychoenergetic] phenomena,' when he had read the book by Ostrander and Schroeder on the way to his Oxford sabbatical. In paragraph 2.5.2 we have had a small glimpse of the nature of the preliminary model with which Prof. Tiller initially set out with in his psychoenergetic research. In the subsequent paragraphs we have seen the experiments and data which Prof. Tiller has done and gathered over time, plus the conclusions and hypotheses he induced from this. In this paragraph, we will look at the theoretical part of Prof. Tiller's work which he has developed to account for that experimental data. He establishes a reference frame which encompasses, but is also beyond our current space-time time reference frame. Aside from accounting for the data which his group has gathered, it is also intended for beginning 'to seriously deal with, and experimentally measure, human consciousness effects on physical reality.'[31] Prof. Tiller uses the term consciousness 'to mean a unique quality of nature that is ultimately convertible to energy (and thus mass) although it also conforms to the typical dictionary usage of being awake, aware, etc.'[32]

Prof. Tiller starts the first chapter on his theoretical proposals with the following citation: '*Truth lies always in the experimental data while uncertainty dwells in data interpretation and in the theoretical modelling of how nature might be constructed to quantitatively express itself according to this specific experimental data*.'[33] Most probably, this is something he said himself, since there is no name with it and there are many citations at the beginning of a chapter with a name reference. With this citation at this location, he quit firmly states what he believes a scientist should always keep in mind. I think the purpose of this citation is threefold; on the one hand he says that he is well aware that the modelling he proposes can be incorrect as a whole or faulty at certain places. Secondly he says that truth lies within the data his group has gathered and that the current paradigm cannot explain this data, thus implying that something is wrong there. Thirdly, he shows us that we should see him in this light; this is the kind of scientist he is, or at least strives to be. Note that this tells us something about the way Prof. Tiller wishes to presents himself, it does not establish whether or not this coincides with reality.

In presenting his theories, Prof. Tiller makes explicit as well as implicit statements concerning concepts and interpretations of concepts within the established theories of science. An example of this is that he presents the de Broglie particle/pilot (information) wave concept as one of the two essential cornerstones of quantum mechanics; Planck's experimental and theoretical observations concerning quanta being the second.[34] I don't believe this to be an undisputed fact within the community of scientists. To illustrate, Prof. Dieks has said that this interpretation of quantum mechanics is a minority interpretation.[35] Prof. Peitzmann, teacher of Quantum Physics at Utrecht University did not know the concept of information waves, when I asked for this during the break of the second lecture of this course. On the other hand, de Broglie was granted the Nobel Prize in 1929 for his concept and anyone who is familiar with quantum mechanics knows the, intuitively strange, particle/wave duality within quantum mechanics, which indeed appears to be "real." In examining this and other (implicit) statements, many interesting things can be learned, which could help us to further determine the place of the work of Prof. Tiller in the methodological landscape. But because of length and time considerations, we will not treat such statements in this thesis.

2.8.1 CONFLICTS BETWEEN THE PRESENTED DATA AND CURRENT PARADIGM

When we look at the data which Prof. Tiller has presented us, from the perspective of the current paradigm, being the relativistic space time quantum model of reality, the data seems absurd; there is nothing that can explain consciousness, or something like intention, emotion, mind or spirit, changing reality. Besides this, 400 years of data gathering has never showed such a thing to happen, although a vast amount of research has been done over the last centuries which is related to the psychoenergetic work of Prof. Tiller. On this basis, according to Bayesian probability, one can rationally conclude that it is highly unlikely that the data presented by Prof. Tiller is truthful. We shall address this matter more fully in paragraph 3.7 and return to the topic of this paragraph.

Science, and I am speaking about the body of knowledge here, does not recognize the existence of the phenomena in the research of Prof. Tiller and psychoenergetic phenomena in general. The reason for this is quite frankly because there is not yet any scientific knowledge about such phenomena. There is no paradigm, no reference frame and no common scientific agreement about the origin of such phenomena, if they even exist at all. Within the scientific community, generally, people frown upon the idea of taking so called paranormal phenomena serious and within society the range of opinions on this matter is extremely diverse.

Now, there are two roads which we can take at this moment. Firstly, we could assume that such phenomena indeed do not exist at all and there is some kind of error on Prof. Tillers side. Secondly, we could assume that they do exist and the error lies within the current paradigm. The first choice would end our journey and we could continue on to section 3 in order to place this work within the methodological landscape. The second option would lead us onto unknown territory.

Because I do not want to stop here, we will choose the second option, with a critical note: on the basis of the presented data in this thesis we cannot yet conclude that these phenomena are scientifically proven to exist. For one thing, however likely or unlikely, Prof. Tiller could lie. But in order for us to further explore his work, we will, for now, assume that the phenomena we have seen in paragraph 2.5 to 2.7 have occurred as described; people have put an intention in an electronic device via meditation. This intention has an actual and intended effect on physical (instrumentally accessible) reality; it has increased or decreased pH in water, it has beneficially changed something in liver enzymes and fruit flies. Rooms in which such an imprinted electrical device is placed for a certain time, show oscillations in measured physical quantities, which are lawful and not explainable when using established theories from the various sciences. Plus, there is some kind of information transfer over long distances which behaves in an extraordinary and unknown way to science. This is very unsettling. Especially when we had seen the world in some way related to the current paradigms of the sciences. A reaction which is therefore very understandable, is to dismiss these results in some kind of way; maybe because it's nonsense, or one could say that it's fraud. But we are not going to do that. For us, these things are genuine, they have happened. So, if you are not yet at least puzzled, you should go back to phenomena which have been described above and think them through. The scientific cosmology does not explain this, and let me be clear, the current scientific cosmology cannot explain this. It cannot, because it does not account for a human quality like consciousness or emotion to directly influence physical reality.

2.8.2 SEEKING AN ANSWER FROM WITHIN ESTABLISHMENT SCIENCE-INFORMATION[32]

Prof. Tiller tells us that the conflict between his data and current science can be found in sciences unstated assumption; as a reminder, no human qualities of consciousness, intention, emotion, mind or spirit can significantly influence a well-designed target experiment in physical reality. Prof. Tiller has found an answer to this puzzle in information. When we look at consciousness, he tells us, and instead of asking ourselves what it is, look at what it does, we see that it 'manipulates information in the form of numbers, alphabet letters, jigsaw puzzle pieces and, most generally, symbols.' I think we can say that we do not yet know in what way consciousness, intention, emotion, mind and spirit interact. Even more, on the concepts we haven't even got some kind of common agreement. But I do think that we can say, based on Prof. Tillers data, that they in some kind of way influence information; where information is expressed in units of bits. Prof. Tiller continuous from here in the following manner:

> 'For the past 50 years or so, establishment science has recognized the existence of a quantitative relationship between information in units of bits and the thermodynamic quality, entropy, in units of calories per unit temperature. For the past ~150 years, entropy has been recognized as a very important contribution to the thermodynamic free energy functions of Helmholtz and Gibbs. Thus, information in [the following metaphorical equation]
>
> MASS ↔ ENERGY ↔ INFORMATION ↔ CONSCIOUSNESS
>
> is intimately connected to energy and also to consciousness and is a very important bridge between the two.' [the connotations of Prof. Tiller have been removed]

Information does not vary spatially, it is not dependent on a location in space. Neither is consciousness, Prof. Tiller tells us. Therefore, the spacetime reference frame, with which we are scientifically very familiar with, isn't of use when we try to mathematically describe information or something like consciousness in a scientific manner. We need to go beyond this reference frame in order to be able to describe 'the manifold expressions of nature that involve consciousness as a significant variable.'

2.8.3 A NEW REFERENCE FRAME: DUPLEX-SPACE

Prof. Tiller seeks to expand the current paradigm through utilization of a concept which is talked about in discussions regarding the big bang theory, involving group theory, on a new kind of interpretation of the particle/pilot wave concept of De Broglie. This new reference frame 'is a special member of the general eight-dimensional space which comprises two, reciprocal four-dimensional subspaces, one of which is space-time,'[36] which accommodates the particle aspect of de Broglie's concept. The other, naturally, reciprocal space-time. It is in this frequency domain where the wave aspect resides and it is this domain in which qualities like consciousness, intention, emotion, mind or spirit can influence things. At the basis of his construction lie familiar concepts of established physics. He changes and expands on these through reflection on the basics of these concepts and his experimental findings. This is a process which took decades in which there has been a constant to and fro between possible places where established theories might needed adjustment, experimental findings and places where the introduction of new concepts was necessary. We will start with Prof. Tiller's motivation for this construct from a theoretical perspective. Although there is no explicit reference to the *why* of these adjustments and new concepts which lead to the construct, that is, no experimental basis which has a direct relation to the proposed changes and additions, naturally these do underlie the whole process. We will see this at the end of this sub-paragraph, when we look at Prof. Tillers proposed explanations of his experimental findings. In between we have had a look at the workings of the construct.

'As presently formulated mathematically, quantum mechanics is a very precise theory whose reference frame of mathematics is four-dimensional space-time within the classical electric particle velocity limits from zero to the velocity of electromagnetic light, c, in physical vacuum, and involving the four fundamental forces discovered by establishment science to date (...).'[33] Prof. Tiller notes that all of 'today's quantum mechanics can be calculated provided one assumes the simultaneous existence of matter as both particle and wave'[37] along with what he says to be the two cornerstones of quantum mechanics; Planck's quanta and de Broglie's particle/pilot wave concept. Now, he continuous, there is all kind of 'perpetuating weirdness' and some great problems which the current scientific community faces – the wave/particle duality as a property of physical matter, string theory, dark energy, dark matter . The reason for this can be found when we return to this point in time. The 'founding fathers' of quantum mechanics have not created a different reference frame for the wave and the particle aspects of e.g. matter; 'they tried to squeeze it all into a space-time reference frame.' When we revise this, says Prof. Tiller and keep in mind all that we have found experimentally, 'we must take the large step of creating a different reference frame for the waves than for the particles.'[38] Prof. Tiller defines a reference frame as: 'A coordinate system that an observer uses for both qualitatively and quantitatively describing an internally self-consistent explanation for all the manifold expressions of nature.'[39]

Before he does this, he states 'two important [mathematical] consequences that come from applying simple quantum mechanics and simple relativity theory concepts to this space-time de Broglie concept.' Firstly, it is found that the individual waves, which create the envelop wave of de Broglie's concept must travel at speeds than greater than the speeds of light, whereas the particle aspect must travel at speeds less than that of light. Because $v_p v_w = c$, where p refers to the particle and w the wave, and $v_p < c$. (When you follow this through, this leads to Heisenberg's uncertainty principle.) An important part in this result is the change of energy level in matter and radiation in discrete steps, $\Delta E = h\nu$, where h is Planck's constant and ν the frequency of the wave aspect of the de Broglie concept. Secondly, 'substance with negative mass and negative energy (...) also satisfy relativistic equation requirements.'[40]

To accommodate for both the particle and the wave aspect of de Broglie's concept, plus integrate all of the established physics, Prof. Tiller proposes an 8 dimensional reference frame which exist of two reciprocal subspaces. One of which is the 4 dimensional space-time, which has been explored for many centuries. Space-time houses "particles" for which $v_p < c$. 'The coordinates found to be useful for defining the space-time subspace are three perpendicular distances plus one of time (x, y, z, t).' Reciprocal space-time is a frequency domain, for N/distance and M/time are a spatial and temporal frequency respectively (N and M being unknown integers). According to Prof. Tiller, such a domain is perfectly suited as a wave domain.[41] 'In today's solid state physics community, such a four-dimensional subspace reference frame is called wave number space and denoted by the vector (k_x, k_y, k_z, k_t).' Space-time is labelled direct space (D-space) and the other reciprocal space (R-space). Some 'unique quality in one subspace has an equilibrium quantitative connection to its conjugate quality in the reciprocal subspace' which is calculated via a Fourier transformation.[42] Via Fourier transformation, 'any shape can be decomposed into a set (...) of (...) sine and cosine functions of distance or time. These function can differ from one another in only three ways: Amplitude, frequency and phase-angle.'[43] Written in conventional mathematical notation, the Fourier transformation of some one-dimensional functional form f(x) is:

$$g(\mathrm{k_x}) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} f(x) e^{i2\pi x g k_x} dk_x \quad (1)$$

and its inverse (converting $g(\mathrm{k_x})$ in *f(x)*):

$$f(\mathrm{x}) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} g(\mathrm{k_x}) e^{-i2\pi x g k_x} dk_x. \quad (2)$$

'Using this particular duplex-space perspective, one can see an entirely different explanation for the very famous Young's double split experiment from the era of the classical mechanics paradigm. The conventional, single-space explanation (the old space and time explanation) saw the result as an interference of the light waves entering the two parallel slits and providing constructive/destructive superposition of these waves behind the slits. In that model, the slit structure itself contributes nothing but the two parallel gap openings. This duplex-space perspective says that the slit structure itself, without the light waves, already had an R-space substance interference pattern existing around the slit regions of the D-space structure. The present hypothesis is that it is this R-space pattern that guides the light into its maxima and minima D-space intensity locations behind the slits.'[44]

In order to illustrate this, Prof. Tiller shows us how one can optically generate Fourier transformations for various two dimensional objects by using the results from a study from Harburn et al.[45] We see the interference patterns of two holes in various arrangements, two rectangles, three holes, four holes, six holes and some more complex orientations. He notes that it is not the Fourier transform which is seen, but the intensity of the diffraction pattern, which is the amplitude squared of the Fourier transform. 'To prove to the reader that the Fourier transformation truly represents the diffraction pattern [Prof. Tiller et al] calculate the normalized R-space intensity spectrum for [a] D-space hexagon of holes so as to compare it with the experimentally generated diffraction pattern' of Harburn's study. Prof. Tiller presents a figure which indeed shows that the intensity pattern calculated via the Fourier Transform matches the experimentally observed diffraction pattern. However, the experimentally generated pattern has D-space coordinates (x, y), while the calculated part has R-space coordinates (k_x, k_y). 'Something is still missing in the present description to convert the D-space coordinates in the R-space coordinates.'[46]

In quantum mechanics a wave function *ψ(x),* can also be represented in momentum space, *Φ(p),*which have the same physical information, via the Fourier transform pair relationship:

$$\Phi(p), = \frac{1}{(2\pi h)^{1/2}} \int_{-\infty}^{\infty} \psi(x) e^{-ipgx/h} dx \tag{3}$$

and

$$\psi(x) = \frac{1}{(2\pi h)^{1/2}} \int_{-\infty}^{\infty} \Phi(p) e^{igx/h} dp, \tag{4}$$

where *h is* Planck's constant. Now, momentum space is a mathematical construct and nothing more. It is just another reference frame in which we can describe our 'normal' space with which we are familiar, in Prof. Tiller's terminology, D-space. 'The Fourier transform, here, provides a unique relationship between the momentum space and position space representation of a particle. That is, for a specific wave function, (x), there is only one representation in momentum space, (p). Further, another property of the FT is that the normalization condition holds for both the position and momentum representations.'[47] In Prof. Tillers proposal R-space is another level of reality. In the full construct (that is, Duplex-space) there exists a same kind of mathematical relation between D-space and R-space as we see between the (**r**, t) and (**p**, t) planes.

But there is yet another problem. Standard relativity tells us that something with a velocity greater than *c* cannot interact in any way with something with a velocity less than *c*. The resolution Prof. Tiller proposes is the existence of some kind of substance which can both interact with the D-space and R-space material. Thus, this substance falls outside the constraints of relativity theory. He has labelled this substance *deltrons*. It are the deltrons which are able to act as a coupling medium between particles and information waves. So there is a small amount of deltron activity necessary for the de Broglie particle/pilot wave to form. He presumes that 'human consciousness can, to some degree, activate the deltron population present in nature.'[48]

When this deltron activity increases, the interaction between R-space substance and D-space substance increases. When the two levels of reality are coupled the space goes from an U(1) symmetry state to a SU(2) symmetry state, using gauge theory. In short, the theory to which Prof. Tiller refers 'represents a new synthesis of quantum mechanics and symmetry wherein gauge invariance is recognized as the physical principle governing the fundamental forces between all elementary particles.'[49] 'In our normal, electric atom/molecule level [i.e. D-space] there is only one internal space variable that needs to be specified, the electron space angle, for a complete mathematical description of a material and this is the 1 in the Group Theory label, U(1). In our isolated magnetic information wave level of physical reality, the magnetic monopole phase-angle is the internal space variable that needs to be specified. Thus, it is also a U(1) gauge state in this isolation case. However, when these two unique levels of reality are coupled, now the coupled system has two correlated internal space variables (phase-angles) to be specified so the Group Theory label shifts to SU(2).'[50]

In order to illustrate the relation between a D-space particle and its R-space counterpart, Prof. Tiller presents figure which can be seen in Figure 4. We already know that a 'unique quality functioning in one subspace has an equilibrium quantitative connection to its conjugate quality in the reciprocal subspace given by an equilibrium Fourier transform pair relationship. Thus, if we know a mathematical description of a quality in one subspace one can, in principle, calculate the equilibrium conjugate quality in the other subspace.' However, in the model Prof. Tiller et al present, 'the deltron coupling substance must be present to allow a substance quality of one subspace to interact with the conjugate substance quality of the reciprocal subspace. Without the deltron coupling, the thermo-dynamic equilibrium between the two uniquely different kinds of substance could never be achieved.' In Figure 4, what we see in (b) and (c) are actual substance in R-space and D-space respectively, 'while items (a) and (d) are only calculated ghosts.' With sufficient activated deltrons present 'the substances b and c interact with each other and we have a functional de Broglie particle/pilot wave system in both subspaces that can seek thermodynamic equilibrium between its three distinguishable parts.' In the mathematical formalism which Prof. Tiller uses, 'the quantitative relationship between the interacting substances of the two, reciprocal subspaces are given in one dimension by

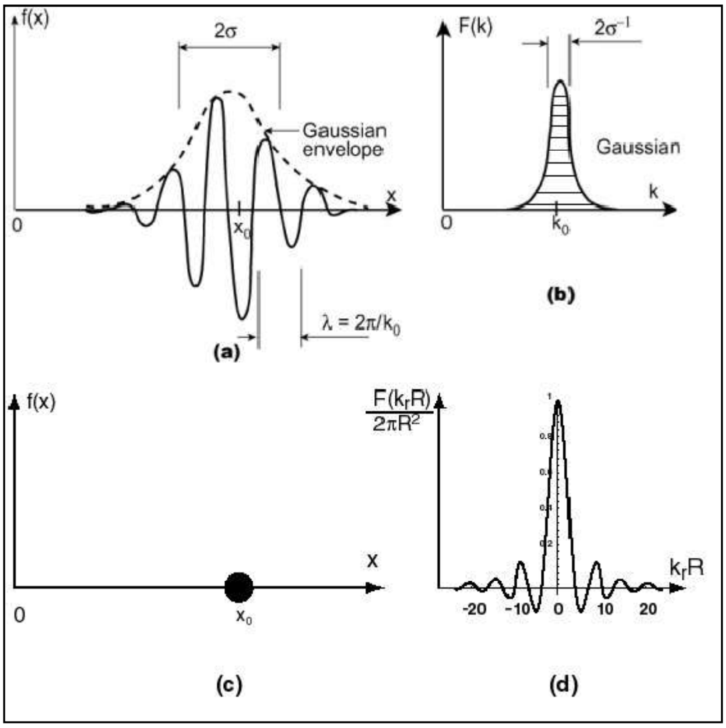

Figure 4 (a) a "ghost" calculated D-space wavegroup for (b) a real R-space, Gaussian substance packet, (c) a real D-space 2-D particle of radius R and (d) its "ghost" calculated Rspace conjugate wavegroup. For an atom, one would choose R~10-8 cm.

$$g(\mathrm{k_x}) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} C_\delta(x, k_x) f(x) e^{i2\pi x g k_x} dx \qquad (5)$$

and
\`
$$C_\delta(x, k_x) f(\mathrm{x}) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} g(\mathrm{k_x}) e^{-i2\pi x g k_x} dk_x. \qquad (6)$$

About these two functions, Prof. Tiller writes: 'This pair of equations are importantly different from both the equations [1 and 2] and the equations [3 and 4]. Our unknown in equations 4 is the deltron activation function, $C_\delta(x, k_x)$, whose zeroth order approximation is α_{eff} in equation [2], and about which we presently know very little from either a theoretical or an experimental perspective.'[51] As mentioned above, 'the thermodynamic equilibrium between [R-space and D-space] requires a careful partitioning of deltrons between [the electric monopole types of substances and the magnetic monopole types of substances]. Further, the rate of approach to thermodynamic equilibrium, the kinetics of the process, is intimately connected to the details of the activated deltron profile, its energy distribution, etc, and we know next to nothing about this at the present time.' Prof. Tiller continues by telling us: 'however, we do know that this "deltron factor", we shall call it, enters the mathematical connecting link via a very sensitive way (under the integral sign) and this makes it impossible at the present time to make completely correct predictions of this dynamic approach to thermodynamic equilibrium. As a useful approximation, which is all we can do at our present level of knowledge, is to extract the deltron factor out from under the integral sign as an average, effective value which we have labeled α_{eff}(…). By doing so, all our lack of knowledge is compacted into α_{eff} and now the mathematical part of the analysis simply revolves about the standard calculations of Fourier transforms.'[52]

Above, we saw that Prof. Tiller mentioned a zeroth order approximation of the deltron activation function. Here follows an account of the use of this zeroth order approximation, which also shows us how the basics of the four intention-experiments[53] are explained: 'Experimentally, we have shown that it is possible to imprint a specific intention from a deep meditative state into a simple electronic device and (1) have the device activate "consciousness" into an experimental space sufficient for coupling to occur between the substances of these two subspaces so that the electromagnetic gauge symmetry state of the space is significantly lifted from the U(1) level to the SU(2) level and (2) the space is tuned specifically to either enhance or diminish a particular material property of interest. Thus human consciousness, in the form of a specific intention, is capable of altering the properties of materials. Subsequent experiments showed that it was the magnetic information wave domain of the physical vacuum that was altered by this process and not [D-space]. If we call the net material property value for the partially coupled state, Q_M, and the unaltered value of the [D-space] and [R-space] substances Q_{P1} and Q_{P2}, respectively, then the zeroth order approximate result is

$$Q_M(t) = Q_{P1} + \alpha_{eff} Q_{P2}. \qquad (7)$$

Here, α_{eff} is the coupling coefficient associated with deltrons that are presumed to leak out of the intention-host device into the experimental space. If $\alpha_{eff} \sim 0$, then the right hand term in equation (1) is negligible and we obtain our normal, uncoupled state, U(1) electromagnetic gauge symmetry state reality. If $\alpha_{eff} \sim 0.1$ to 1.0, the second term in equation 7 is of significant magnitude so that $Q_{P2}(t)$ can either increase or decrease relative to Q_{P1}. If α_{eff} leaks away from the experimental space for a variety of reasons, then $Q_M \neq Q_{P1}$ slowly returns to $Q_M = Q_{P1}$.'[54]

In the remainder of chapter 6, Prof. Tiller shows us how all kinds of reciprocal behaviour exists between the two subspaces and gives an explanation for the long range, macroscopic, room temperature information entanglement. As a small detour, Prof. Notes: 'Some yet undetermined cosmological process probably slowly increases the activation of deltrons in outer space so that, after the electric particles and magnetic information waves form in the cosmos, the presence of some minimal level of activated deltrons allows a {E-particle//Deltrons//ME-pilot wave } complex to form.' 'Here, ME stands for magnetoelectric which is the higher dimensional, magenetic analogue of electromagnetic waves (generated by the movement of electric charge.)' 'Next, as the cosmic activated deltron population increases, a more rich spectrum of R-space, magnetic information wave movements probably occurs to allow various simple types of atoms to form from these various { } species. As the population of activated cosmic deltrons increases further with the passage of time, the complexity of this type of atom and molecule formation continues to increase. As time flows, such a process should lead to macroscopic gases, liquids, solids, planets, stars, etc, even without a "big bang" event.'[55]

To summarise, 'the current picture involves (1) an R-space, magnetic information wave Gaussian-shaped profile centered at wave number k_0, (2) a D-space, electric particle, with or without mass, centered at x_0 and (3) sufficient activated deltrons to form an { } complex in D-space.'[55] About the future, Prof Tiller writes: 'Our path forward will be to (1) postulate various functional forms for $C_\delta(x, k_x)$, (2) calculate duplex space dynamic behavior for a proposed form of $C_\delta(x, k_x)$ (3) experimentally observe $Q_M(t)$ in equation 1, given Q_e for the special case of $\alpha_{eff} = 0$ and (4) for the real case of $\alpha_{eff} \neq 0$, evaluate the magnitude and sign of $\alpha_{eff} Qm(t)$. In this way, step by step, we will learn more and more about the functional structure of $C_\delta(x, k_x)$.'[52] Furthermore he tells us: 'it should be clear to the reader that much quantitative work will be immediately needed to provide

1. a viable duplex-space thermodynamics,
2. a viable duplex-space electro- and magneto-dynamics of these higher electromagnetic symmetry state levels of physical reality,

3. a viable duplex-space quantum mechanics,
4. a viable duplex-space relativistic mechanics, et cetera, et cetera, et cetera, et cetera.'[56]

We stop our investigation of the theoretical part of Prof. Tiller's work here. What I have seen of his work thus far, and I haven't seen everything, is that his work is far more developed and elaborate then that which I have presented thus far. Prof. Tiller uses concepts from material science and other established physics which are far more advanced than the current level in which I'm trained at at the moment. As far as I can see, the two main items are Dirac's negative energy sea and nodal networks. Therefore, it is not useful to for me to continue, for I cannot appreciate it at its true value and use it for the following section.

2.8.4 PROPOSED SOLUTIONS WITH THE THEORY

We have already seen sketches of solutions or new viewpoints which the duplex-space reference frame offers; e.g. formation of physical reality, intention imprinting and the wave/particle duality. In his white papers[57], the book which we have dealt with in this section and in the video *conscious acts of creation* Prof. Tiller proposes explanations for all kinds of different phenomena. We're not going to deal with them, but to give an idea about the extend in which Prof. Tiller is thinking, here follows a list of the phenomena which he deals with in Chapter 8 of the book:

- Homeopathy
- Placebo's
- Energizing Supplements, Food and Human Living Spaces
- The enhancing yields, efficiencies and performance for a variety of common technologies
- Enhancing birth probabilities
- Remote viewing
- Psycho kinesis
- Clairvoyance
- Precognition
- Telepathy
- Levitation
- Materialization/dematerialization
- Aura's
- Local and non-local healing

In chapter 7 he explains how our chakra/meridian system maybe exist at the higher level, SU(2), symmetry state and what further constitutes a person (using a model of reality which is beyond duplex-space). In the second chapter of the book, he only mentions that the following phenomena can be explained, but does not elaborate on them:[58]

- New energy sources in nature (dark matter and dark energy)
- Anti-gravity effects
- Anti-inertial effects
- Super-luminal effects

These are dealt with in the white papers. In the video, he explains that how that which we call 'life' could come to pass: 'So what it says, is, if you somehow had a device and you could connect it lets say between this SU(2) and the U(1) it could do useful work, it's a thermodynamic pump. That's what thermodynamics is all about. So you ask yourself the question, might there be some organ or function in our bodies that is at a higher gauge symmetry state, when we're born? Because if it is, then that can pump what we call live. Everything about life, it would do all the work, it would make synapses go, it would have the brain function, it would just pump the heart, etcetera.'[59] Prof. Tiller, later on in the video, proposes the chakra/meridian system to be this organ, or function.

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SECTION 3 – PLACING THE WORK WITHIN THE LANDSCAPE

3.1 INTRODUCTION

In section 1 we have dealt with the question 'what is science and what isn't?' It became clear that there is no such thing as a demarcation criterion which can once and for all include all that is science and exclude all that isn't. We have seen that this is because using the concept science in this way, makes it a vague predicate; a linguistic construction which depends on the context in which it used and even when the context is clear, there is a gradual transition of one end into the other. Furthermore, science is a evolving tradition. The issue is even greater because we are dealing with an evolving human activity, not subjected to any rule but that what is accepted by the scientific community and society as its whole (those who interact with it). In section 1 we had a thorough examination of that which we came to know as the methodological landscape. Taking all what we have seen in the first section into account, we came up with a procedure to be able to place something within this landscape. This is the goal of this final section.

It is the psychoenergetic work of Prof. William A. Tiller which we're going to subject to our demarcation procedure. In the second section we have had a wide-ranging investigation of this work which took us from the background of the people involved, to Prof. Tiller's philosophical ideas about his work and science in general. We have seen that Prof. Tiller is well aware that his work proposes a great paradigm shift. These experiments, as presented in 2.5 of this thesis, aim to show us that the human qualities of consciousness, intention, emotion, mind or spirit can significantly influence a well-designed target experiment in physical reality. This lies at the heart of the paradigm shift. The experiments have been replicated at other places, by other people and by an individual institute. In the replication step, they found that there was some kind of macroscopic, long range, room temperature information entanglement. Besides this unexpected behavior regarding their lab spaces, Prof. Tiller found a magnetic polarity effect which suggests magnetic monopoles, lawful oscillations in the measured values of material properties which couldn't be accounted for by using established theories, communication over distance between IIED conditioned spaces which didn't occur between spaces which weren't IIED conditioned and the use of the experimental procedures to produce a detector for measuring the gauge symmetry of a space. We have seen the theoretical framework which Prof. Tiller proposes and finished with the listing of other phenomena which he explains or proposes to explain with his reference frame.

3.2 APPROPRIATNESS OF OUR QUESTION

In 1.7 we said that the first thing to do is determining whether or not it is appropriate to subject the object in question to our demarcation procedure. In this case, the object is the work of Prof. Tiller et al. In order for it to be appropriate, we said that the object must in some way aspire to be scientific. Although there are more reasons for it being appropriate to investigate Prof. Tillers work, I find the greatest to be that it proposes a paradigm shift from the established paradigm within the physical sciences. When something does that, it is definitely appropriate to have a very close examination of it. It is very controversial and yes, the odds of some theory radically departing from established theories being valid is small, as we have seen in 1.5. But it *might* reflect reality... and in order to 'objectively' test this, all we have is science. As we have seen, this method is not perfect nor absolute. In 1.6 we saw that even the scientific method itself at its base is nothing more than the inherent human ability to deal with problems. When that's true, what makes something 'science'? Apparently it is not the method. In 1.3 we saw that there is also no official entry requirements, test, or whatever other kinds of requisites maybe possible in order to become a 'scientist.' Such a thing does not exist. There just seems to be the consensus between people who are doing 'scientific things' to acknowledge that some other person is doing 'science.' Now, there is off course the specialist training which someone has had, which gives him or her a great amount of knowledge and (craftsmanship like) skill in his area of expertise. But does this makes someone a scientist? No, it does not. Someone has to occupy himself with what we have named the scientific enterprice.[1] Which, in essence, means that this person seeks to expand the generally available and testable knowledge of everything which surrounds us. At this moment I believe that it is this and only this which makes someone a scientist. I think it doesn't matter whether or not the person in question is accepted or not by others. It is just the occupation of seeking to expand generally available and testable knowledge of something which surrounds us, by which we define someone to be a *scientist.*

What about the knowledge? When can we speak of scientific knowledge? (Leaving out the issue what knowledge is. We will just define it as something that is known to someone.) I think that, exactly because of the great complexity of this issue, the answer to the question is quite simple: consensus within the scientific community. As Prof. Theunissen puts it at the end of his book: 'Whoever wants more than the consensus amongst scientists must give up his confindence in science.'[2] There is no way known to us at the present moment to test a statement of its absolute validity and its general availability and applicability. The best we have is for this is a general consensus within the scientific community.

This brings us to the scientific community. This concept is part of the larger structure which is the methodological landscape. The beginning and last segment of paragraph 1.2 dealt with this matter, so we are not going to do it here again. Suffice it to say that just being a scientist isn't enough to be part of the accepted scientific community.

Now we come back to the specialist training which someone has had. It doesn't make the person in question a scientist when he or she has had a scientific education. But what it does do is equip this person with knowledge and skills to be better able to add to the vast amount of scientific knowledge. As we have seen at the end of 1.2, it is almost impossible to do this without some form of training (be it autodidact or not).

We're not yet going to apply this to our object of study. It was a jump start for the following paragraph.

3.3 A DISSECTION

The goal of this paragraph is setting our terminology straight. For we must gain a common understanding of the definition and naming of the different parts of our object of study, in order for us to be able to communicate about it. The second goal is to see the relation of our terminology and dissection with the terminology and dissection of our subject. Note that Prof. Tiller is part of our object and therefore part of our dissection, but it is also the one who has made the dissection in his works, which is also a part of our object. The dissection that Prof. Tiller has made in turn tells us something about his place in the landscape.

The first thing I notice from section 2 is that nothing radically different is going on in the inherent dissection and terminology Prof. Tiller uses. We have seen *people* which are involved in the work, with a certain *background*. These people have certain *ideas*, of which we have seen the ideas of Prof Tiller's regarding the body of science as depicted in the first section, in paragraph 2.3. What I observe in these ideas is a tendency to place the general body of the scientific community in a orthodox kind of light, where scientists hold on to their ideas in a dogmatic kind of way.[3] I don't know whether or not scientist in the exact sciences actually do this. I have done no research there, nor have any experience. The only thing which I've heard regarding the matter is that there is a lot of knowledge and skill within the scientific community, a lot of people and not only ill will with respect to things which fall outside the established areas of research. The other tendency which I notice is a subtle promotion of his own work, for example when he speaks about the sensory system in 2.3.3 or when he classifies 'space-time' as a dogma at the end of 2.3.1. This tells us something of the kind of person we are dealing with. We will deal with this matter further in 3.7.

Lets continue with general picture of section 2 regarding the terminology and dissection which Prof. Tiller uses. Prof. Tiller sees a *paradigm* and proposes a shift, in the Kuhnian sense. Then we saw there were *experiments* with certain *protocols*. These experiments were *replicated*. There was *anomalous behavior* in *lab spaces*. Prof. Tiller set up a *theoretical framework*, which he tells us isn't a *theory*, but a *reference frame*. There is nothing strange going on at this first level of terminology and dissection.

As a second step, let's look at each term we defined in paragraph 1.2 and apply them to our object of study to have a common understanding and see what we find out. For the definitions themselves, I refer the reader to paragraph 1.2, for it would be to lengthy to repeat them all. We saw that in talking about science, we could refer to the knowledge or the organization which acquires it. This organization we divided in the community and the method they use. In our case, we will say that the content of 2.7, anomalous behavior, and 2.8, theoretical framework, plus the experimental results are the *knowledge*. Prof. Tiller et al are the *community*. To point out the *method* which they used costs us a bit more effort. In 2.5, four experiments, and 2.6, replication, we saw how the *data* was collected and which protocols they used. Paragraph 2.7 also dealt with data, but not how it was collected. In paragraph 2.5 to 2.8 we saw how this data was used to *formulate and test hypotheses*. This concludes the used *method*. Paragraph 2.8 dealt with the theoretical framework, but according to Prof. Tiller, this was not a *theory*, but a *reference frame*. Prof. Tiller defined a reference frame as 'A coordinate system that an observer uses for both qualitatively and quantitatively describing an internally self-consistent explanation for all the manifold expressions of nature.'[4] I believe 'an internally self-consistent explanation for all the manifold expressions of nature' to be a *theory* or *part of a theory* as we defined it in paragraph 1.2. A theory must be able to make *quantitative predictions*. As presented in 2.8, this theoretical framework is hitherto very limited in this aspect. Prof. Tiller is aware of this fact (see the fore-last alinea of 2.8.3). Another concept which we haven't defined in 1.2 is the *qualitative hypothesis* with a scientific value. These are statements which aren't quantified exact, but give binary options. For example: the pH of a water can't be influenced by human intention. This either is or isn't true. For such a qualitative hypothesis to be of scientific value, it is absolutely imperative that it is unambiguous. There must be no subtleties or *but's* whatsoever. It either is or isn't true and this fact tells us something about the object which one investigates. Prof. Tiller makes a lot of use of qualitative hypotheses, although inexplicit. I believe that the reader can find these statements him- or herself. I'm not going to further investigate whether or not the theoretical framework as we have seen in 2.8.3 is a theory, reference frame, a bit of both or something else. For this exceeds the scope of this thesis. The data has been *observed* with *digital measurement equipment* always, except for the *analogue* pH measurement with litmus paper. Although we have seen only qualitative hypotheses which have been tested, a lot of (quantitative) data has been gathered. We have seen a part of this data and how it has been qualitatively but also quantitatively analyzed. In 2.1 we saw that the recorded data is used to investigate causal relationships between variables. Part of this work is the fitting of mathematical functions with the data. This is the quantitative analyzing which Prof. Tiller has done, of which we have seen some in the previous section. However, the exact mathematical behavior has not yet been connected to theories. (It is possible that this is done in some of the other books, for I have not looked at these.) This is part of the future work which Prof. Tiller told us to be necessary, at the end of 2.8.3.

We now turn to the second element of paragraph 1.2 in which we dealt with the scientific community. As a reminder, the scientific community was said to consist of the total body of scientists, their interactions and the relationships between them. In 3.2 we saw that someone who seeks to expand the generally available and testable knowledge of everything which surrounds us can be called a scientist. By this definition, William A. Tiller is a scientist and therefore part of the scientific community. In paragraph 3.7 we will investigate his place within the scientific community, with regards to the interactions and relations of our subject to the rest of the community. A common way to look at the community in general was to divide it in *sciences* which consist of *fields*. One of the sciences is *physics*. Physics has been defined by H.D. Young as: 'an experimental science. Physicists observe the phenomena of nature and try to find patterns and principles that relate these phenomena. These patterns are called physical theories or, when they are very well established and of broad use, physical laws or principles.'[5] Prof. Tiller's psychoenergetic work can be placed within this science, for it conforms with the general picture. Physics is also Prof. Tiller's background. When we further specify his background, we see that he works within the scientific field of materials science. His psychoenergetic work belongs to no field, nor is it a field itself. For a field was defined as having:

- a clearly described and defined field of research,
- a specialist education with associated qualifications,
- a group of people who associated themselves with the scientific field,
- an internal rewarding system and
- institutions such as associations, (sub) faculties, magazines, etc.[6]

Although there already appears a clear picture of the area of investigation within Prof. Tiller's psychoenergetics, it is not yet clearly described and defined as is alluded to in the first point. There is no specialist education with associated qualifications. There is a group of people who associated themselves with the work, but it consists of no more than a few people. There is no internal rewarding system and no institutions which occupy with the psychoenergetics of Prof. Tiller. When we look at the properties for a scientific field, we see that scientific fields can only exist in periods of normal science, as Kuhn described it.[7] In 3.6.2 we will further deal with this matter and see its implications. Next to the sciences – field division, we saw that we could look at the community by what the members did.[8] For our purposes, a scholar can be defined as a scientist. The rest of the terminology which was used in the list has either been defined in paragraph 1.2 or is considered generally known. We will deal with this way of looking at the scientific community in relation to our object of study in paragraph 3.7. This concludes the conciliation of the definitions from 1.2 with our object of study. We have not seen things within our object of study which are out of tune with that which we have sketched in paragraph 1.2.

Now, the attentive reader will have noticed I contradicted myself and before we continue, we must make this contradiction explicit. Both paragraph 1.2 and 3.2 said that, in order to be a scientist, one must occupy himself with scientific work. No contradiction there, but in 1.2, scientific work was contributing in some way to that which the community classifies as science. In 3.2, we defined this to be expanding the generally available and testable knowledge of everything which surrounds us. It is here where the prescriptive and descriptive viewpoints come very close together. In paragraph 3.7, we will further deal with the matter.

3.4 SCIENTIFICNESS AT FIRST SIGHT

In this paragraph we 'scan' the object for its scientific-ness at first sight. That is, does it fit the general picture? We will still assume the verity of the results presented in 2.5 - 2.7. That is, I must ask you, the reader, not to continue until you have a clear picture of the factuality of these results –it is not yet interesting to doubt the results for the current phase of our investigation; for now we shall assume that these things have actually happened!

As discussed in 1.7, we will use the list which Ruse has set up. For readability, we will first repeat the description of each feature which Ruse has presented us, after which we apply it to the content of section 2. Before we do this, let's look at the three points which were mentioned at the beginning of paragraph 1.4, by which one would expect science to differentiate itself from pseudoscience: 1) doing measurements, 2) the testing of these facts to hypotheses which are derived from theories and 3) taking an object standpoint with respect to the theories one uses;

that is, theories are adjusted to the data. The first point seems to be covered, there have been a lot of measurements. The second point is a bit more problematic, for there is not yet an established finished theory from which quantitative hypotheses can be derived. What has been done, is the 'derivation' of qualitative hypotheses (see paragraph 3.2) which indeed have been tested. The third point seems to be well covered as well. In section 2 we have seen how each established and new theoretical concept is weighed carefully and no preference is given to any theoretical concept above the other, based on the gathered data. (Note, all this is a momentary conclusion, which we'll further investigate in the paragraphs to come.) Before we do that, let's turn to Ruse's list.

Natural law – a science is guided by natural law. It is an empirical enterprise about the real world of sensation. Science seeks to understand this empirical world. More specifically, science looks for unbroken, blind, natural regularities. Bodies of science, therefore, known variously as 'theories' or 'paradigms' or 'sets of models', are collections of laws.

When we look at section 2 as a whole, we see that Prof. Tiller is searching to understand the natural world. He is looking for unbroken, blind, natural regularities, through which he wants to understand the empirical world. The word empirical refers to the gaining of information by means of observation, experience or experiment.[9]

Prediction – a science has to predict and explain by reference to natural law. That is, these laws indicate, respectively, what is going to happen, or what has happened. A scientific explanation must show that what is being explained had to occur. The explanation excludes those things that did not happen.

As we have seen, at this moment the theoretical part is only capable of predicting qualitative behavior and not quantitative. With regards to quantitative behavior, the theoretical framework is not adequate. It fails this feature. With regards to qualitative behavior, the framework suffices. Although it is not yet strict enough. We must digress from our main line, in order to investigate why it isn't strict enough and what this means for the place of our object of study in the methodological landscape. The looseness lies in the matter that there is no(t yet a) way to measure the influence of someone on an experiment. Because of this impossibility, each outcome can be a confirmation of the theory, in principle. To illustrate this, say independent investigator X does the pH experiment, a negative result tells us that this person isn't able to lift the gauge symmetry of his lab space or has some form of hindrance which prevents this from happening. A positive outcome tells us that the gauge symmetry state has been lifted from U(1) to SU(2). I said in principle, for it is not necessary for an investigator to do this. If someone would do this, it would stop progress, for nothing new would be learned. I have not found a place where Prof. Tiller obviously (but I'm not infallible) seeks justification for his theory. On the contrary, I have seen a resolute and thorough attitude with regards to familiar and newly found data, common theory and new concepts. An attitude which seeks to understand scientifically unfamiliar phenomena and bring them within a cognitively understandable mathematical framework. But, I don't know this for sure. Now, the results of the pH replication experiment have shown us that it is possible for other people to get the results, which, if true, would overthrow the 'unstated assumption of science.'[10] The theoretical part would explain this outcome, although it is not an absolute conformation of the theory. There are a lot of other qualitative assumptions for which this reasoning is valid. I'm not going to treat them all here, for it would add very little to our understanding. Thus, quantitatively the theoretical part does not predict and explain by reference to natural law. Qualitatively, the theoretical part does predict and explain by reference to natural law, although the theory must be handled carefully by the scientists who use it. The reason for this caution lies in the fact that the theory isn't yet strict enough.

Testable – a science is testable against the empirical world. It must have empirical support (conformation) and it must be open to possible refutation (falsifiable).

This third point is an intrinsic part of the previous point, as defined above. In order for 'a science' to be testable against the empirical world, it must be able to make predictions – something which does not make predictions can't be confirmed nor refuted. As we saw in the previous point, it is in the refutation where the theoretical part of Prof. Tiller's work falls short.

Tentativeness – the conclusions of a scientist are tentative. In the end, he must be prepared to reject his theory.

I believe this point to be well answered by Prof. Tiller et al, for they all have an establishment science background. They have abandoned their scientific origins in order to pursue this work. Within the psychoenergetics work which we've studied they work with (preliminary) hypotheses and seem to be careful to make absolute conclusions on any point.

Integrity – a science must presuppose a certain professional integrity from its members. A scientist should not cheat or falsify data. He must not achieve any fallacy in the logic books to achieve his own ends. He must not use inappropriate or incomplete quotations or anything else that is intellectually dishonest.

What Ruse names *Integrity* is, I believe, the basic scientific moral. Without it, one can't do science. I have learned in my first year when studying physics at the *Vrije Universiteit* in Amsterdam, that it is excellent when someone searches for what he or she hopes to find, but when something happens what one wouldn't expect, it is far more interesting than finding what one presumes to find. Something new and interesting could be going on! Of course a basic 'boggle factor' is essential in this process, because it makes one search for possible causes for the anomalous data. This again will learn the investigator a lot about the natural world. Now, when we would come to learn that Prof. Tiller et al. have cheated in some kind of way with regards to their data, the scientific value of their work would diminish drastically. For the unstated assumption[10] would still hold, making the basics of their work worthless. It is of course possible that they indeed cheated is some kind of way, but there is no way for me to verify this. From what I have seen and read of the man, I would be surprise if this were to be so.

So, at the end, what is our verdict? Can the resulting theory be taught in classrooms? No it cannot. It has not yet been tested and developed well enough. In this sense, it is even not useful to teach this in a classroom, for what would the children and adolescents have to learn? However, it is an excellent example of the difficulties which arise when deciding what is science and what isn't. Or to illustrate how hard, or even impossible it is to investigate something to which you don't know the answer yet. For these uses it is perfect, also in a classroom. Now, is it a science? Let's look at what we have got. The basics of integrity, tentativeness and natural law seem to be there. But the theoretical part misses the ability to quantitatively predict psychoenergetic behavior, although it can qualitatively explain a whole host of outcomes which can't be explained by anything else. So, what must we do? We can't really classify a theory scientific if it can't quantitatively and qualitatively explain and predict behavior, can we? However, what is the importance, the weight, of the 'theory' within a far greater work. Must we say that what Prof. Tiller does, isn't science, because his theoretical framework can't yet qualitatively predict behavior? I am inclined to say no, we should not say this. Science is far more than a theory which is able to quantitatively explain behavior. Based on this information, the test is inconclusive and our subjects scientific-ness seems to mostly depend on the importance we give to the ability of the theoretical part to quantitatively predict behavior. When we find this to be the hallmark of science, then we must conclude cannot be called scientific. When we find the theory in an overall work or the ability of quantitative prediction to be less important, the scientific-ness increases. Therefore, before we continue our research of the entire object, let's look at the theory in isolation.

3.5 REFLECTION USING KUHNIAN VALUES

In the previous paragraph, in looking at the scientific-ness at first sight, we saw that quite a difficulty arose regarding the theoretical part of our object of study. In order to better deal with this problem, let's subject it to a list of Kuhnian values. As we say in 1.4.2, he set up five criteria which, together with a few others, according to Kuhn, give the shared basis for theory choice. The first five are the ones Kuhn presented. Remember that we were recommended not to use these criteria as rules which determine choice, but instead as values which influence it. The criteria are not objective in this sense, because they are imprecise and can conflict each other when deciding one theory above another. We are not going to use them as a basis for theory choice, instead we will use them as maps for the specific part of the methodological landscape regarding theory.

There is a problem though. These criteria are explicitly said to regard a theory, not a reference frame. Prof. Tiller tells us specifically he presents a reference frame. Which essentially comes done to a mathematical framework in which we can build theories. Or is it something more than that? It doesn't seem basic enough for a reference frame. It has elements of a theory in it. With our current background, we are not yet able to accurately and systematically analyze the theoretical part of Prof. Tiller's work to this extent. So, what we are going to do is continue the investigation and keep in mind this ambiguity in concepts. We will mark each feature with a number from 1 to 5, where 1 means that a full coincidence of the theoretical part with the feature and 5 that it does not the satisfy the feature at all, in order for us to survey this review based on Kuhnian values.

Accuracy – within its domain consequences deducible from a theory should be in demonstrated agreement with the results of existing experiments and observations.

We dealt extensively with this point in the previous paragraph. However, this description is more narrow than *prediction* of the previous paragraph. *Accuracy* speaks about consequences which are deducible within its domain. I take it this refers to the domain of intended and possible application of a theory. The theoretical part of Prof. Tiller's work intends to incorporate all of the established theories with their domain of application, the unanswered questions and phenomena which established physics faces, plus the complete host of psycho-energetic phenomena which are known to mankind. The psychoenergetic phenomena are qualitatively deducible from the theoretical framework and are in demonstrated agreement with the results of existing experiments and observation. However, we cannot deduce quantitative consequences form the theoretical part. Another point is the looseness or liquidity of the theoretical framework. The basis is relatively firm in its structure and in what it predicts, namely the results which we have seen in paragraph 2.5 to 2.7. When we go up one level though, all kinds of hypotheses can be build in order to explain the phenomena around us, making the hypotheses seem kind of arbitrary. We will leave this point for the following paragraph, for this has to do with the phase of investigation which the work is currently in (pre-scientific period, Kuhnian terminology). Base on this discussion, I am inclined to appoint the number 3 to *accuracy* of the theoretical framework, as described above. For the consequences which are deductible, are in demonstrated agreement with the results of existing experiments and observations. But the theoretical framework still lacks in its deducibility of quantitative consequences.

Consistency – a theory should be consistent not only internally or with itself, but also with other currently accepted theories applicable to related aspects of nature.

According to Prof. Tiller, this is what physics tries to do, become internally self consistent.[11] I think we can even conclude that Prof. Tiller finds this to be one of the hallmarks of science, for he tells us: 'rather [science] provides relative knowledge, internally self-consistent knowledge, about the relationships between different phenomena.'[12] He has build the theoretical framework to be both internally self consistent and consistent with accepted theories; that is, accepted *theories* are not contradicted by and are included in the theoretical framework Prof. Tiller proposes. Base on these points, I am inclined to appoint the number 5 to *consistency*.

Scope - a theory's consequences should extend far beyond particular observations, laws, or sub theories it was initially designed to explain.

As we have seen in discussion *accuracy*, the theoretical part is designed to include all of the established phenomena, unexplained established phenomena, established theoretical mysteries (e.g. magnetic monopoles) and all psychoenergetic phenomena known to us. Now, the only thing which it wasn't design to explain, are the phenomena which aren't yet known to us. We can't tell whether or not the theoretical framework will be able to explain this, because we don't know these phenomena yet. This is a very factual problem, which can only be determined through future work. Base on this discussion, I am inclined to say that we cannot yet appoint a number to *scope*, as defined above.

Simplicity – Closely related to the previous point, a theory should be simple, bringing order to phenomena that in its absence would be individually isolated and, as a set, confused.

With regards to *simplicity* the theoretical part does extremely well. It brings order to phenomena that in its absence would be individually isolated and, as a set, confusing. It bridges scientifically well understood phenomena and phenomena which are regarded not to exist, through a different interpretation and modeling of the wave/particle duality of accepted quantum mechanics. Base on this discussion, I am inclined to appoint the number 5 to *simplicity*.

Fruitfulness – a somewhat less standard item, but one of special importance to actual scientific decisions – a theory should be fruitful of new research finding: it should, that is, disclose new phenomena or previously unnoted relationships among those already known.

Although not very rigid and strict in its predictions, the theoretical framework is very fruitful of new research finding as described above. Base on this discussion, I am inclined to appoint the number 5 to *fruitfulness*.

Reproducibility – the theory makes predictions that can be tested by any observer, with trials extending indefinitely into the future.

The theory doesn't make predictions which can be tested by any observer, because the observer must be able to lift the gauge symmetry of a space from U(1) to SU(2). However, the predictions are reproducible in principle, for, according to Prof. Tiller, anyone is capable of doing this. It can allegedly even happen unknowingly, when someone works very lovingly and dedicatedly in one place for a longer period. It is of no impact for the reproducibility of the theoretical predictions that not anyone is capable of producing the necessary context which allows the phenomena to happen. As a simple illustration, not everyone is capable of building a particle collider, be it knowledge, skill, money or time. This does not mean that these experiments aren't reproducible. Base on this discussion, I am inclined to appoint the number 5 to *reproducibility*.

Falsifiability - possibility of a theory to produce hypotheses which make it possible to refute it.

The theoretical framework is capable of producing hypotheses which make it possible to refute it. The greatest of which is the hypotheses that the unstated assumption of science[10] is false. Furthermore, it is build on the anomalous behavior of which we have seen the data in 2.6 and 2.7. Each point has been translated in a hypothesis to which the theoretical part had to confirm. Naturally the theoretical framework can produce hypotheses which confirm this anomalous behavior, and naturally these hypotheses can be refuted if this behavior is found not to occur. However, thus far, the theoretical framework is not able to produce novel predictions, nor quantitative predictions which are able to refute it. Base on this discussion, I am inclined to appoint the number 2 to *falsifiability*.

Correctable and dynamic – can a theory be subject to modification as new observations are made.

Thus far, we have found this ability of the theoretical framework to be a weakness regarding to its scientific-ness. Apart from its basis, it is very flexible to modification as new observations are made. Base on this discussion, I am inclined to appoint the number 5 to *correctable and dynamic*.

Summarizing, as defined above, the theoretical framework which Prof. Tiller et al. have build is a *consistent, simple, fruitfull, reproducible, correctable and dynamic* mathematical structure. We cannot yet determine its ability to produce consequences which extend far beyond particular observations, laws, or sub theories it was initially designed to explain. Regarding *accuracy* it has a problem, which lies in its *falsifiability* which it at the moment completely fails to do in areas beyond the hypotheses on which it was build. Based on this and in relation to the previous paragraph, we can say that the theory is quite valuable scientifically. We cannot yet determine the impact of the lacking features on the place of our object of study within the landscape. We can say that, when looking at the pseudoscientific – scientific distinction one dimensionally, our object of study definitely lies on the scientific side of the line. But where, we can't say. We have learned quite a bit about our subjects place within the landscape, but we are not yet able to draw conclusions. We will continue with the demarcation procedure as set up in 1.7.

3.6 SCIENCE OR NOT, ACCORDING TO…

In this paragraph, we are going to look at what each philosopher we treated in paragraph 1.4 would say about our object of study, based on what we have seen in the designated paragraph. We do this in order to evaluate the work of professor Tiller through the eyes and insights of the philosophers we have seen in that paragraph. We must pay attention to the terminology which is used in these paragraphs and when necessary dissolve conflicts between our terminology and theirs. I'm not going to use connotation in the following sub-paragraphs when I refer back to the content of the respective sub-paragraphs of 1.4, for this would be only tedious to you, the reader.

To walk ahead of ourselves, the work of Prof. Tiller, using Kuhnian terminology, takes places in a prescientific period, in which there does not yet exist a general agreement on a paradigm between its practitioners. According to Kuhn, Popper's description of "true scientific behavior" applies to these periods. So let's look at the work of Prof. Tiller through the eyes of Popper and see what this tells us.

3.6.1 … SIR KARL RAIMUND POPPER

We saw that, in the article of Popper we regarded, Popper said that in deciding what is science and what isn't, it did not matter whether a theory is true, when a theory is acceptable, or how exact or measurable a theory is. This would completely cancel the objection which we had regarding the ability of the theoretical part to quantitatively predict behavior. Also, all theories are equally improvable and even impossible.[13] Poppers ideas are the most prescriptive. According to Popper, when a stone falls up, both the option of the theory of gravity being false and the option of some second order phenomena, leaving the theory of gravity intact, should be regarded in an equal sense. The only thing which matters, according to Popper, is whether or not a theory is falsifiable. A theory is falsifiable when it makes conclusions, which must be logically derivable from shared premises, which are refutable. A refuted conclusion will refute the theory.

Looking at the theoretical part of Prof. Tillers work, can we find such a conclusion? At first instance we could say, no problem: 'in a space which is in the SU(2) symmetry state, the pH of water can be influenced by human intention without any form of chemical addition or other influence which can be explained by the currently established theories.' Another one would be: 'when a space is lifted from the U(1) gauge symmetry state to the SU(2) symmetry state, a magnetic polarity effect occurs regarding the pH of a glass of water, which can't be explained by the currently established theories.' When the negative appears to be true for the moment, then, until demonstrated otherwise, the theory is falsified. The problem lies in the issue whether or not a space is in the SU(2) symmetry state. There is no accepted procedure of measurement which determines whether or not a space is in a higher symmetry state. The second statement provides a partial solution to this problem, as there is no known cause for the described magnetic polarity effect. Therefore, in principle, the space being in a higher symmetry state is as good as an explanation as any other. I said in principle, for, as discussed in the previous paragraph, what Tiller proposes is an explanation which incorporates and utilizes accepted concepts and theories. But does this solves the problem? In principle no, it does not. For someone can always say that a space hasn't been lifted to the SU(2) gauge state. Thereby the theory is not refuted. Therefore, how the theory is presented in section 2 and using what we have seen of Popper in section 1, because the theory is not falsifiable, it is not a scientific theory.

3.6.2 … THOMAS SAMUEL KUHN

Kuhn brought history and sociology into the debate regarding the scientific status of things. He tells us that there is more to science than testing and falsifiability. He taught us to look at the evolution of science in steps of revolution, instead of the linear accumulation of knowledge. Between the revolutions, periods of normal science exist in which there exists a common paradigm. Before the first revolution, there is no consensus on a paradigm between its practitioners. In a period of revolution, there is a paradigm shift, in which there is a sudden change of the concepts, assumptions, values and practices. Based on the content of 1.4.2, I think we can say that Prof. Tiller psychoenergetic work is taking place in a prescientific period. There is a lot of research going on in this area, by more or less qualified researchers and there have been found many things. But nothing which could explain the elusive behavior of psychoenergetic phenomena. Prof. Tillers work does explain this and does this in such a manner that scientific research is still possible.

So, according to Kuhn, the work of Prof. Tiller is cannot yet be regarded as a recognized science, because no puzzle solving tradition has been able to develop and there is no central paradigm. Kuhn tells us nothing about the "rules" of a prescientific period and whether or not something can be scientific in such a period. As we saw in 1.4.2, he dismisses astrology not on it being in a prescientific period or something else. He tells us that astrology is not to be regarded as a science because only its most general and least predictable forecasts could be derived from accepted theory: 'In short, though astrologers made testable predictions and recognized that these predictions sometimes failed, they did not and could not engage in the sorts of activities that normally characterize all recognized sciences.'

3.6.3 … IMRE LAKATOS

Lakatos begun his essay by telling us: 'the hallmark of scientific behavior is a certain skepticism even towards one's most cherished theories. (…) blind commitment to a theory is not an intellectual virtue, it is an intellectual crime.' He has taught us the methodology of *scientific research programs*. He has created this methodology in order to solve to problem which he saw in Kuhn's model: irrational change. According to Lakatos, were this to be true, then there is no way to distinct science from pseudoscience, no way to distinct 'scientific progress from intellectual degeneration.'

He told us that when distinguishing knowledge from superstition, ideology or pseudoscience, it does not matter how many people believe a certain statement and how strong they do this. Neither does it matter how credible a statement is, or how much people understand it. A theory can be of great scientific value, even if no one believes or understands it. The objective scientific value of a theory lies beyond the states of the human mind which creates it. It lies in the objective support it has in facts. Applying this vision to our object of study, it does not matter how credible this work is, nor how many people understand it. The objective scientific value lies in its objective support in facts. When we take the data Prof. Tiller presents us to be facts, his framework has objective support, through which it becomes scientifically valuable.

We saw that 'the typical descriptive unit of great scientific achievements is not an isolated hypothesis but rather a research program,' according to Lakatos. He said that science is far more than trivial process of trial and error. I'm not going to explicitly dissect section 2 in accordance with Lakatos' methodology, for this would make another thesis in itself. We have, however, not found a concept which could describe what our object of study is, what it is we deal with. I think it is most natural to regard it as a research program. When we do this, let's look at the general consequences. According to Lakatos it is the scientific research program which produce the dramatic, unexpected, stunning predictions. A few of them are enough to tilt the balance, he tells us. Pseudoscientific research programs are degenerate, here theories are fabricated only to keep up accommodating known facts which damage the research program. He continues and tells us that one should be lenient towards a ´budding´ research program. It can take decennia before such a program becomes empirically progressive. Furthermore, a theory is not put aside without a better one. Neither does critique refute a theory, important criticism is constructive. Using this basic picture, I find it natural to regard Prof. Tiller's work on psychoenergetics as a budding research program. Although the theoretical framework has not produced stunning novel facts, the framework is build to accommodate them and thereby predicts them. Personally I do not find these to be stunning new *predictions* of the research program. But whatever we call the data of 2.5 to2.7, it is stunning and progressive.

Unfortunately, paragraph 1.4.3 doesn't tell us what it means that we should be lenient towards a budding program. Should we accept it as science? Should we just let it be and do nothing with it? Should money which is meant for the scientific community be invested in such a program? Should a special section in leading magazines be set aside for such work? What does it mean practically? As I said, Lakatos does not elude on this matter. I leave it up to the reader to form his or her own opinion.

3.6.4 …PAUL R. THAGARD

In the paragraph on Thagard, we saw that he set up the following demarcation criterion:

> 'A theory or discipline which purports to be scientific is pseudoscientific if and only if:
> 1. it has been less progressive than alternative theories over a long time and faces many unsolved problems; but
> 2. the community of practitioners makes little attempt to develop the theory towards solutions of the problems, shows no concerns for attempts to evaluate the theory in relation to others, and is selective in considering confirmations and disconfirmations.'

Based on this criterion, our object of study, the work of Prof. Tiller as presented in section 2, cannot be called pseudoscientific, for it satisfies none of these criteria. Now, what can happen, says Thagard, is that a theory or discipline can classified as an unpromising project, well before it can be marked as a pseudoscience. Unfortunately he does not expand on this. We don't know *how* something might be marked as an unpromising project. Perhaps, but I am just thinking out loud here, an unpromising project reveals itself through it being uncontrollable for the people who work with it, because no mathematical framework can be build to hold and connect the concepts. When this happens, the project is just a random collection of facts, which are connected together through metaphors. Such a thing cannot be worked at in a scientific manner. This is not the case in section 2.

We saw in 1.4.4 that Thagard has weakened his criterion because of objections, in saying that the difference between science and pseudoscience is a matter of degree rather than kind. But he remains convinced that this difference of degree is usually large and obvious. We saw that he also introduces two new criteria for pseudoscience; properties which can point out a pseudoscience when there is no other theory which can replace it:

1. Pseudoscientific theories are often highly complex and riddled with ad hoc hypotheses.
2. Pseudoscientific reasoning is (often) based on resemblances. Instead of testing causal claims by looking for statistical correlations, pseudo scientists are often content to rest their believes on superficial analogies

In our case, we haven't got a theory which can replace it, when the data is true. (We've already seen that when the data isn't true, the scientific value of the work diminishes drastically.[14]) So these properties are important for our evaluation. When we look at the work in section 2, it doesn't satisfy these two criteria. The framework is build using accepted concepts and mathematics, in order to provide an explanation to the experimental data which Prof. Tiller et. al have gathered and is, for example, far less complicated than current attempts to unify quantum mechanics with general relativity. The framework is a unified and firm body, which makes sense as a whole. As far as we have seen in section 2, causal claims are tested by looking for statistical correlations. Based on this, plus Thagard's remark that the difference between science and pseudoscience is usually large and obvious, we can only conclude we are dealing with science.

3.6.4 SUMMARIZING

As we saw in 1.5, Poppers ideas presented in 1.4.1 concern only theory. Prof. Tillers theoretical framework has a unique status with regards to Poppers ideas, in that it does not seek to refute all of established science; that is, he has build a framework in which a refutation of the unstated assumption[10] will not wipe away the whole foundation of science. He has determined exactly which concepts need adjustment, which must be taken away and which must be added, in order for the vast amount of physics to remain erect. But the theoretical part is not falsifiable in the way Popper has described it, making it unscientific in Popper's eyes. Kuhn learns us that we must place Prof. Tiller's work in a prescientific period. Lakatos shows us how we can see the whole content of section 2 as a research program. When the data Prof. Tiller presented us is true, it has objective support in facts. The extent of this support in facts must be further investigated in order to determine its full scientific value. Taking a step forward and using the criteria which Thagard has set up, we can only tentatively conclude that we are dealing with science.

3.7 TILLERS WORK IN HISTORICAL AND SOCIAL PERSPECTIVE

In this paragraph we will have a look at the historical and sociological aspects of our discussion. It is here were we will find a common ground for the prescripte and descriptive accounts on science and it is in this paragraph where we will doubt the results of Prof. Tiller and see what this brings us. I have waited for this paragraph with this, for I consider this doubt as a sociological factor. Although doubting this data has been made quantitative in Bayesian probability, which, for our use, basically tells us that we can rationally assign a very low probability to the data which Prof. Tiller presents us.[15] This probability goes up as more and more people replicate the data. Although we must be careful in not using this concept for blind commitment to whatever theoretical concept, for we would indeed be an intellectual crime.

In regard with the notion of probability, I ask myself, why would anybody spend 40 years of his life, his professional career on something which he knows to be falls? I can believe that when someone is so convinced of his own ideas, his own concepts build in a mathematical framework, that this can happen. But for 40 years? When no data has been found to indicate this to be true. I would doubt it. Furthermore, in such a case you would expect theoretical reasoning for the greatest part. For you are not going to come up with some random data to later build a theory in order to explain this. In his presentation there seems to have been a strong interaction between theoretical modeling and experimental results. As Prof. Tiller presents us, there was no fixed theory in which he could believe let alone believe in so strongly that he would spend decades, his professional career and hundred thousands of dollars on it. Although highly unlikely, we can't say it to be completely unlikely. I have not been there and facts could have been presented in such a way as to make it look unlikely.

When looking at paragraph 1.3, we learned that the one thing that unites science trough history appears to be it never assuming a particular form. Instead it always remains susceptible for correction, expansion in width and depth, and for radical changes and revolutions.[16] When the work of Prof. Tiller turns out to be a new revolution, the ability to self publish material on the internet and self publish books has played a great role in it. For without it, the probability that his work would have received funding or seen the light of day would by very low. In line with the general lines of history, we could then say that personalization of research is the characterization of the current age.

In paragraph 3.3 we saw that a contradiction arose within this text. We said that, in order to be a scientist, one must occupy himself with scientific work. The contradiction lies in the definition of when we can speak about scientific work. We have seen in paragraph 1.2 that is natural to define scientific work as contributing in some way to that which the community classifies as science. In paragraph 3.2, we defined scientific work to be expanding the generally available and testable knowledge of everything which surrounds us. As already noted, it is here where the prescriptive and descriptive viewpoints come very close together. The first definition is descriptive at its basis, the second prescriptive; that is, the first is based on what we see happening and the second on an ideal. The problem lies in how to decide what is knowledge of the world around us and what is hot air. There is no way to decide this. The best we have is our combined efforts. The best of combined efforts we have at the moment is the general consensus of the scientific community as a whole. Now, this community is far from perfect with respect to objectiveness. Therefore it is of utmost importance the ideals are held high, sought after, discussed, etc. etc. This is the common ground of the descriptive and prescriptive account of science.

As a reminder, the scientific community was said to consist of the total body of scientists, their interactions and the relationships between them. In 3.2 we defined that someone who seeks to expand the generally available and testable knowledge of everything which surrounds us can be classified as a scientist. By this definition, William A. Tiller is a scientist and therefore part of the scientific community. But, whether or not the knowledge which scientists produce can be classified as scientific knowledge can only be decided by the scientific community as a whole. Thus, we must conclude that we do not yet know whether or not the theoretical framework which Prof. Tiller presents us is scientific knowledge. It must first be accepted by the scientific community as a whole, for we have no better classification then this. A scientist who is a voice in the wilderness, must really confront himself as to the reason of him being a voice in the wilderness. In order to determine what this means for Prof. Tiller et al. we must have a thorough investigation on how people have reacted to his work, why they reacted in this way, etc. But when we take Prof. Tiller's words in paragraph 2.2.1 and 2.3 as true, his work has never *seriously* been investigated by established science in general. Thus whether or not his work can be classified as scientific, based on this discussion, remains inconclusive.

So, the subjects of our study are not accepted by the scientific community in general. It is important to be accepted, for the scientific community as a whole is the only thing we have for deciding the scientific value of something. Now, in order to further determine whether or not Prof. Tiller et al. is part of the scientific community, we can use the list which Abraham Maslow gave us:

1. seeking problems, asking questions, develop ideas and produce hypotheses
2. put to the test, explore, confirm and refute, investigate and test hypotheses, repeat and inspect earlier experiments, gather facts
3. organize, theorize, give structure, seek more and more inclusive generalizations
4. collect existing knowledge and history, functioning as a scholar
5. develop instruments, methods and techniques
6. administration, implementation and organization
7. publish and educate
8. develop applications for human usage
9. appreciate and enjoy knowledge[17]

Except for the ninth point, we have seen that all other functions are carried out by Prof. Tiller et al. and to be quite honest, I couldn't image them to do this work when they didn't appreciate and enjoy knowledge.

Concluding this paragraph, we see that for the greater part, all theoretical aspects of our discussion testify for the scientific nature of our object of study. The only thing which makes us have to doubt is the general acceptance within establishment science. For this is the most important point on deciding whether or not something is scientific. To further investigate the nature of science, our landscape, it might be very interesting to see what is going on here.

3.8 HISTORY ON TILLERS WORK

In this paragraph we will use the insights which have been gained by looking at the nature of science in the past to see how Prof. Tillers work interacts with and fits in this general picture. We saw a whole host of outcomes, but what couldn't be found in the history of science was an infallible scientific method. Such a thing appears not exist. The scientific process is too unpredictable to be captured in a cookbook-like manner, Prof. Theunissen told us. We saw that a discovery is a process, not a single event, in which a whole group of people are involved, not just one or a few. Conditions have to be just right, in order for a discovery to be possible. Furthermore, this conditions aren't enough. Creative leaps are necessary for science to happen. 'Without creativity, no science and creativity knows no rules.'[18] Observations do not automatically lead to knowledge, for observation only gain their meaning within a theoretical framework. When an observation opposes existing knowledge, it is the experiment which is questioned; experiments aren't evaluated in isolation. In order to build a measurement instrument, one has to know the phenomena in question. Scientific theories do not arise in a vacuum, but bear the marks of the culture in which they are formed. Culture and science are subtly and intricately woven together. Furthermore, scientific knowledge is to outcome of a discussion within the scientific community. And even more, the scientific method is in essence nothing more than the fallible problem solving ability which everyone of us inherently has.

In the light of the insight that there exists no scientific method which you have to follow to gain results and in fact, that the thing which we call the scientific method is nothing more than the inherent and fallible human problem solving ability, where does that leave us? Does this mean that we can't actually say anything about whether or not our object of study is science or not? Yes, it means just this. We can't say whether or not our object of study is science for the same kind of reason that science can't tell us whether or not something is going to happen, until it has happened; take, for example, global warming - the causes it has and the effects it is going to have in our future. Perhaps a scientist working on this great problem has the full answer, but how do we know? And how do we know which one has the answer? The answers to these questions are simple and the same as the answer to the previous issue regarding our main question, we can't know. All that we have is common sense, our own background of knowledge and skills plus the consensus of the scientific community. As we have learned in from the book of Prof. Theunissen: '[scientists] offer the best of their abilities and knowhow of that moment. Their discussions show that, when in doubt, they do not over hasten their conclusions. They accurately check each part of their tests (...) [and] argue on the cutting edge to come to an agreement.'[19] So must we. All that we have discussed and carefully constructed until this point is nothing more than our fallible ability to search, with the best of our abilities and knowhow at this moment, for the place of our object of study within the methodological landscape. Therefore, let's continue our search and see what else we find. From this point on, we shall deal with each alinea of paragraph 1.6 at a time. Starting with the second alinea.

This dealt with Alexander Fleming and the discovery of penicillin. In it, we saw that discovery is a process in which a whole host of people are involved, instead of a single even with one (or a small group) of discoverers. Also, the conditions for a discovery to happen, have to be just right and even with the conditions being just right, creativity is necessary in order to find new questions, answers, results and methods of investigation. For us, it is not possible to investigate all the people involved, process as a whole and conditions which were met which led to the psychoenergetic work we saw in section 2. Though we have investigated a few and a part of the process. We have already dealt with the largest part of this, interpreted its meaning and placed it within the methodological landscape.

The third alinea showed us the nature of scientific work: "Only the imaginary genius sees and understands. A scientist thinks about a problem, makes observations, forms a theory, tries to find support for the theory with observations, adjusts the theory, tackles unexpected observations with the theory, expands the theory, makes new observations… etcetera. And with each bit of knowledge that he obtains, he realizes how much he doesn't understand yet."[19] We have seen this process in section 2. What does this tell us? The nature of Prof. Tiller's work resembles the nature of scientific work.

The findings in the fourth and fifth alinea regarded experimental findings and its relation to scientific knowledge, which is knowledge that is valid always and everywhere. We saw that because of this nature, the experiments on which it is build must be reproducible always and everywhere. We also saw that scientists have a strong confidence in the general validity of their results. But before this confidence can arise, the experimental finding must be considered valid by the scientific community in general; that is, consensus. What is happening in our case, is the experimental findings are of such nature that they oppose what 400 years of scientific research has shown us. So, keeping the content of this alinea in our mind, it is natural that such results are regarded a lot more skeptically than experimental results which deviate less from the established scientific picture of reality. We must be careful however, not to decline in scientism,[20] which almost naturally occurs, as a consequence of the social factors to which a scientist is subject to.[21] Now, another point which could make someone doubt the validity of the findings in section, is that no one is allowed to enter the spaces in which the experiments take place. (I don't know the exact details regarding this matter.) However, we saw that no one was allowed in Joule's lab space as well. In this case, because the body temperature of someone entering the room would influence the measurement (temperature). In our case the mental state, someone (un)conscious intentions is said to influence the measurement. Is there a difference? I am inclined to say no, there is no fundamental difference which sets the two cases apart. As with Joule's case, it is natural that the skeptic view on the experiment increases because of this.

In the fifth alinea we looked at two cases: Schmidt (telepathy) and Weber (gravity waves). We saw that, as the need for certainty increases, because research is entering new or controversial areas, the uncertainty of the meaning of experiments increases as well. This happens because you need to know beforehand what the outcome of an experiment should be, in order to be able to evaluate the outcome. It even goes a step further, for Prof. Theunsissen tells us: 'The same can be said about the ability of the researcher: it is only when you know what the outcome should be, when you know whether or not the researcher in question did a good job.' Prof. Theunissen continues in telling us that in such matter 'scientific results alone aren't enough to come to a decision. In these cases previous experiences, personal belief and the authority of others are involved in the decision process. This are not solid criteria but personal and subjective. (…) There is no set procedure by which to value the outcome of an experiment. That remains the work of man.'[19] I believe this, in combination with the three social factors that Prof. Tiller has mentioned,[21] to be the cause for the problems which Prof. Tiller et al. experience to find acceptance within the scientific community. Even though they all have an established science background, even though Prof. Tiller was a well respected member within his scientific field, the momentum of 400 years of (previous) scientific experience, which is set very rigid within the worldview (the personal believe) of scientists, is far greater.

The sixth alinea showed us that you need to understand a phenomena, at least to a certain degree, in order to make a instrument which can measurement it. This applies to the work which we have seen in section 2, so it might be a really interesting object of research in order to gain a further understanding of this process. This is not the goal of this thesis however.

In the fore last alinea, Prof. Theunissen deals with something we already came across at the beginning of paragraph 1.2,[22] although in another form: the relation between science and society, of which it is a part. Science is not a, never changing, rigid object. It is an evolving human activity, not subjected to any law, but that which is accepted by those who interact with it. Scientists are a part of both society and the scientific community. It is here were the interaction lies. A part of this interaction between society and science takes place through the workings which we described in the sixth alinea of this paragraph (regarding Schmidt and Weber), regarding past experiences, personal believe and the authority of others. But as Prof. Theunissen told us, this interaction takes place in endless varieties. We can't say how big the part above is and what other factors play a role. This would require an investigation. However, taking into account the growing trend of spirituality in our society, I think we can say that the work of Prof. Tiller is a natural reflection of this within the scientific community. But this is just a hypothesis.

This concludes our research regarding paragraph 1.6. The two main points which emerged in this paragraph, were, strangely enough, a reflection on what we ourselves were doing and a social factor regarding the acceptance and thereby scientific status of our object of study. The first point concerned the non existence of the scientific method as something which one can follow to gain results. We saw that there is no way for us to determine, in principle, whether or not we are dealing with science. All that we have discussed and carefully constructed until this point is nothing more than our fallible ability to search, with the best of our abilities and knowhow at this moment, for the place of our object of study within the methodological landscape. Which is what we should do. The second point regarded the way in which experimental results can be valued. When entering newer or more controversial areas, the uncertainty in what we should expect of an experiment increases. Therefore it gets harder to evaluate the outcome. As it gets harder, more and more emphasis is placed on previous experiences, personal believes and the authority of others; criteria which are personal and subjective. This, in combination with time and sociological pressure and no place within establishment institutes (because these have a reputation to protect), are thought to be the reasons behind the reaction of the current scientific community to the experimental results of Tiller et al. This is not the results of the outcome of a scientifically based discussion, but a social mechanism described by Malcolm Gladwell in his book '*the tipping point.*'[23] In it he argues for the idea that the workings of a social change can be compared with the workings of a virus; nothing happens until a critical mass has been reached, after which the social change is unstoppable. With it, he explains things like the sudden drop in crime rates in New York in the 1990s, the rise in sales and popularity of *Hush Puppies* and decreasing the spread of teen suicide in Micronesea. In our case we are dealing with the tipping point between acceptance and rejection.

3.9 CONCLUSION

In section 1 we searched for a demarcation criterion and found that there was no such thing. Instead we set up a demarcation procedure, through which we could determine the place of an object within the methodological landscape, which gives us insight in its nature regarding science. In section 2 we looked at our object of study. In this third section we applied our demarcation procedure to our object of study.

Before we begin with the conclusion, it is important to revise something which we said in paragraph 1.2.[17] We said that scientific knowledge is considered important, because it is based on and produced by the scientific method. In the previous paragraph we saw that this is not true. The scientific method is in essence nothing more than our fallible human ability to deal with problems. It is the consensus between scientists through which scientific knowledge is considered important. It is considered important because, together, the scientific community has an enormous amount of knowledge and skills to deal with problems.

The first thing to notice is that its place is highly depended on the factuality of the data which Prof. Tiller presents us. Although it is quite possible that there are all kinds of subtleties which may be discussed over regarding the experimental findings, the experiments are set up in such a way that, when factual, the results refute what Prof. Tiller calls the unstated assumption of science: "no human qualities of consciousness, intention, emotion, mind or spirit can significantly influence a well-designed target experiment in physical reality.'[10] When the data is factual, it is interesting to further explore Prof. Tiller's work's place and workings in the landscape. If it is not factual, that is, the data is manipulated in such a way as to make it refute the unstated assumption, whereas without the manipulation it wouldn't refute it, then it is no longer interesting to investigate the landscape as we have done. (This manipulation can be done intentionally or unintentionally, that doesn't matter for this conclusion.) Would this be the situation, our object of study would be an interesting case to learn more about other things; for example, the reasons why a scientist would pursue what Prof. Tiller has done. Because it was not possible for us to investigate whether or not there was a manipulation of data as described above, we have assumed the data to be factual and continued from that point on.

We have seen that it in describing our object of study, the most natural way is to describe it as a budding research program, for it is not a science, nor a scientific field. Of the sciences we know nowadays, the work fits best in physics, which is also the background of Prof. Tiller. In the dissection Prof. Tiller makes and terminology there is no important difference from our dissection and terminology we have discussed in paragraph 1.2 and 1.3. This, although no surprise, teaches us that Prof. Tiller is familiar with the general way science is dissected by its members. Also, he does not wish to make changes in this aspect or offer a new view on this. The theoretical framework which Prof. Tiller has build has not been tested and developed well enough to be taught in a classroom. In relation to Ruses list,[25] the basics of *integrity*, *tentativeness* and *natural law* seem to be there. But the theoretical part misses the ability to quantitatively predict psychoenergetic behavior, through which prediction and testable, as defined by Ruse, are not met. On the other hand, the theoretical framework can qualitatively explain a whole host of outcomes which can't be explained as a whole by anything else. At that point of our discussion, we weren't yet able to determine what to do with this. For we couldn't classify something a science when the theoretical framework can't quantitatively predict behavior, but couldn't say it wasn't science either just because of this fact, because science is more than the ability to quantitatively predict behavior.

In the following paragraph, we looked at the theoretical framework which we have seen in Section 2 with a list of Kuhnian values, in order to learn more of its place within the methodological landscape. We saw that the theoretical framework which Prof. Tiller et al. have build is a *consistent, simple, fruitful, reproducible, correctable and dynamic* mathematical structure (as defined in paragraph 3.5). We were not able to determine its *scope*. Regarding *accuracy* it has a problem, which lies in its *falsifiability*. As described in Section 2, the theoretical framework completely fails in these areas, beyond the hypotheses on which it was build. Based on this and in relation to the paragraph 3.4, which searched for the scientific-ness at first sight, we said that the theory is quite valuable scientifically. We couldn't yet determine the impact of the lacking features on the place of our object of study within the landscape.

Next we used the insights of the remaining four philosophers we treated in paragraph 1.4 as a basis for discussing our object of study. As we saw in 1.5, Poppers ideas presented in 1.4.1 concern only theory. Prof. Tillers theoretical framework has a unique status with regards to Poppers ideas, in that it does not seek to refute all of established science; that is, he has build a framework in which a refutation of the unstated assumption[10] will not wipe away a part or the whole of accepted and tested scientific theories. He has determined exactly which concepts need adjustment, which must be taken away and which must be added, in order for the vast amount of physics to remain erect. The theoretical part is not falsifiable in the way Popper has described it, making it unscientific in Popper's eyes. Kuhn learns us that we must place Prof. Tiller's work in a prescientific period. Lakatos shows us how we can see the whole content of section 2 as a research program. When the data Prof. Tiller presented us is true, it has objective support in facts. The extent of this support in facts must be further investigated in order to determine its full scientific value. Based on the criteria which Thagard has set up, we must conclude that we are dealing with science.

In paragraph 3.7 we regarded the historical and social aspects of our object of study. We saw that for the greater part, all theoretical aspects of the discussion testify for the scientific nature of our object of study. The only thing which makes us have to doubt the scientific nature is the general acceptance within establishment science. As we have seen, this is appeared to be the most important factor for determining whether or not something can be called scientific. One part is nearly semantic, for something cannot be called science, if it is not accepted by those who recognize each other in their practices being science. Behind this, lies the important insight that it is exactly this consensus within the scientific community which gives scientific knowledge its value and status. Accepted scientific knowledge is the mutually accepted effort of hundred thousands of specialists.

But, this can't be infallible. An important understanding in this matter came in the paragraph which followed, using the insights gained by looking at history to reflect on the work of section 2. The understanding regarded the way in which experimental results can be valued. We saw that when entering newer or more controversial areas, it gets harder to evaluate the outcome. As it gets harder, more and more emphasis is placed on personal and subjective criteria. This, in combination with time and sociological pressure and no place within establishment institutes,[21] are thought to be the reasons behind the reaction of the current scientific community to the experimental results of Tiller et al. This is not the results of the outcome of a scientifically based discussion, but a social mechanism described by Malcolm Gladwell in his book '*the tipping point.*'[23] In our case we are dealing with the tipping point between acceptance and rejection within the scientific community.

As a concluding remark, based on our research, psychoenergetics as proposed by William A. Tiller must at least be treated in a way related to the 'budding research program' as proposed by Lakatos. A serious investment should come from establishment science to investigate the work, especially the experimental results, to determine its scientific value. Prof. Tiller, in his place, must seek this acceptance step by step. He cannot expect his work to be recognized as a whole in one go. The first thing, as I see it at this moment, which must be accepted, is the possibility for a space to be in the SU(2) gauge symmetry state as described in section 2 and the works of Prof. Tiller et al.

LITERATURE SECTION 3

1. See paragraph 1.2
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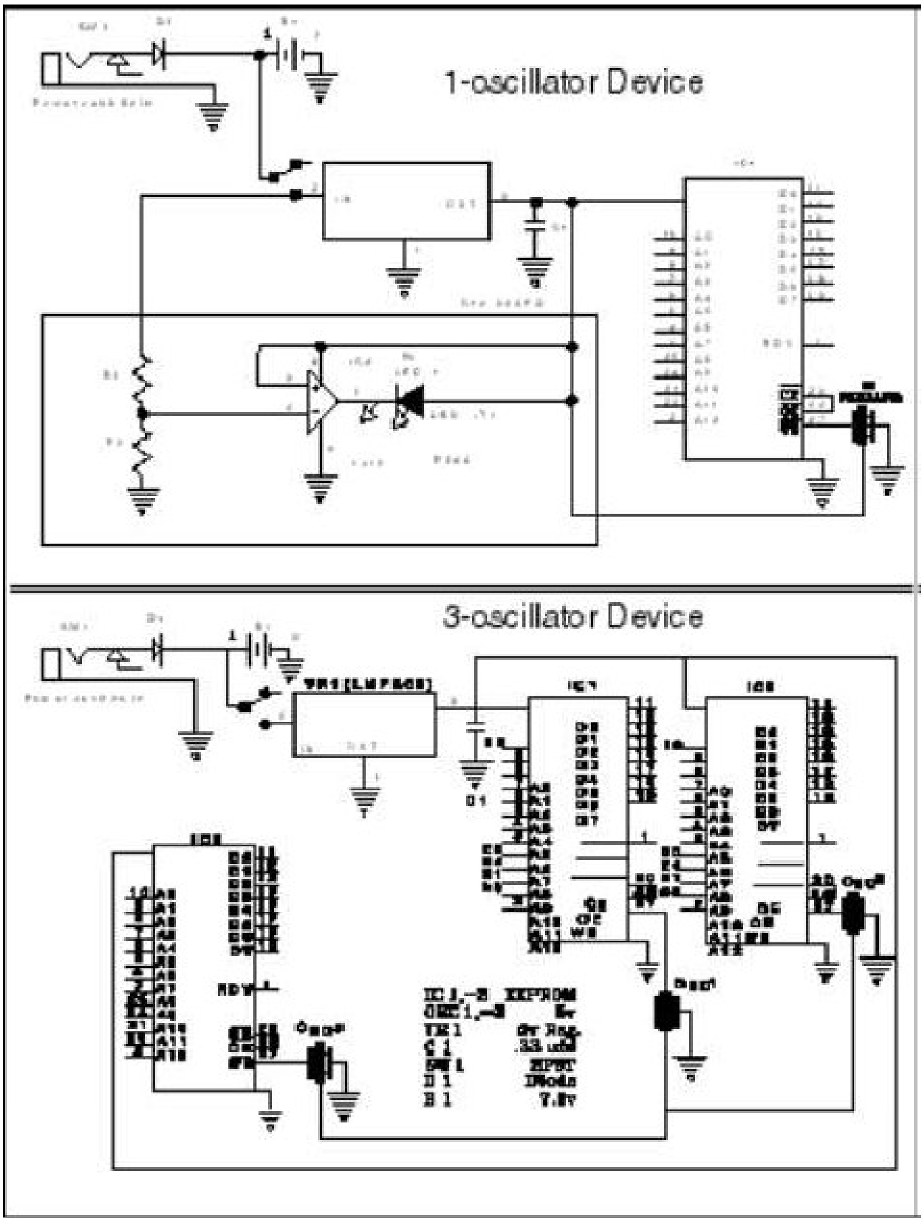
3. See page 35
4. See page 51
5. H.D. Young, R.A. Freedman (2004). University Physics with Modern Physics (11th ed.). Addison Wesley. p. 2
6. See reference 8 of section 1
7. See paragraph 1.4.2
8. See page 8 and reference 20 of section 1
9. Merriam-Webster online: "empirical" (Retrieved August 2010). http://www.m-w.com/dictionary/empirical.
10. See page 36
11. Tiller, W. A. (2007)the video: '*Conscious Acts of Creation'*, the text of which can be found in the appendix: pg. 13
12. See page 33
13. See reference 17 of section 1
14. See page 64
15. In a personal discussion with Prof. Dennis Dieks, regarding the progress of this thesis
16. See reference 21 of section 1
17. See page 8
18. See reference 20 of section 1
19. See page 25
20. See page 34
21. See sub-paragraph 2.3.5
22. See page 6
23. Gladwell, M. (2002) '*The Tipping Point: How Little Things Can Make a Big Difference*' Little, Brown and Company.
24. Theunissen, B. (2004) *"Diesels droom en Donder's Bril"* (eng: *The dream of Diesel and the glasses of Donders*). Amsterdam, Nieuwezijds B.V.: pg. 149.
25. See 1.4.5

Appendix

The Payson laboratory intention statement (as stated on pg. 92 of the book)

'*To activate the indwelling consciousness of the Payson laboratory in order to 'condition' it to a significantly higher electromagnetic symmetry state. The special tuning characteristic of this state is to be specifically such that* ***any psychoenergetic experiment*** *subsequently conducted in this IIED-conditioned space would be significantly benefited.'*

Het circuit van de UED (zie whitepaper 2)



Publicaties van W.A. Tiller (see whitepapers XI and XII)

De text from the video 'conscious acts of creation'

Can be seen at:
http://video.google.nl/videosearch?q=conscious+acts+of+creation&hl=nl&emb=0&aq=o#
Bellow is a litteraly translation of this video, which we have used for quotations.

Introduction

In the first part, I will try to convince you that there is plenty of critical experimental data that, at least under special conditions that I will define, human intention can robustly effect physical reality:

- The paradigm of physics
- Experimental design
- Three initial target experiments; 1) inanimate material (water), 2) in vitro system (ALP) and 3) in vivo system (fruit fly)
- The results
- Conclusion: Human intention robustly effects physical reality and conditioned spaces
- Consequences

In the second part I shall try to provide you with a theoretical perspective as to how you can understand this.

- How do we have to shift our frame of reference for viewing the universe
- Quantummechanics; de Broglie's particle pilot wave concept, what does it tell us?
- Quantummechanics; Diracs work on the origin of the electron, what does it tell us?
- A model for a view of the universe that would allow human qualities of mind, consciousness, intention, emotion and spirit to be formally introduced to a mathematical structure – an expansion of quantummechanics.

PART 1

The paradigm of physics

We have to always realize that nature is richer than the models we use to describe it. The old old paradigm was a theological one in which God moved everything at personal will, etc. Than came Copernicus, Galileo, Newton and so many others who showed that God may still be moving it, but it is not personal. It is a lawful set of structures that led to the paradigm called classical mechanics. At the end of the 19th century, scientist where applauding each other, saying: "We know it all now, all we have to do is cross a few t's, dot a few i's and it is all made. Don't advise anyone to go into physics." Then the universe surprised them by opening the door the the quantum and relativity concepts. It was a very big struggle to shift the paradigm, many of the people went to their death beds with the old paradigm thinking the new stuff was terrible. But there were a lot of young folks who moved this frontier forward. In 30 to 40 years there was a new paradigm called quantum mechanics. During the rest of this past century it was refined. We came to understand a lot about it. It became fairly reliable. Remarkably reliable in certain places it could be applied. And in the latter part of this past century, again scientist where applauding each other and physicists where saying: "we know it all now, we can write the theory of everything." In that paradigm there is no place for any human qualities to influence the formal description of quantum mechanics. Yet, for well over a century, there have been lots of experiments saying that humans can influence physical reality. Most scientist are more comfortable sweeping that under the rock and they have been able to sweep it under the rock because in general the effect size is small. The can say: "well, we can just neglect it, because it's probably random errors". What we have contributed in the recent time is to address this question head on about human qualities of consciousness, in particular intention, affecting physical reality.

Experimental design

We have fortunately been led to develop a technique wherein it is possible to objectify an intention by putting it into a simple electrical device. That device we have called an IIED (intention imprinted electrical device). We have applied that to three different target experiments. What we do is we take two identical simple electrical devices. We take one, we rap it in aluminum foil and put it in an electrically grounded faraday cage and that is our control device. We take the other, sat it on a tabletop around which four highly inner self managed individuals who are long time meditators. They go into a deep meditative state. At some point during that period, there is an cleansing of the environment to remove old inprints and then one of the four speaks the specific intention for the target experiment. This intention is held for the order of 15 minutes and then there is a subsidiary intention given to seal the prime directive into the device so that it doesn't leak away. Then that is set, the individuals come out of meditation, check the device, see if it feels right. If it does not do it again. We never had to do it again more than twice. That device then, is wrapped in aluminum foil and put in its own electrically grounded faraday cage until we are ready for the next step. It turns out that if we do not do this, shielding and putting them into a faraday cage that's grounded then they can be hundreds of meters apart and in the off state and they still will somehow crosstalk, so that you lose the control. The control becomes like the imprinted device. So we have found that when using that simple technique, we have been able to keep the imprints in the device for four to six months. So that means you can do a lot of experiments.

Three target experiments

1) inanimate material (water)
The first experiment was to look at water. One device could be to raise the PH of water by one full PH unit; no chemical additions. We have measurement accuracy of at least a hundredth of a PH unit or better. So we're asking for a signature to be at least a hundredth time larger than our measurement accuracy; we are not looking for something down amongst the noice. We also did the companion experiment of lowering the PH. That's another device, because that is another specific intention.

2) in vitro system (ALP)
We moved from the water experiments to expand into the biological realm and we wanted to look at an enzyme, alkaline phosphates. The imprint was to increase the thermodynamic activity of that liver enzyme.

3) in vivo system (fruit fly)
The third thing was then to move to looking at an in vivo system, a living system. Would the same procedures work for a living system? So we worked with fruit fly larvae. The intention was to increase the ATP to ADP ratio in developing fruit fly larvae, so they would be more fit and therefore have a short larval development time. [answer to a question, which could not be heard]The intention was only for the reduction in larval development time; the stage from larvae to adult fly. You will see Joe, that we can reduce it by up to 25%, which is pretty significant. We had to be very careful, we are talking about a living system. You can't make the

intention such that the living system sacrifices itself. [another question which cannot be heard] Hold on a second. There is a huge amount of work done on fruit flies, and that's why. It turns out that Michael Cohen was an expert. [prof. Tiller wijst de volgende aan, de vraag is wederom niet te verstaan] No, basically the simple device that we had, it was the Total output power, it was less than a microwatt and the frequencies: one was a single oscillator, another device was three oscillators, all of them within one to ten Megahertz. [wederom een niet te verstane vraag] Well, it just turned out this was simple and it was available. The thing is, I think there are many many ways. I could take your shirt and imprint it with an intention. [de man zegt weer iets onverstaanbaars] But… you're doing exactly that right now, exactly. [de man zegt weer iets onverstaanbaars] Well, I will take someone else's shirt. The point is that this was convenient and it worked well, I had prior experience with it. But the details are less important than the overview. [De man zegt weer iets] The flies don't necessarily live longer and none of them have ever told them they were healthier, but they looked fairly fit. [de man] They seemed very happy, yes. [prof. Tiller moet lichen] They more quickly got to the place of producing more fruit flies, so I suppose that's good. Anyway, this is just to give you an idea. Let's look at this one, because details are important. So the thing is, let me just read it: "For the fruit fly experiment to synergistically influence the availability of oxygen, protons and [adenine di-phosphate] – that is a precursor – and the activity of available concentration of NAD [nicotinemide adenine dineuclide] – that's an energy catalyst – plus the activity of the available enzymes dehydrogenese and ATP synthese – which help break these things down and recombine them in the [midacondrium] – so that this production of ATP [adenine triphosphate] – which is the energy storage molecule in all of our cells – in the fruit fly larvae is significantly increased as much as possible, without harming the life function, relative to that of the control sample." So that's the point. We wanted to have a big enough effect to show statistically that it was significant, but we didn't want to go beyond that, because we didn't want to hurt the organism. [de man vraagt weer iets] Just be patient Joe.

The results

1) inanimate material (water)

This [plaatje op een sheet] is the simple set up for the water experiment. The bottle of water with the PH electrode and a thermistor, to measure temperature, all going out of the faraday cage into a meter, which then goes into a computer to continuously record and this represents the device being inside the faraday cage, going out to its power pack. Later on we'll see that we do an experiment which relates to distances between different stations, in this case in the order of 115 and 156 feet, another one D, which is 900 feet away. So, just remember that. The first thing we notice with the water, with the unimprinted device, was that, for example on the 7th of July, we gave an one hour exposure and then measured it, on the 8th, 10th 17th and the 18th. You see that these curves hop around and that they are fairly rough. If one has experience with measuring PH at short times, this is in fact the way they are; really bounces all over the place. However, with the intention imprinted device, in this case it was the 5th of August, the one hour treatment was given and here we say basically that things moved in direct steps towards the equilibrium range and they where smooth in terms of the curves. So, the underlying theme is that the intention tended to cohere things. That's the point of that view foil. [W. Tiller verlegt een blaadje en het beeld verspringt] Here is the experimental result for two cases, let's start with the bottom one, which is the ΔPH, the increase up one PH unit. And here… this isn't what we started with, this is the second experiment, that was the first one, but basically it started at 6.1, it initially comes to a kind of local equilibrium with the measurement instrument, the electrode. And then it started climbing, out of the equilibrium range, over a five day period, to exactly 1 PH unit higher. Here is a circumstance for the PH down. Two experiments done. The interesting thing about these experiments, once again, they quickly get in to the equilibrium range and come down, about a half PH unit [each?]. One experiment was, where the device was one and you measure simultaneously. The second experiment was with the jar sealed and the device was one for five days. Then take the device away and put it into its faraday cage. Then open the top of the jar and put in the measure instruments and let it go for five days. It followed the same track. Interesting. Not fully understandable, but interesting. OK, that's the water work. Now, let's move to the in vitro liver enzyme.

2) in vitro system (ALP)

The protocol in this case, was to measure four things simultaneously. That is, we would have what we call a control, we can put inside the faraday cage, we can put it inside the faraday cage with the unimprinted device for a certain time, we can put it inside the faraday cage with the imprinted device for the same time. We run all four of these simultaneously, just side by side, in a control room. The procedure is to expose, we have them in the empty case, no enzyme in it, and this is water, for two days. Then we put the enzyme solution in and hold it here for 30 minutes. Then we analyze it. We have two dilutions. With the treatment we add some water to it. – ehm, and the… forget the numbers, you can read them if you want – Basically this one is the more concentrated one, this is the more dilute one. But what we see; now, here is the reading for the control, [which just] out in the room environment. You put it in the faraday cage and so all that's happening, is that the high frequency electromagnetics can no longer get to the system. And there's something… [smore fit] by something like 15%, which is very significant and important for us, in terms of the amount of the electromagnetics in our environment and the effect upon processes in cells. Then, if we take the unimprinted device, and its putting out less than 1 microwatt in this frequency range 1 to 10 Megahertz and its inside the faraday cage so the background is pretty much gone, and it brings it all the way back. To here, with the other dilution, even down bellow. So that that small amount of electrical energy had a significant effect upon the… mmm, let's say the coherence of that enzyme. Basically then, if we go to the IIED, its outputting the same less-than-1-microwatt but it's got the imprint intention, so we go from here [prof. Tiller wijst aan in een grafiek en maakt een rondje van punt naar punt] and for this one it would bring it down, lets shift it over, OK down to here, and then the imprint intentions brought it back up. Brought it up above the other. [einde rondje] So we see the effect of the imprint intention. In this particular case you can make these various comparisons and you get all that wonderful information.

3) in vivo system (fruit fly)

Now for the fruitfly larvae, again the same kind of protocol. Four of them side by side. At 18°C and 55% humidity. You can see that we've studied about 10.000 larvae and about 7000 adults. We added some NAD or we would just use pure water. NAD is, like I sais before, a catalyst. If we just look at the NAD one, then basically again, here's the control for the ATP to ADP ratio. You put it inside the faraday cage and it's gone up about the order of 20% in terms of greater development of ATP. So it says that just the electromagnetic environment that we live in, is sufficient to degrade the production of ATP in the cells by the order of 15 to 20%, for the fruit fly larvae. Then, if we put in the unimprinted device, with its small power output. It brings it down below the control, in terms of the imprinted device, with the same kind of power output its bringing it back higher up. We see again an effect. The statistics for the last experiment again it was… p values are better than .001. The statistics are better than .001. The larval development time basically is just the inverse of this, so the shorter is the larval development time, the more fit they are. So here we go from the control, inside the faraday cage they are more fit. Then if we go to the unimprinted device they are quite a bit less fit. And with the imprinted device they are more fit, the order of the control for that particular experiment.

Conclusion: Human intention robustly effects physical reality

So, in essence then, that comes to the conclusion that I've said earlier, that we have achieved the goal we initially sat out for to do. We looked at an inanimate material, we looked at a biological in vitro material, we looked at a living biological system. And in all cases we were able to show that the devices, and all you do is just take the device and turn it on for a period of time, and you see the data goes into the direction of the imprint intention. Statistically showing it is not a random effect, the statistics are better than one part in a thousand. Now comes the wonderful serendipitous surprise. We found, and this turns out to be a really crucial part of the experiment, because it tells us what is needed to achieve those good results. We stumbled on the fact that as we continued to do these experiments measurement seem to be changing and we got the idea that the space, the very space itself, was being conditioned. We didn't quite know what the word conditioned meant. But we knew that something was happening as we continued to do the experiments. We have since found that if we just have a device set up just to condition a space, then the same sort of thing happens in about three months in the space. But what we found was that for the order of a month to two months there is not much change. Then we start seeing a change and then we got to a kind of plateau where we can take the device out at that point of time and it stays there. We have spaces that have been conditioned and remain conditioned for well over a year and are still going. So, the first thing in our minds was: "OK, how can we tell something about what this space is?" There were some signatures and I'll show you those in a minute. But the experiment we decided to do was a very simple one. The experiment was to just put a simple DC magnet first with the north pole up underneath the jar of water that we're measuring and after three of four days turn it over and measure it with the south pole up. Now it turns out that in conventional reality, the, which is called a U(1) gauge symmetry reality, in that case the magnetic force is proportional to the square of the magnetic field. So you should never see a polarity effect; it is just like -2 x -2 = +2 x +2, alright? The sign goes out. And when we do that experiment in a normal space, an unconditioned space, we get no effect whatsoever. However, when we do it in a conditioned space, here's one of the pieces of data, so here we see, this is PH up here versus time, and over the order of three or four days we see that with the south pole up, the PH just keeps increasing and with the north pole up, if anything, it decreases a bit and the stronger is the field, the bigger is the effect. This difference is in the order of half a PH unit. We've had measurements of one, one and a half PH units, etcetera. So… yes? [vraag: is the implication that there is an energy transfer from the magnet to the effect of the PH shift?] No, the implication is that the gauge symmetry of the space has changed. Something very fundamental has changed. And where is it? It's in the vacuum. And our supposition is that the vacuum, at the U(1) gauge state, the vacuum is random. So if you develop order, some measure of order in the vacuum. Then you raise the gauge symmetry. But anyway, the effect is, that, it's a profound effect, it says that the very fabric, the space, is somehow malleable to this intention. And it changes the symmetry. In this talk I'll come to what that really means to us. In terms of signatures, what do you see? You always see, if the intention is for the PH to go up, you see it go up. If the intention is for the PH to go down, it goes down. But when you get to a significant level of conditioning you start to see not only diurnal oscillations, this is temperature and this is PH, you see those large ones. But you see these small period oscillations and these are fairly big magnitude oscillations. Now what they look like, if you just amplify them. They are not just random, they are very orderly, they are lawful in any sense that you want to talk about it. The way in which we determined characteristics of lawfulness is we do a Fourier transform. So here, what you see, for one of the oscillations in that picture is here is the fundamental, the first harmonic, second harmonic , third harmonic. It's a beautiful structure, OK? So that's a very lawful wave. So that's one characteristic and it turns out that if you.. when you get to that place where the oscillations, and temperature also oscillates (we get temperature oscillations which can be 3 to 4 degrees) and the PH, and they both have the same period, also electrical conductivity has the same period, etcetera. You see all of these sort of things and if you take away the intention imprinted device they still stay there. This is the characteristic that after a year is still going on, in the space that we, one of the spaces that we created. [een vraag] It is a memory, you can speak of it as a memory, exactly. It is something... something about space remembers. Ehmm.. now, this is an experiment we did to... we had four different, well, four different sites we're doing experiments up in Minnesota. The barn in this site and these two sites where not conditioned, but this site was. We were able to trigger oscillations in the barn using an IIED and so this is the result we got with no IIED present. And in this office, that was about a 150 feet away, we see that this highly correlated result picked up at a 150 feet away. This one is 900 feet away, it is not conditioned, it does not show this high correlation. However, as we worked on this space with more and more experiments it eventually became like this space. So we had correlations over the 900 feet. So it says that just like why we had to put things in the faraday cage, it says that there is a level of the universe where there can be communication not in the normal way. Because in these experiments things where all in the faraday cages, electrically grounded faraday cages. So the insights that we gained from that then, certainly the prime directive for the specific intention was fulfilled over time. And there was a kind of intelligence, because the one device didn't do what the other device was supposed to do or what the other device was supposed to do. It acted just like a thermodynamic potential on the material. Just as if it was you're changes the pressure or changing the temperature. So something very fundamental about thermodynamics was going on here. There was an incubation period, which was the order of several months as I mentioned. There had to be some kind of ingredient that was involved in this conditioning process. And as I said, what appears to happen is that you've altered the gauge symmetry, the basic symmetry of the space. Now the place where these things are talked about is in the modeling of the big bang. I'll come to that in a minute and as I say the oscillation property is a significant indicator. Because you never get those oscillations in an unconditioned space. So here we're back to this again [legt sheet neer]. The issue is, it says then that any measurement is made of two parts: this U(1) part, or let's say A part, plus some other part which depends upon how much conditioning you have. It turns out that for the U(1) symmetry state, this part is much bigger than that, alright? So it says, but the effect of it is still there, a little bit of it, in that, we'll come to that again later. However, if it is strongly conditioned, then this part can be much bigger than that. So you can have a very different reality. I mean really different in terms of the magnitude of measurement, or the kind of measurements. Just as I say the DC magnetic field polarity is that kind of change. So what it says, to me, is that if we look now at the thermodynamic free energy, OK, the very fundamental quantity in our universe. Nature flows in such a way as to reduce the free energy. All of our live is based upon the thermodynamic potential driving forces and the kinetics of those transformations. So it appears then, with the degree of conditioning, that you can go through a variety of symmetry states. Starting from this U(1) gauge and going past this SU(2) gauge. So what it says, is, if you somehow had a device and you could connect it lets say between this SU(2) and the U(1) it could do useful work, it's a thermodynamic pump. That's what thermodynamics is all about. So you ask yourself the question, might there be some organ or function in our bodies that is at a higher gauge symmetry state, when we're born? Because if it is, then that can pump what we call live. Everything about life, it would do all the work, it would make synapses go, it would have the brain function, it would just pump the heart, etcetera. Now that's interesting speculation. It turns out the answer is yes, there is such a thing. I'm getting ahead of myself. I want to say, when I have this on, the place where, if you do a lot of reading, where you've seen this thing before, is the big bang. The big bang was supposedly an explosion that took everything up into fundamental particles and beyond that. Then, as the universe cooled, it went from a very high state of symmetry to successively lower states of symmetry, eventually getting down to the SU(2) gauge symmetry level and still going down, eventually getting to the U(1) gauge symmetry level. At that level we had continued decreases of free energy associated with... going from the plasma state, to the gas state, to the liquid state, to the solid state. And then various kinds of ordering going on in the liquids and solids. All of that was reductions of free energy in the system. So the place where you see this SU(2) gauge and the U(1) gauge is in that kind of conversation, about the big bang. So now it turns out that acupuncturist have for some time known that if you put a DC magnet at an acupuncture point, you get a different response whether it is a south pole at the point or the north pole. And if you do advanced kinesiology, the muscles, it's the [proprior receptors] in the muscles that connect to the acupuncture meridians and that's an unconscious kind of communication system. If you put up a DC magnet, you bring it up into the biofield adjacent to that muscle, if the north pole is adjacent to the muscle, the muscle will weaken. If the south pole is adjacent to that muscle, the muscle will strengthen. You've got a DC polarity effect. It can't be U(1) gauge, it has to be a higher gauge symmetry, just like our experiments. So it says, to me, that, that system, the acupuncture meridian system and the chakra system connected with it, that that in fact, in the new born embryo, the development of that, is what starts the pump. And with the child born, that is the pump, that pumps chi, or qi, whichever terms you want to use. And so on the one hand it's the chi pump for the meridian system, it's the prana pump for the chakra system. That is what connects us on the one side to the higher dimensions and on the other side to the coarse physical level of our bio body suits. We know when a group of humans get together, committed, devoted, they meditate together, they pray together,then they create a field. We've all had the experience, we all sensed it, sometimes we haven't wanted to leave the group. But it raises the symmetry level from what's coming… they're pumping chi and prana. Now, if they leave the room, it's there, but it starts to decay. It's what we would call meta-stable. They come the next day, before it is fully decayed, and they do the same thing and it pumps up a little higher. They do it the next day, a little higher, the next day a little higher, next week, next month, the next year… that how we've, that's how people have created sacred spaces on our globe. We've all had the experiences of walking in to those spaces. [vraag: that energy is transferable to, isn't it?] That energy is definitely transferable. Chi Gong masters can transfer it over a thousand miles, they can influence specific experiments over a thousand miles. So the potential is there to do amazing things and we all have it. The second example I would give you, is the kind of thing that well meaning, compassionate, loving people who do work in their own office in essence, and they do it every day, they in fact have raised the gauge symmetry. They don't realize it. We can go in with experimental equipment and we can see that the symmetry is raised by just measuring the PH. [vraag] It makes a real doctor. The third example that I want to give you is the inventor that worked in his garage for several years. Let's say he's building a free energy device. One of those crazy things, OK, trying to get greater than one efficiency, greater than a 100% efficiency. And he works on it, dedicatedly for years. And he is successful. So he calls his friends in and he demonstrates it to his friends and they're excited. They are so excited , they say: "oh gosh, let's start a business. Ow, but before we do that, we have to have it independently tested by someone else in some other town." He didn't know that he had unintentionally with his intention partially conditioned that space, so the machinery, everything, was part, it was saturated with whatever this stuff is. But it goes to another space in another town, that is an unconditioned space. All he's going to get is U(1) gauge physics and that what the guy finds. It happens all the time. We haven't recognized the importance of condition the space and then do the experiments. Now, so what I'm saying, is that in every act of your life it's like this. Whether you are a spouse communicating with a spouse, or a parent with a child, one human to another human, a performer to an audience or a practitioner in an office to a client, your system allows you to radiate the chi and the prana so that you pump the space, you can change the local gauge symmetry of the space and thus make significant effects here. The thing you have to recognize it isn't just here here interaction [prof. W. Tiller wijst 2 dingen aan], it's also the unseen universe deciding whether to help you or not. And in our case, I don't believe we could have condition imprinted those devices, got them… see, because those devices had to be in a SU(2) gauge level and I don't think we did it all by ourselves, we four meditators. Then if you have a device, we find, for example if we take a computer out of our system that's been conditioned and given these beautiful oscillations, the oscillations diminish or disappear for maybe a day. Then they come back. Because this device gets saturated with whatever this stuff is and that's part of this oscillation. So always, all of these things are there, in pretty much everything that you do. [vraag & knip?] The point is that every measurement has two parts , OK, the one part is there, for this, this is a random vacuum state, with the U(1) gauge, and it turns out that's why the coupling substance, the amount that's available in that interaction is very small. OK? It comes from the human qualities. They're there, but you have to do good statistics to be able to show them, alright? All the para-psychological work is that kind of thing. There are superstars in that area as well, just as a Michael Jordan or Tiger Woods in the physical domain, but in general, for most humans, the effect size is small. We're all potential avatars to do all these things that we used to call miracles. [vraag] Exactly, we all carry it. It's a question… in terms of one's acupuncture meridian system and the coupling substance, what level were we born with and what level do we develop through the practices of our live. I mean, Chi Gong masters can do pretty amazing things. So the point is, a lot of it is inner self management and practice. It is like another muscle, OK? So, wonderful, complex, it's really the spirit that is doing it. The mind is the first place for the imprint of intention from the level of spirit to manifest. [Knip; Vraag: you consider the soul and the spirit to be different?] They are very different, yes. I think of the… the soul to me is the spirit, plus the mind, plus the emotion domain. The only thing that is born and is died are the two outer layers of the biobody suit, which I will talk about in a minute. Which is the direct space part and the reciprocal space part; the electric part and the magnetic, the electric monopole part and the magnetic monopole part.

Consequences, for humanity/philosophy

So anyway, in terms of the implications for humanity. The first is that we do matter. We really do matter. All of this stuff is just for us. It's a great big teaching machine for us. So personal, sustained, specific, intention influences substances in specific ways. And it influences people, and it influences events around us. Another one is, from our experiments, space is malleable. That is the symmetry. It is possibly for humans, individually or collectively, to raise the physics gauge symmetry of space. This leads to an altered reality, it can be quite different then the reality that we all cognitively perceive in an U(1) gauge state. That altered reality can be meta stable, if it hasn't gone far enough, or it can become stable, if we can kick it up high enough. We have nucleate a new phase, we have to nucleate elements of order in order for it to become stable. That means we have to surmount a particular energy threshold.

Consequences, for general science

So the effects for general science; generally our present science is all U(1) gauge. Human consciousness only has a small effect at that level. However, if we first condition the space to the higher symmetry state, that is approaching this SU(2) gauge state, then the effect size can be very large. Then the effects that come from our intention can be very significant. I'm just almost finished with this part Joe, and then we'll have general questions. Because of this, it really is time to change the physics paradigm. We see where the present paradigm is and we see where it has to go, OK? It doesn't hurt [present] physics, it just says: "hey, expand the paradigm to allow for humans changing the gauge symmetry". It will lead you to some vast new territories for research, investigation. [knip] Just a short list of things; let me give you an example, in this case, for chemical or pharmaceutical industries: [some examples of (stunning) practical toepasingen 52:01 – 54:30]

PART 2

How do we have to shift our frame of reference for viewing the universe

The thing that is important is, there is a lot of work out there. A lot of wonderful people have been working on things that science could not except, there weren't the bridges, there wasn't a framework. What I have been trying to do is to provide a framework. It doesn't mean that all the details of all the things out there are correct, but a lot of it is correct. The question is, how it is interpreted. How it is discussed. How it is described. One have to have a framework. It is like a picture, OK? You can put things in relationship to other things in the picture, but if there is a big part of the picture missing then it is very hard for most of humanity to connect the dots for some of this new technologies that you're talking about; that's the dilemma. In the last 50 years, the electromagnetic intensity of our environment has gone up at least 50 million times. So that is a big number. [opmerking: not necessarily beneficial] Not necessarily all beneficial, yes. So, what this says, is that for fruit flies you can do that simple experiment and you see that just putting it in a faraday cage and screening out part of the environmental frequencies, certainly it doesn't screen out the very low frequencies and it doesn't screen out the optical frequencies because we didn't wrap things in aluminum foil to do that, but it says just screening out that intermediate part the effect for the fruit flies was the order of 15 to 20%. [vraag: can you speak about the role of intention in healing. Why healing works sometimes and other times it doesn't ?] Ehmm.. the… [denkt na]… In the picture that I gave with the unseen universe, up there in a box, that's part of it. The other part is we humans, we go through cycles. OK, we intend something to happen and maybe a little later we think "o, how foolish of me. I can't possibly do that." So, the first time you write it. The second time you un-write it. You erase it. So the reason I didn't use humans in these experiments was because time average there intention is not very strong. Because they erase a lot, it fluctuates and it erases. There are a whole varieties of things that go into that sort of thing. So if you put it into a devise it is easier. Because a device doesn't have those cycles, per se; it has different kinds of cycles. But somewhere in that category is why. A lot of people think they intending something, but they're not really burning on it. Or they're not as deeply committed, not as deeply devoted, etcetera. Human intention probably comes the closest to, and probably in that it's an act of creation and therefore it is in the band of love. And we know practically nothing about love. But it begets consciousness, OK? And then consciousness in turn converts to energies and energies connect with mass. So let me move forward. Basically the frame of reference for quantum mechanics is our familiar four-space of distance-time (x,y,z,t). That is OK so long as there are no mathematical singularities in the domain. However, quantum mechanics has lots of singularities and relativity theory has a very big one at the velocity of light. So, when there are singularities then any mathematical function requires that you use something that you call a Lorentz expansion rather than a Taylors expansion. These where man who worked this out century ago. What this says is that when you work with a Lorentz expansion, you can put it in the form that I would call a bi-conformal base space and it consists of two four dimensional sub-spaces. One of these is this distance-time and the other one is its reciprocal; one over distance and one over time. So one over distance is a number over unit distance, that is a frequency; it's a spatial frequency. One over time is number over unit time, that's a temporal frequency. So in essence, then, I call this direct space, or D-space, with this symbol (x,y,z,t) and the other is reciprocal space, or R-space, and it's really this symbol system (k_x, k_y, k_z, k_t). So that a biconformal base space then is that when you have mathematical singularities which you have to use. So it is these two subspaces. When there are no mathematical singularities, then this part becomes zero [wijst naar het k-systeem] and it is just that [wijst naar (x,y,x,t)]. So it is always better to work from this. The point is this [wijst naar (x,y,x,t)] is where particles are, this is where waves are [wijst naar het k-systeem]. So here we have the dual aspects of particle and wave, which is key for quantum mechanics. This part [(x,y,z,t)] is local, that part [k-system] is non-local; that's also a part of quantum mechanics. So [and/in] this R-space, I'm saying is [that/at] the coarsest level of the vacuum. Now, we all think that we see waves; water waves and so on. But those waves are only modulations of particle density; that is, particle concentrations. If you have light flowing and such and it is modulated, you see intensity go up and down, that in fact is just a modulation of the flux of photons. So if you think about it, and I invite you to try and think about it, try to think about any of your experiences in this cognitive realm, that is other than a modulation of particle concentration or particle flux. I think you will find that you cannot find one. The pictures of waves in text books are continuum pictures; electromagnetism and so on. Those are in the vacuum. Now it turns out, that for this particular kind of dual subspaces, mathematics requires [underline] that any substance quality in this space, in D-space, has an equilibrium conjugate quality in this space, which is given by the mathematical Fourier transform. It is a mathematical relationship connecting these two qualities and it goes, if you know the information pattern of this level, you can calculate the equilibrium value of this level. So that's a real step forward. It says that when we have this bi-conformal base space we can know something about this space, even though we cannot cognitively access it at our present level of development. So, it says then, that any measurement has two parts: one which comes from D-space and one which comes from R-space. And as I said, under the U(1) gauge condition, this part is very small and you have to use statistical measurements to even begin to discriminate it. But if you have a conditioned space, this part is large, easy to discriminate and it makes a different reality. So, when we talk about the physical world in the future, we need to talk about two layers; the coarse layer and the fine layer, OK? Both aspects are very important to us. Let's talk about the Broglie.

Quantummechanics; de Broglie's particle pilot wave concept, what does it tell us?

The Broglies particle Pilot wave concept was a very important one for quantum mechanics, it is one of the corner stones. What it looks like, it looks like this [hij laat plaatje zien van golf pakket] You have reciprocal space waves coming in as this particle is moving along and it has an envelope around it, the envelope is called the de Broglie pilot wave, and the waves that come into it come from reciprocal space and there are waves that move out of it as it goes along. When you do calculations of the quantum mechanical relativistic kind, then, what you find is that the product of the two velocities, this reciprocal-space wave and times the velocity of the particle is c^2, the velocity of light squared. Now from relativity theory we know that the velocity of the particle is always less than *c*. So it says that v_w must always be greater than the velocity of *c,* alright? People where concerned about that, because of relativity and such, so they said: "oh, that's not a problem. We just call it an information wave." So it's an information wave and as it doesn't have mass, you don't need to worry about it, OK? Now, I want to make my first postulate:

1) Suppose that the particles that "write" these information waves are the magnetic monopoles, moving at velocities much larger than the velocity of light.

These R-spaces waves then, act as polarization traces in the vacuum. Then it's a group of these which form this pilot wave around the particle. It turns out that one of the characteristics of this pilot wave, part of it, is like a vortex. You're asking about a vortex, in three dimensions this first part is really this way and that part that way and the point is that those compared give an aspect like spin which would make the particle appear to be spinning, if that's the only thing you're focusing on. So that would be where spin comes from, that's where magnetic dipole aspects come from; as an image. So, now we have conventional electromagnetism and in this U(1) gauge state we have electric monopole stuff and we have magnetic dipoles, which I say are magnetic dipole images. But there is an interaction between them, giving rise to the Maxwell equations, OK? That's real, we have all kinds of technology based upon it, but if in fact, then these dipole images are related to the magnetic monopoles in the vacuum moving much faster than the velocity of light, then you have a potential problem with relativity theory. Now I make the second postulate (the second postulate is that, in order to get around that problem)

2) Let's suppose that there exists a higher dimensional substance, so it is not constrained by present relativity theory so it can travel at both v<c to interact with D-space substance (physical matter, particulate matter) and at v>c to interact with R-space substance (magnetic monopole substance). It could exchange energy within its own envelope. I call this coupling substance "deltrons" from the domain of emotions. (9-dimensional)

So we're now introducing a higher dimensional substance, 9 dimensional; these two subspaces, one is four and the other is four. So it's a special system, this bi-conformal base space is an eight dimensional space. It's a special parameterization, within that general group of eight dimensional things. So now, what this leads to are a number of things. I go back to that. So in essence what I am saying is that we have been looking at energy versus velocity. We have the normal physical branch, going up to infinity at the velocity of light and we have a kind of reciprocal mirror of this magnetic monopole branch with negative energy states with velocities greater than the velocity of light. Now this superluminal branch here at positive energies, they are imaginary particles called tachyons. We haven't labeled these yet. Let's see, where am I. That was there. And so, what is says, from this mirror, it's a kind of reciprocal mirror, there's a lot of things which can be said about it, but I don't have time. So here in the D-space part we have electric monopoles through the mirror we have electric dipole images. Here we have magnetic monopoles in R-space giving magnetic dipole images. This leads to Maxwell's equations, in this case conventional electrodynamics, quantum mechanics, U(1) gauge physics. In this case, this is a higher dimensional aspect, so that there is another equation set for magnetoelectrism, because it is driven by magnetic monopoles, the mathematics is called [non-ebalian] so it gets very complex. So we have new magnetoelectric phenomena and I think this is where qi or chi comes in and it is really part of the energy structure of this domain, of reciprocal space. So in that family are all these things that Rick talked about and people who talk about prana and such and with all these words. Here is just another aspect of the mirror principle and it is that… so we've got electric monopoles, magnetic monopoles. This one's were allopathic medicine is involved and this is where homeopathic medicine is involved. This is positive mass, that is negative mass. Velocities less than light, velocities greater than light. Positive energy states, negative energy states. Come down here to gravitation, levitation. Etcetera. So that the characteristics of these two things, depending upon which is dominate, you can have both. So it says that where U(1) gauge state is, then clearly gravitation is very dominant. But if you really get to high levels of symmetry in the reciprocal space aspect, then I would suggest that levitation is dominant. So if we think and work towards this technologies of these sorts of things in the future then we're going to, I think, discover a lot about these sort of things. O, the other thing, the last thing I wanted to mention in passing, because I haven't given you any mathematics, but it turns out that this deltron is really important because that's the coupler between the two substances. That's the thing that grows with conditioning, all right? That's the thing that intention acts on. So you can begin to see that it becomes to bridge to the higher dimensional realm. It turns out, that empowers the Fourier transform. It makes the magnitude much larger and it also makes it much more complex, so I'm having struggles with it. But it's a very important part of this picture. It says that emotion is very important in manifesting physical reality; you give things a lot of "oomph". People that don't give things "oomph" don't make much of an imprint, OK? Joe, you give it lots of "oomph"

Quantummechanics; Diracs work on the origin of the electron, what does it tell us? OK, let's go to the next concept… [Joe zegt wat, wat heen en weer gepraat en gelach] All right, we'll talk about Dirac for a minute. Dirac was a great theorist of the 20th. He asked himself the question: "where does the electron come from?" He thought long and hard and he came up with a resolution. His resolution was something that relates to this picture. He says: "suppose the vacuum is a sea of negative energy states that are all filled. Then, if a photon of sufficient energy comes along and is absorbed in the vacuum at some place, it can pop an electron, OK, cross this band gap to some higher energy state and leave behind a hole in the vacuum. [opmerking] Eh.. don don, what we think of is nowhere, but it is not nowhere Boyd, it is really somewhere. So the point is, if it's a hole in a negative energy state, [right], negative energy structure, than it's minus a negative energy, which is a positive energy. Which means that it is a positive energy, we can only measure positive energies. In terms of the charge, it is minus an electron charge, which is negative, so it's a positive charge. This was the first piece of antimatter, which became the positron. We have found, for every particle in physics, the anti-particle and they're all this way. They all come out of the vacuum, perse, so the vacuum, the thing that's important is the stuff that was there that interacted with this photon. Now, there are several things that are important about this, that people tend not to think about enough. One is that the energy level of this ground state energy, here, of let's say of the electron, is due to its interaction with this stuff. Which means that if, and I made this proposal about ten years ago, suppose human consciousness could interact with the stuff in the vacuum and somehow shift its coherence a little bit. If we co do that, it means that this energy level, the ground state energy level could change in magnitude. If you can do it for one particle, you can do it for all the particles, which means you can influence chemical reaction; in terms of their rates of change and going right versus left. You can do it for nuclear reactions. For quantum mechanics, for present quantum mechanics, and relativity to be internally self consistent, and that's what physics tries to do – become internally self consistent – in order for that to happen, the prediction is, that this stuff, this vacuum, has to contain a latent energy density of 10^{94} grams equivalent per cc. Where each gram is related to energy by $E=Mc^2$. Now, that is a very big number, but what does it mean? What it means is that if you take the volume of a single hydrogen atom, a hydrogen atom is one ten billionth of a centimeter across, you take that volume, you multiply it by 10^{94} and if you can say that the universe is essentially flat, that means you can neglect that gravitational constant, then what that says is that within the volume of that single hydrogen atom is a trillion times more energy than all of the energy in all of the mass in all of the planets and all of the stars out to 20 billion light years, so on the one side you have the volume of the hydrogen atom multiplied by 10^{94} and on the other side you have this sphere of 20 billion light years radius and you multiply it by the average matter density that comes out of texts on astronomy; and the one side is bigger than the other by the factor of a trillion. So the point is that number approximation requires that it be a flat universe, as I [say it]. But it is a huge consideration. It says: "there is stuff there, OK, that stuff is huge, it is immense". So here's my third postulate, which I say then

3 suppose the human conscious, from the mind level of nature, which is 10 dimensional in my modeling, can interact with the "stuff" in the physical vacuum to change its degree of coherence.

So that's what I said a little while ago. So now, it turns out, then, we know from our experiments that we've done with the intention imprinted devices, to have the effects we've had, we got to be able to change the equilibrium constants of the water [dissociation] reaction or the CO_2 [solubility] reaction or both. OK, those things are required, so here… this is the way they can happen by changing this ground state level by consciousness. I now come to the fourth postulate:

4 suppose we're all spirits, OK and in my model that is 11 dimensions or above, and we're having a physical experience as we ride the "river of life" together. We interact with physical reality by our intentions.

A model for a view of the universe that would allow human qualities of mind, consciousness, intention, emotion and spirit to be formally introduced to a mathematical structure – an expansion of quantummechanics.

Let me give you the bio-body suit model, very briefly, to see what this means. We're all this, let's suppose and that our spiritual parents put us in this [play pin], called the universe, in order to grow in coherence, in order to develop our gifts of intentionality and in order to become what we're intended to become, which is co creators with our spiritual parents. Now, these bio-body suits made for us come in a wide variety of colors, two basic forms that we choose to call genders and they have four main layers. The outer most layer is the electric monopole substance layer. The first inner layer is the magnetic monopole substance layer. The second inner layer is the emotion domain substance layer and the third inner layer is the mind domain substance layer. So it's kind of like a [diving bell] well designed to respond to this queer earth environment we're in. To have motility, mobility and in that bio-body suit is a portion of our spirit self. Not all of it, just a portion. The amount that can be there depends upon what kind of infrastructure is build in all of these layers. We generally build infrastructure in these layers by living, by doing things. The more infrastructure that is there, the more of our spirit self can come into this vehicle and the more conscious we become. Consciousness to me is a [concommitment] or a byproduct of spirit entering dense matter. So that, as we build more infrastructure, more and more spirit enters, we become more conscious. We see more opportunities, we see a larger perspective. We understand ourselves and others better. We begin to see that others are just part of ourselves. We begin to see that as we built others, we just built ourselves, OK? So it's a bootstrap process of becoming. [vraag: doctor, what do you mean by built more infrastructure?] Ehm… when you go to the gym to work out, you're building [finer tune] muscles. When you learn to dance, dancing, you learn rhythms and movements and patterns. There are infrastructures build in your body to do that automatically, that's what I mean. And I mean that at the outermost level, first inner level, second inner level, third inner level, lateral relationships, [very much] relationships, in the emotion domain level learning about those things. Going to school, in the mind domain level you built structures. So that's what I mean. Looked at another way. This is a picture of the bio-body suit, as I would see it then. Here are these two subspaces, the fourspaces, the whole thing being the eight dimensional bi-conformal base space, inside of the emotion domain, inside of the mind domain. All of this I think of is a construct that is like a big teaching machine, teaching this to grow and become an effective co creator. So our body functions, we have this path through the outer layer of the bio-body suit to magnetic vector potential which connects to these higher dimensional domains of emotion, mind and spirit. Or we go through the reciprocal space level and the magnetic layer of the bio-body suit again to magnetic vector potential and then again the connection. So all allopathic and homeopathy are part of the larger whole. If we look at it in terms of the energy kinds of construct, and it relates to the gentlemen in the yellow shirt in the back, that basically here is the spirit domain and an energy structure then, we have this positive energy state, a forbidden gap. Here is the reciprocal space, the magnetic monopole substance level. I'm presuming that there are two more levels down here in this negative domain. But that's an arbitrary zero. A we evolve a little further, we just bring it down here, you see. But it is useful. It has been useful, because all we've been paying attention to is this. Classical mechanics is all of this stuff, quantum mechanics is this stuff and the stuff we're moving towards is all of this stuff. So how do intentions, or, how do I think intentions work? In the modeling then, the intention is an act of creation from the level of spirit and you're doing this all the time, in order for you to even move around in this room. It basically imprints on the mind domain of the universe and that is a consciousness, becomes a consciousness imprint. This is a domain, I won't go into it, but in the books I talk about an ordered nodal network structure, which diffracts these consciousness waves, to make an imprint on this reciprocal space level but also activates emotions and in particular deltrons, to increase the deltron activation. This acts something like a toner in a [zerox] machine. This imprint with that toner puts an imprint on the outer layer of the bio-body suit and we've got all kind of structures then, which lead that towards materialization of our intention in physical reality. So, that is the picture of how I see it. In essence we are intending. All the time. All the things that we are doing. There are conscious intentions and some unconscious intentions as well, so this kind of process, not yet proven, but it is consistent with the kind of experiments that we have done; that is, intention, however the final modeling works out, we know that intention causes these… works its way all the way down to the physical chemistry at this level to produce changes. Whether it is an inanimate system, whether it is a biological material or whether it is a living system. That's, let me see how we are doing here, I think that's got to be it for the talk and let's see if we can have a few questions here, if you like. Master Rick? Yes [vraag: I was wondering if you could comment about the role of, in terms of sacred space and the way that ritual works in the various religious has been a way of focusing intention to condition space that way?] Well, I think, you see, ritual is important, so long as it is not just form. So long as one truly gets into the evoked pattern. To get into the ritual and really mean it. Then you are broadcasting prana and chi. I think that's crucial, and … [it's the spirit of the ritual, not so much the form, and the…] Right, it truly is the spirit of the ritual. If the form helps you in terms of, to get to it. Then that's great. But if you don't get to the spirit of the ritual and don't really entrain with the spirit of the ritual, then you don't, you don't pump the system much. Yeah [vraag: can you speak a bit about the sacred geometry of the octahedron working with that with intention and the merkaba and how that interfases with your bi-conformal base space?] Well, I can tell you, let's see, I brought some stuff… what am I going to show you? I think, I won't do the octahedron perse, but let me… in the first book I deal with this a lot, and in the second book even more. For example, if I look at structures, in this case let's just say a slit, or a solid, and then two, and then a square slit, circular slit, triangular slit, star of David slit. The Fourier transform, which is the reciprocal space part, its modulus is the amplitude of that. For the single one what you see a series of wave oscillations which look like this, this is normalized and it should turn it this way, because they are… goes up and down, going this way. The longer this becomes, then the narrower become these undulations. That's the mirror principle operation, the bigger are in direct space, the smaller they are in reciprocal space. Now when you put two of them together, then what you see, is that this pattern for this one interferes with the pattern for that one, OK? In space. So that's the interference now of two objects. You only see that in reciprocal space. Here they look to be separate. We look to be separate in direct space, because our neural system is based on contrast, which is differences. In reciprocal space it's the mirror principle; we're all connected, we are all entangled with each other, we are all interference effects with each other, OK? Now let me come down through this, they're all patterns or similar, but this one, the triangle… Here you see the amplitudes go down to zero, as you go to higher and higher frequencies. Not so with the triangle, same thing with the tetrahedron, OK? You see wonderful things, but now when you see the interference, the interference comes from two parallel sides. [Now it takes the time to zero] So all of these geometrical effects, you can calculate these things for any geometry, I have not calculated it for the dodecahedron or various kinds of things, I've calculated it for these simple ones and they're straight forward to do, as long as you've got a big enough computer and storage, you can do it. Thank you. It was a pleasure.
