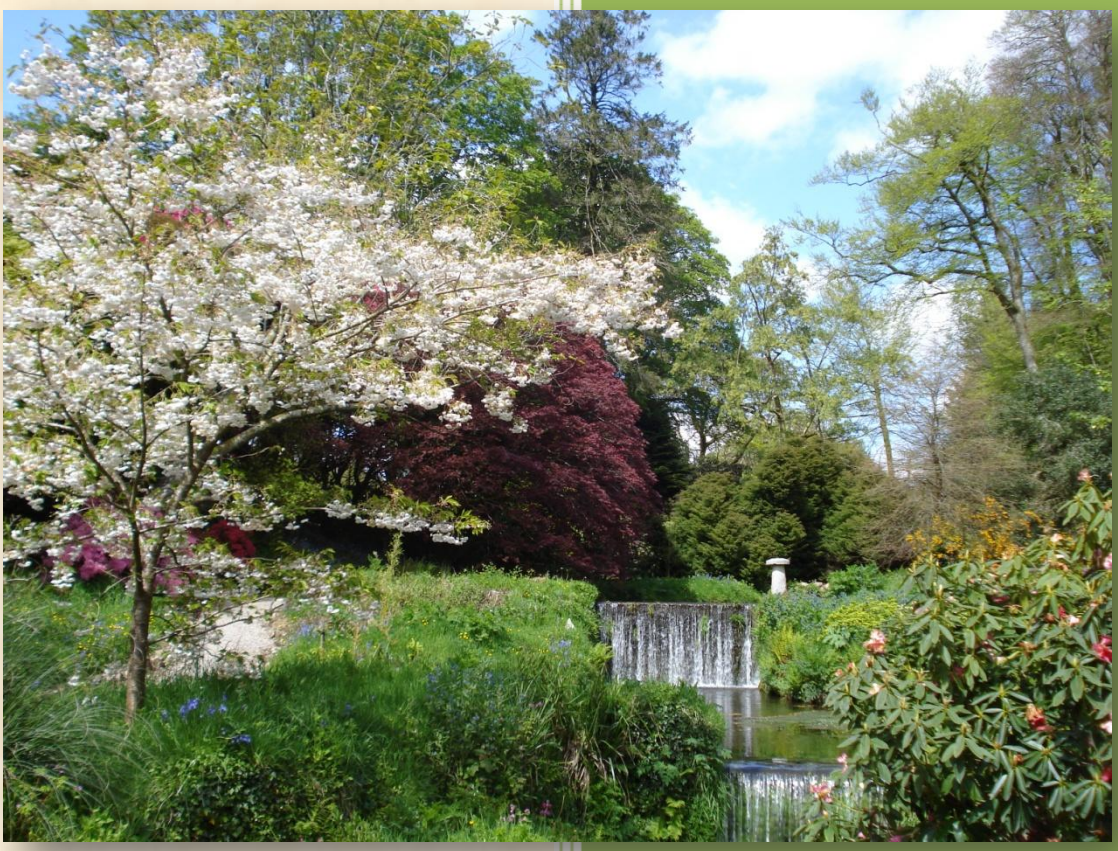
Anthroposophy & Waldorf: Science or Pseudoscience



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Waldorf: Science or Pseudoscience? – Scientific Research Methods in Waldorf Education

Preview

Critics of Waldorf Education assert that its foundation, anthroposophy, is not a science but a pseudo-science. In doing so, they implicitly assume a uniform view of modern science defined by a narrow form of empiricism. However, a deeper analysis of science and its philosophies reveal a much more complex map of what constitutes modern science. As a consequence of this complex map, Waldorf Education and Anthroposophy can be regarded as having science at their core, including scientific methods which range from the outer empirical of the natural sciences to the inner empirical of the spiritual sciences. As such, another of the critics' arguments fails along with their racism assertion (Leist, Ravagli & Bader 2002; Rose 2013 & 2016; Selg, Kaliks, Wittich & Häfner 2021; Selg 2022).

Introduction

One of the challenges currently facing Waldorf Education is the assertion that its underlying philosophy (anthroposophy) is unscientific. It is, as the claims go, an ideological world view that runs counter to science (Ullrich 2015). Without a scientific basis, some think, Waldorf education leads inevitably to indoctrination, we have an "education towards anthroposophy" (Prange 1985). The implication being that Waldorf education coerces young people toward anthroposophy, even that they are channelled to becoming anthroposophists. The difficulty for such critics is, however, that there is no unanimous agreement amongst scientists, educationalists and philosophers as to what constitutes science beyond the two elementary concepts of rationality and evidence. In reality there is a diversity of understandings and practices of science and consequently the implications for interpreting issues concerned with pseudo-science and indoctrination in education. Not only that, but also the relationship between rationality and evidence is much debated as well as whether or not either one or the other, or indeed both, are the only defining features of science. This diversity of understandings also has an impact on the conceptions of education research and thereby the role of anthroposophy in Waldorf Education. *Consequently, I will be advancing the thesis that, rather than "anthroposophy is Waldorf's world-view problem", "anthroposophy is Waldorf's solution"; at the very least it opens up avenues to solutions. In the process of doing this, that, by implication, it is the critics' world-views that are Waldorf's problem*.

One of the other difficulties about the critics of Anthroposophy and Waldorf Education is their focus on the unusual and specific *propositions* of Anthroposophy rather than its fundamental *scientific methods*. This usually takes on the form of making criticisms, and often ridiculing, of specialised propositions found in subjects such as homeopathy, or biological claims such as "the heart is not a pump", or claims of the existence of gnomes, angels, etc. Other examples include: "The evolutionary notion that animals are the by-products of human development, that the spirit of man physically incarnated into soul qualities that manifested themselves into various animal forms, is highly suspect as a valid scientific theory. So is the geological position that earth evolved through Lemurian and Atlantean epochs and is now in its fifth post-Atlantean epoch. Or the theory that the four kingdoms of nature are mineral, plant, animal and man" (Jelinek 2006, p. 9).

The problem is that such criticisms usually show a double ignorance: of Steiner's spectrum of scientific *methods*, as distinct from his specialised *propositions*; and of the nature of modern science itself. After all, it is arguable that what makes something science is the method and not its specific propositions. In fact, a predominant concept of modern science is that its propositions, in the form of hypotheses and theories, are falsifiable through the scientific method (Popper 1963). If so, any of Steiner's specific *propositions* could indeed be wrong, but that does not invalidate the *methodologies* of anthroposophy, just as it doesn't in natural science. This text explores then the connection of scientific method and its outreach in education research in the context of Rudolf Steiner's educational philosophy. Consequently, in the following I will make the fundamental distinctions between, *inter alia*:

- Scientific *method*.
- Scientific *propositions*.

Another aspect of this concerns one of the main criticisms of Waldorf education and the anthroposophical movement: that they are entirely dependent on the research of Rudolf Steiner and lack independent empirical evidence (Schieren 2015, p. 139; Jelinek 2006). Due to this, the Waldorf Schools movement, amongst the other initiatives derived from anthroposophy, is considered to be an activity deprived of independent rationality or evidence, i.e. it is a cult where adherents slavishly follow what the guru has said. Such a view is based on two assumptions: firstly, that Steiner was the only one capable of doing the research he recommended and that secondly this research is of only one kind: of a supposedly

"spiritual" nature without reference to natural scientific methodology. The assumption of the critic's here is that the word "spiritual" refers to some mystical form of clairvoyance rather than what it actually is. Moreover, the critics assume that anthroposophy does not include empirical methods that are convergent with those of natural science. The conclusions the critics come to from this is that anthroposophy, as the foundation of Steiner education, is not a science, it is a pseudo-science. If this were true, it would be pretty damning for Waldorf education and any activity which derives from anthroposophy. Contrary to this, I will make the case that anthroposophy, including its spiritual component, is *an extensive set of scientific methodologies across the natural to the spiritual that have a ground in reason and evidence.*

The problem with the critics' views, as I will show, is that a more careful investigation of Steiner's works reveals a far more diverse view of scientific research than they allow for. They seem to think that the only form of "research" that he spoke of was "spiritual" (whatever *they* understand by that). This becomes even more evident when considered in the light of contemporary research methodologies. The consequence of what I will argue here, however, is that anthroposophy has many types of research methods, traversing the natural and spiritual, including a more precise understanding of the spiritual which is open to anyone. In light of this, it may be asserted that many, if not thousands, of Waldorf practitioners around the World can be said to have done, and are doing, scientific research in accordance with the research methodologies recommended by Steiner and thus it is justified to claim that *anthroposophy and the Waldorf movement as a whole is a scientific research community.* This includes the possibility that some of its propositions may indeed be false.

The main key to understanding this spectrum of research methodologies is Steiner's earlier philosophical and scientific works and their relationship to his later anthroposophical and educational texts. An awareness of current trends in the philosophy of science is also important as well as of modern education research if parallels are to be drawn between them. Part of the aim of this text then is to locate Steiner within the spectrum of contemporary research methods.

One aspect is that the critics' understanding of modern scientific and education research is completely out of date. There are many approaches to education research not all parts of which are compatible, especially a one-sided interpretation of positivism, with understanding what Waldorf Education is and what it is about. What I will show is that a new kind of *"mixed methods"* (Cohen 2011) approach, advocated by many contemporary education researchers, is a better way to investigate Waldorf Education, but that this will need to include Steiner's own

views on research. What I will show is that neither *positivism* (including behaviourism), *in their extreme forms*, nor reductive physicalism, as an *exclusive* "metaphysical" theory, can do justice to education research generally nor can they help understand Waldorf Education if they are regarded as the only means to do research. *Interpretivism* shows some promise, but it only captures some elements of a future openminded research programme.

Why Science cannot be fixed: making way for life, soul and spirit

One of the hindrances to understanding Waldorf Education and anthroposophy is the hidden assumption that science has a fixed definition and is not in a state of evolution. Such a conviction is devoid of any understanding of the historical transformations of science as well as of a potential to grow beyond its current boundaries in terms of the types of things it includes in its remit and the kinds of activities it pursues. This of course refers to the two basic ways in which science has attempted to understand itself. The first is through its ontology (what kinds of things exist in the World); the second is through methodology (how it proceeds in order to find out). I shall return to the latter of these later.

One of the implicit assumptions of the critics of anthroposophy is that of the correctness of scientific materialism. The existence of life, soul and spiritual realities is thereby doubted and sometimes ridiculed. The problem for such critics, however, is that scientific materialism is dead. Today the predominant scientific ontology is called "physicalism" which asserts that the reality which underlies all other existence is the physical, i.e. as it is defined by physics. This is currently called the "Ultimate Physicalist Ontology" (Kim 1992). Physicalism has superseded materialism partly because it contains a better understanding of what science needs in terms of explanations and a greater scope of concepts. Classical materialism was defined in terms of motion, extension and mass. Clearly, modern physics includes many more fundamental concepts than these due to its ongoing discoveries. It is fair to say that no scientist is a materialist today, but most are physicalists. Physicalism is a particular form of realism and is the dominant paradigm in the current scientific world view (Papineau 2001). Moreover, physicalism does not exclude the possibility of the emergence of non-physical phenomena, such as life, mind and consciousness. It simply asserts that they are not *fundamental*. That is, such emergent phenomena are ultimately reducible, explicable, and have their causation in, "ultimate physical entities and processes". Hence originates the expression: "*Ultimate* Physicalist Ontology".

The problem with physicalism is that it faces an unsolvable problem. In contrast to this view, I will propose a competing fundamental concept derived from Goethe and Steiner, namely that of Being (Steiner 1978, p. 7). Being is not a set concept, it is an open concept which evaluates new discoveries and practices as science evolves through history; it is not determined by the current state of science. The idea of Being avoids the presuppositions of physicalism and postulates that science is about what exists, whatever this turns out to be. This also includes Becoming as the transformation between modes of Being. It therefore circumvents the problems of the two versions of physicalism, namely *Currentism* and *Futurism*. The two problems associated with these are often referred to as Hempel's Dilemma (Crook & Gillet 2001, p. 331). There are two aspects to this. *Currentism* is the view that the "physical" should be defined in terms of the current principles of physics. *Futurism* is the notion that 'the physical' should also be defined in terms of the future principles of physics as they are discovered.

The main problem with Currentism is that it excludes future new physical principles. For example, had Newtonian physics been seen as the *definitive* principles of the physical, then photons would have been excluded from such a definition as they do not possess mass. Similarly, quantum theory and relativity theory would have been excluded and anything else that was not already a part of Newtonian physics. The concept of Currentism prevents any historical change and future discoveries that science may make if they are not a part of the *existent* physicalist framework.

With Futurism as a part of the reductive physicalist project the problem is different. Futurism allows for new discoveries to become part of the definition of the physical, but there is no principal reason why *anything* could not be part of the definition. Thus Futurism is so indefinite that the physical could mean anything. The physical under this conception cannot be any one specific principle and would essentially open ended. For Futurism all the sciences from physics through biology to the social would have to be defined as being about the physical. The problem then is that what we now call physics would have to be re-defined as something else with more specific principles of explanation in order to give it a subject specific definition. This is not a desirable thing for science as one would then have to find differentiating concepts for the various types of physical. So, as physicalism aims for reductionist explanations, little would be achieved as no reduction to the physical could be spoken of and one would be back to the same problem but with different names. If however,

Futurism is defined by the concept of Being, then the problem of reduction goes away and science becomes about finding new and distinct ideas about reality.

The consequences of this dilemma, is that physicalism has no grounds. If physicalism believes that new phenomena are explicable ultimately by the physical, but if the physical cannot be specified, which it cannot by Currentism or Futurism, then it cannot even hope to explain anything. Physicalism as the "Ultimate Physicalist Ontology" (Kim 1992), i.e., a philosophy that claims to be able to explain everything in terms of the physical, cannot work.

Crook and Gillet (2001) have proposed a solution to this problem which re-formulates physicalism as *philosophical* materialism. Their approach has many aspects, but I will address one which makes the whole of their argument seem implausible. They agree that physicalism as a *scientific* principle is doomed; they accept that Hempel's dilemma cannot be overcome if one takes the explanatory principles from science. They suggest a shift from a scientific approach to a philosophical one, i.e., to *speculative metaphysics*. Many arguments follow from this shift, but I will not go into them as the change in stance itself is very questionable. The move is questionable because a purely speculative approach to understanding the world has no empirical basis. One could imagine any kind of ontology, but if there was no means of testing it, then one kind of ontology cannot be chosen in preference over another. I would argue that if two or more ontologies are *empirically identical*, for example they were all able to make the same predictions, then there is no means to choose one over the other. At best, one could end up with a consistent thought structure, but there would still be no means to differentiate it from another consistent thought structure *unless* it had some empirical references. But if it did have empirical references, then it is not a purely speculative metaphysics and would become, in effect, science. If this were to happen, sooner or later Hempel's dilemma would take effect.

In order that one ontology may chosen over another, we need to find a way of unifying metaphysics with an empirical base of some kind. For this to happen, a concept is needed which is an open space for ongoing scientific discoveries without the presuppositions of physicalism. Developing this from Goethe and Steiner, this concept is "*Being*". This is another attempt at providing a holistic unity of ontology and scientific epistemology. The solution I suggest would be to re-define the meaning of 'science' as: *that process through which Being is discovered and theorised*. This definition would be in keeping with the Goethean approach, it

would be empirical in accordance with *Being* and it would be philosophical in that the idea content could be theorised about. In so far as the first aspect of this would provide the empirical content, it would avoid Hempel's dilemma altogether as Being is not a physicalist concept. *Being is a universal ontological concept waiting to be filled in by the discoveries of science, whatever they may turn out to be*. Instead of a physicalist science we would have just science. Science would aim to understand Being whatever it turns out to be and not assume that everything will be physical or be explicable by the physical. A science of Being is a relatively presuppositionless science which discovers, and does not assume, what the dimensions of Being are. One of these dimensions will no doubt be the physical, but it will probably be only one dimension amongst many.

A consequence of taking Being as the real starting point for science is that explanations that are not physical (as in not from physics) are not to be seen as unscientific. In the arguments about the demarcation of science from pseudo-science, there was the background concern that the acceptance of something like a 'life force' is unscientific, even as being 'mystical' (Plotkin 1998; Ruse 1992). The main problem with such a designation is that it is based on the covert assumption of physicalism, that for an explanation to be scientific it has to be a physicalist one. One often sees this even amongst those of a more holistic and pluralist persuasion (see Gould 2003, p. 223; Rose 1997, p. XI). However, I have shown physicalism cannot be justified and that Being is a better starting point for scientific research. Science from this point of view is not just physical science, or even biological science, it is a generalised science of "all that exists". Under this conception, the discovery of *necessary explanations* is nothing mystical; it is just the aim and practice of science. If, for example, someone were to discover an explanation of some aspect of culture that is not a physicalist explanation, this does not imply any kind of mysticism, it is simply an explanation of what is, whatever that may be.

Being provides a relatively assumption free starting point for the understanding of the different layers of reality and will at least allow for the possibility of existence being explained in more than the principles of the physical. By having the concept of Being as the starting point of scientific ontology, the existence of new realities is not automatically ruled out, leaving space for the possible existence of life, the soul and the spirit as distinct possibilities for scientific discovery. But it is only a starting point.

Between Natural Science and Spiritual Science: General Trends in Education Research

In this section, I want to explore the connection between the methodologies in scientific and education research. This is to be done with a view to understanding the research status of Waldorf Education and anthroposophy. What we will find here are a number of contrasting and competing views as to what constitutes research and its *interpretation*. I will show, however, that the fact of this does not disqualify any of the different perspectives from scientific status, merely that there are simultaneous aspects of the differing views which may not be acceptable to other interpretations. Differing views do not disqualify. As I will show later on, the implication of this is that Waldorf Education and anthroposophy also have scientific status.

The competing views that come into focus here are: *empiricism, positivism (including the logical kind), constructive empiricism and scientific realism*. There are of course both similarities as well as differences between these positions that are important to our consideration. Classical empiricism sees the source of knowledge as being in experience. Initially, this included both inner as well as outer experience as described in John Locke's (1631-1704) "*Essay Concerning Human Understanding*" (1690). Positivism, as formulated by Auguste Comte (1798–1857), rejected inner experience as a foundation for science, favouring outer experience in an attempt to formulate a philosophy of modern science. This was developed further in the logical positivism of the 1920's, also known as logical empiricism (Oldroyd 1986), such that all metaphysical realities were rejected from science. In fact, it considered all talk about metaphysical realities, including inner experience, as unverifiable and indeed meaningless. More recently, constructive empiricism asserts the un-testability of the unobservable, in the outer sense, and rejects their existence. However, it does accept that they can be a part of meaningful theories, but these are mere helpful stories to aid explanation. Scientific realism has within its remit the outer empirical dimension of the previous positions, but additionally looks for causes that transcend it, i.e. unobservable metaphysical causes. These distinctions play a role in our discussion below.

Additionally, one of the challenges for education research is that, historically, it has become parasitic on a *positivist* interpretation of scientific research and its outlet in behaviourism, a view which tries to reduce human nature to sense-perceptible behaviour and characteristics. This leads to the question of the ***nature*** and the ***boundaries*** of what constitutes science and its research methods. Interestingly, more recently modern education research attempts to

transcend the narrow confines of the one-sided, one dimensional, interpretation of positivism. Whilst the latter is not totally rejected, it is now argued that it should be seen just as one part of a broader palette of research methods rather than *the* defining principle:

> Educational research has been plagued by dubious bifurcations, the most significant of which is between 'positivism', according to which social sciences ought to be modelled on the natural sciences, and 'interpretivism', which rejects this view. However, the association of 'positivism' with modern science is misguided since, as Carr and Kemmis point out (1986, p. 71), one need only carry out a historical analysis of the nature of progress in science to see that positivist notions 'lay down ideals for the conduct of research that are . . . unrealistic and irrelevant'. As they go on to note (1986, p. 120), the philosophy of science 'generates an image of science very different from the orthodox positivist account', yet this rather *outdated account continues to dominate educational research*. As we shall argue, such an account is not only unrealistic and irrelevant, but also divisive and detrimental to social science. (Rowbottom & Aiston 2006, p. 137/8) (My emphasis)

The historic process of this is simple in outline: science's self image *seemed* to take on a positivist and later logical positivist appearance in the 19th and early 20th century. This was due to its advocacy of the empirical method grounded in *sense-observation* and coupled with *logic*. This then influenced education research up until this day. The problem is that science and its philosophies were never entirely positivist, or indeed *only* empiricist. An acquaintance with the metaphysical theories of modern physics as they started to emerge in the 19th century can reveal this, such as in the work of Ampére (1775-1826), Ørsted (1777-1851), Faraday (1791-1867), culminating in the famous equations of electromagnetic field theory by Maxwell (1831-1879). Moreover, science has evolved, but education research became more narrowly constrained by a positivism that never really truly took off in natural science.

Modern education research then became beset with a dual problem: firstly, a research method which excludes *a priori* any possible reality that transcends the sense-perceptible. But, secondly, concurrent with this science developed a metaphysical theory based on the laws of physics which was also applied to education. This latter is a view anticipated by Steiner as early as 1922:

> With the aid of natural laws, we can comprehend lifeless matter. This leads us to conclude that, following the same methods, we can also understand living organisms. This is not the time to go into the details of such a problem, but one can say that, at our present state of civilization, we tend to use thoughts that allow us to grasp only what is dead and, consequently, lies beyond the human sphere… The human being, in terms of soul and spirit, is not part of this picture, but has been excluded from that worldview. (Steiner 1921/22, p. 20)

> When you meet educational reformers, you hear the opinion that this principle of *causality* is the only one possible. Any open-minded person will reply that, as long as we consider the intellectualistic natural scientific approach the only right one, this principle of causality is also the only correct approach. As long as we adhere to accepted scientific thinking, there is no alternative in education. But, if we are absolutely truthful, where does all this lead when we follow these methods to their logical extremes? We completely fetter human beings, with all their powers of thinking and feeling, to natural processes. Thoughts and feelings become mere processes of nature, bereft of their own identity, mere products of unconscious, compulsory participation. If we are considered nothing more than a link in the chain of natural necessity, we cannot free ourselves in any way from nature's bonds. (Steiner (1921, p. 23) (My emphasis)

So, why does this matter to Waldorf Education? Waldorf Critics indicate the presence of anthroposophical terms, such as an "independent spirit", as if it is self-evident that it is an anathema to real science and likewise an education based on them. In the above, physical causation in this context becomes a pseudonym for laws of necessity as in the physical sciences and which deprive the human being of any degree of genuine freedom if applied across the whole of reality . Such a view is a natural consequence of understanding the human being merely as a physical entity. One sees this in a response to information sent by critics, through the British Humanists Association (BHA), the British government has stated that: "According to the materials provided, Steiner education is said to be founded on *spiritual rather than educational principles and concepts*", (*Reference: First Tier Tribunal (Information Rights) Case No. EA/2014/0017*)(My emphasis). In this statement, the "spiritual" and the "educational" are set against each other as if they are in opposition. One of the implicit assumptions of this view is that the methods and beings of modern education can only be

conceived in a "non-spiritual" way; without any explanation as to what this might mean, or even if it is justified. As such, terms like "soul" and "spirit" are automatically excluded from having educational status. *This is one of the reasons that the world-view of the critic's is Waldorf's problem*, not anthroposophy: it is their *implicit* methodology and metaphysics which creates an *a priori principle of exclusion* towards Waldorf. Modern educational academics, however, conceptualise a word like "spirit" in a way that is more accessible to its understanding and research:

> "The Latin word scientia, from which our word 'science' comes, originally meant nothing more than 'systematic knowledge of the true causes of particular things' (Smith 1997, p. 16), as opposed to the revealed knowledge that came from religion. It did not mean what we have came to designate in the 20th century as the 'natural sciences' (ibid.). It was in the 16th and 17th centuries, in what is usually called the Era of Scientific Revolutions; that 'science' began to acquire its modern connotations of empiricism and experimentalism. Thus conceived, 'science' began to seem, because of its spectacular successes, the only game in town, which is why the social sciences came to be so called and why, riding on the prestige of experimental science, some people talk of management science, political science and even the science of literary criticism. They do things differently elsewhere. The German language, for example, does not speak of the social sciences but of the Geisteswissenschaften, sometimes translated as the 'humanities' or the 'humanistic study of culture' (literally it means the ways of knowing the human mind or spirit, Geist), and distinguishes the Geisteswissenschaften from the Naturwissenschaften or ways of knowing the natural world. Continental Europe is more hospitable to theory than the Anglophone countries. It is a sobering thought that the influence of the scientific paradigm may be largely an accident of history and of the English language." (Bridges & Smith 2006, p. 132)

Of course, this does not solve all of Waldorf's methodological issues, as Schieren (2015) has rightly pointed out, so we will return to this later. However, such statements as the above follow in the wake of decades of research into the role of spirituality in education and child development, as exemplified in the subject dedicated publication of the "*International Journal for Children's Spirituality" (1997-)*. The articles presented there do not just discuss the nature and role of religious education, but also a secular form of spirituality and topics such as

compassion, awareness and moral values and principles. Critics of Waldorf appear to be completely oblivious to such research and seem to think that an education which has the word "spirit" in it is automatically at odds with education principles. Ironically, the values advocated by critics of Waldorf, like the British Humanists, are often the same values that go under the heading of "spiritual" explored by some modern education researchers.

Contrary to the views of some Waldorf critics, today education research is interpreted as an interrelated set of dimensions which include different approaches to: how we find out (methodology), the nature of knowledge (epistemology), what can argued be to exist (ontology), what the human being is (human nature), and the connection of these to social knowledge and value (axiology and sociology) (Cohen *et al* 2011). The text book on "*Research Methods in Education*" by Cohen, Manion, and Morrison, represents a kind of turning point in education research and has been cited as one of the most referred to in education research (Rowbottom & Aiston, 2006). In this book, two of the main perspectives have been described in education research: the 'Objectivist' and the 'Subjectivist' (Fig 1). The Objectivist account is claimed to have been derived from natural science and the Subjectivist from the humanities, especially the social sciences, education supposedly falls into the latter of these. (In the following, examples are drawn not only from education as a *process of learning* and *human nature*, but also from the *contents of the curriculum)*:

Fig 1(Developed from the source Cohen *et al* 2011, p. 7)

A Scheme for Analysing Assumptions about the Nature of Social Sciences such as Education		
The Subjectivist Approach to Social Science		**The Objectivist Approach to Social Science**
Nominalism **Anti- positivism** **Voluntarism** **Idiographic**	**Ontology** **Epistemology** **Human Nature** **Methodology** **Society**	**Realism** **Positivism** **Determinism** **Nomothetic**

In relationship to this, Cohen *et al* claimed that:

> Our analysis takes an important notion from Hitchcock and Hughes (1995: 21) who suggest that ***ontological assumptions***... give rise to ***epistemological assumptions***... give rise to methodological considerations... Indeed... ***axiology*** (the values and beliefs we hold)... that ***educational research***, ***politics*** and ***decision making*** are inextricably intertwined. (Cohen *et al* 2011, p. 3)(My bold)

I will discuss the first four of the above scheme, leaving the social questions for another occasion. I will also simply challenge the assumption that a researcher needs to locate themselves completely in one column or the other, i.e. the subjectivist or objectivist camp; rather a more complex tapestry of positions emerges on further analysis: *each of which can be attributed with scientific status*. Furthermore, one of the problems with the above account is the order in which the different assumptions are put. Normally, within philosophical circles, it

is thought that it is the *epistemological assumptions* which give rise to the others, so I will discuss them in this order.

Epistemology is about the nature of knowing, but what I wish to discuss here is how it also impacts on ontology, i.e what is considered to exist. Due to their interpretation of science as empiricism, critics of Waldorf covertly accept the notion that science deals exclusively with supposedly objective facts based on sense-perception. The consequence is that Waldorf's advocacy of the inner reality of the human being can only be incomprehensible to them. This view assumes that there is only one kind of epistemology of science and education research. There are, however, at least two recent approaches to this in modern science and education research: positivism and so-called anti-positivism. Positivism had its precursor in empiricism which emphasises the significance of an *objective* observational base. Positivism, particularly of the 'logical' kind, as developed by the "Vienna Circle", argued that for a theory to be scientific it had to be verifiable through sense perception. Anything that was not verifiable in this way was deemed to be "metaphysical" and "un-scientific" or even pseudo-science. In some cases this was referred to as 'nonsense' (Uebel 2006). In its extreme form, what this *'verifiability criterion'* ruled out was the existence of the inner reality of the human being, including the spirit, feeling and, ultimately, anything 'metaphysical' (i.e. that which is believed to exist but cannot be experienced through the senses). The latter also included theoretical physical entities as advocated by scientific realism. As a consequence, this would include also the inner observations of ideas, feelings and the 'inner self'. For Waldorf education, this means that all the pedagogical principles based on "soul" and "spirit" would be considered by a positivist science as either 'nonsense' or inexistent. Followers of logical positivism as an epistemology could not accept such notions. This helps shed some light on why some critique Waldorf and Anthroposophy: because they are covert, and perhaps unknowing, adherents of the logical positivist interpretation of science, or at the very least a narrow form of empiricism. The problem for them is that few scientists follow this interpretation in an exclusive manner; rather it is only one component of the empirical side of science, as we will see shortly.

One way to understand the above table is from a historical perspective. Smith (2006) follows the idea of research methodologies back to Bacon (1561- 1626) and the attempt to formulate 'research methods' for the social sciences (including those of education) that are derived from the natural sciences. It is partly due to the success of the natural sciences that makes them appealing, as through them a certain degree of *prediction* and *control* is conferred with the

promise that the same may be possible in the social realm, including education. This is a part of the diagnosis of the history of behaviourism especially in its application to education: its appeal to prediction and control in the learning process (Blackburn 2005, Bowler & Morus 2020). The hidden assumption of this is that the human being is entirely constructed from outwardly observable physical reality and can be understood in terms of physical forces and composition. The problem with this is that the methods derived from the natural sciences may not be entirely applicable to the human realm especially if it has elements which transcend the sense-perceptible, such as the possible existence of the soul and spirit; or even every day *inner* psychological realities such as perception, memory, imagination, emotion, thinking and will. As inwardly lived experiences, these are precluded by positivism, and later behaviourism, as they cannot be *outwardly* observed. In a curious case of denying the obvious, positivism rejects the psychological realities that many, if not most, people take for granted: their lived experience of their own inner reality.

Anti-positivism has other issues. It found its more recent appearance in the work of the historian of science Thomas Kuhn (1970) and further developed by Paul Feyerabend (1995), Bas van Fraassen (1980) and Nancy Cartwright (1986), *et al*. This particular epistemology is often referred to as "*constructive empiricism*" sometimes just *constructivism*. Alexander (2006) describes the distinction between positivist and constructivist epistemology (see van Fraassen 1985), the former of these which focuses on supposedly objective (sense-perceptible) **content**, showing its connection to scientific empiricism; and the latter on the subjective **activity** of the researcher. On the other hand, constructivism normally argues that the content of knowledge, including scientific theory, is subjective. This form of "anti-realism" rejects the notion that sense-observation is objective; rather it is "theory-laden". In this sense, it makes the case that observation is not something just "out there" independent of the knowing subject; it is permeated by the *thought* of the knower. Due to this, it is believed, that even observation is subjective.

The problem addressed here is how to balance the objective and subjective aspects of education research and to avoid the negative consequences of either position. This can be seen in that positivism can be interpreted as rejecting or ignoring the inner subject (active and / or passive) in the knowing process; on the other hand, constructivism can be seen as advocating a subjectivist view of knowledge and learning. Curiously, the assumption of such anti-realism is that to make its case it needs to have knowledge of the inner self of the researcher, otherwise it is a mere assertion. This in turn requires the recognition that there is an

"objective" inner reality to each and every researcher operating within a set paradigm in order to test the proposition out. In other words, the inwardly observable thought content of the paradigm needs to be universally identifiable by all researchers in order to demonstrate its influence on the observation.

On the other hand, whilst it needs to be said that constructivism has a strong empiricist component, it diverges from classical positivism in that it does not consider proposed transcendent realities as meaningless, and secondly it implicitly assumes the reality of the knowing subject. This might help provide at least a small opening to some scientific recognition to anthroposophy as ideas such as soul and spirit, including the active inner subject, can be ascribed at least theoretical existence or being useful explanations. Whilst this is not an ideal situation, at least constructive empiricism as a scientific method creates a possibility space for the proposed realties in Waldorf. The downside, however, is that, for constructive empiricism, such things would not be considered real, just helpful scientific explanations.

As we will see below, Steiner proposed a way of unifying as well as transcending these positions and their inherent problems. In the first instance, his argument makes the case that the fact that the subject is an active knower does not imply that the content of knowledge is subjective. In the second case, he argued that knowledge of the existent is not limited to the sense-perceptible but includes knowledge of the inner life. Moreover, as we will see below, Steiner proposed the idea of the practice of presuppositionlessness which would enable the knower to transcend the condition of "theory-ladenness" should it occur. In that way, the potentially subjective interpretation of science may be overcome.

Whatever the view one takes on the different epistemological positions, none of them can be designated as "pseudo-science" otherwise one would run the risk of closing down a research process to discover which is appropriate in which case. Were one to do so, this could be truly called dogmatism. In a curious turn about, critics of Waldorf are taking a dogmatic approach to science by thinking it is only about one type of epistemology.

Ontology and ***Metaphysics*** are concerned with the nature of reality. The former can be said to be the study of what is real generally, the latter is the study of possible realities that transcend the sense-perceptible. The usual position of the objectivist's approach to scientific and education research is to assume the real existence of the things proposed in the theory concerned. This is also described as the *realist* position. For this way of thinking, theories refer

to independent and objective existences in the World. The subjectivist view, on the other hand, is to assume the contents of theory are not real, i.e. have no independent or objective existence in the world without the knowing subject. This eventually leads to the *nominalist* view that ideas are mere names of things without a demonstrable objective reality. For education in general, this means that objectivist theories are supposed to refer to real things, such as the 'personality' which learns. Further examples would be from the *content* of the curriculum such as ideas of magnetic and gravitational fields, electrons and DNA, etc, which are deemed to exist independently.

A part of the problem with objectivism, however, is that it usually gets connected with physicalism. As we discussed earlier, for this view, the only kinds of ultimate reality are those things advocated by physics, thus excluding anything else that was not defined by the properties and forces of physics. As described earlier, today, physicalism is the successor to materialism. The latter of these is considered to be out-dated as it is based just on simplistic notions such as motion, extension and mass; the former is an emerging world view founded on the objects, states and processes postulated by *physics*. Consequently, the potential *autonomous* reality of "soul" and "spirit" would be rejected by what has come to be called the "Ultimate Physicalist Ontology", (Kim 1992, p. 122). For this view, the reality of "soul" and "spirit" would not be fundamental only secondary to the physical; they may have emergent properties but not independent causation.

For subjectivism, due to its commitment to *nominalism*, life, soul and spirit would be mere 'fictions' that might be 'useful' for science and education research (van Fraassen, 1985); (Churchland & Hooker 1985). For Waldorf education, this would mean that all talk of a "life force", "soul" or "spirit" would be considered to be just useful fictions that were parts of the theoretical framework (paradigm) but which had no reality in the world. The main problem for this though is that it introduces an element of arbitrariness into theorising: any one theory is as good as another unless some means of testing them can be shown. This means that some form of objective reality is needed to arbitrate between the theories concerned. For Steiner, this would mean making inner observations to test the reality of such an idea of "soul", which includes the psychological processes of observation, memory, imagination, thought and will (Steiner 1919).

The main problem for the ontological consequences of logical positivism is that modern science in practice does not merely adhere to the principle of "sense-perceptibility" or in fact the so-called "verifiability criterion". It is true that making sense observations is crucial to the *epistemological* aspect of empirical research, but its *theories* frequently go way beyond this and are distinctly *metaphysical*. As I will show below, science abounds with theories about metaphysical realities and without which it could not operate. A more penetrating problem for positivism though is that it wrongfully assumes a one-sided method and then transgresses the boundary between scientific *methodology* and scientific *metaphysics* (ontology). This means that due to its *epistemic* criterion it rules out the *reality* of things not observable to the senses. The problem is that the philosophy of science has moved on a great deal since the 19th century and the early part of the twentieth century; so why hasn't education research followed suit? Logical Positivism has had its day and has been superseded by a predominant turn to realism (Papineau 1996 & 2001). More precisely, modern science is currently a form of *evidence based metaphysics*.

But there is another interpretation to this. Cartwright (1986 & 1996) has made a useful distinction between three different aspects of science which may help create a bridge between nominalism and realism. These are: *explanatory laws, models and phenomenological laws*. The phenomenological laws are what the *empirical* aspect of science deals with, i.e. the *sense-perceptible* regularities. Explanatory laws on the other hand are often very *theoretical* and cannot be tested directly through sense perception. The *Model* provides a bridge between the two; it is a kind of image which makes the link between theoretical concepts and sense-perceptible realities. Steiner might have called the model a "representation" (vorstellung) (Steiner 1894). An example from the science curriculum might be that of gravity. The *phenomenological* law of gravity would be the coupling together of the sense-observations of objects falling with the statement that "all objects with mass are attracted to each other". The *explanatory* law is that there is a gravitational *field* that surrounds all objects that causes the attraction of objects of mass to each other. This is not something that can be *observed* directly with the senses, but something that is *imagined* to be a metaphysical reality, i.e. unobservable in itself but has observable effects. This view interprets phenomenological laws as laws between real existent objects that can be sense-perceptibly observed; the theoretical explanatory laws, on the other hand, are thought not to refer to real things, rather they are helpful imaginations, fictions even. In this sense, Cartwright is a *realist* of the sense-observable and an *anti-realist* of theoretical entities. Those of the realist camp would argue that both could be accepted as real.

In this sense, one interpretation of modern science could be described as combining empiricism with scientific realism. If one takes the constructive empiricist position, then transcendent *physicalist* concepts are not necessarily excluded from our principles of *explanation*. But for this position, the metaphysical theories are not considered to refer to anything real, they are only useful explanations. If, however, this is combined with realism, aspects of reality are not rejected just because they are beyond sense-perception. In this case, we are dealing with the inferred existence of theoretical entities derived from sense-perceptible realties. This is often called the principle of the "*inference to the best explanation*" (Harman 1965). In this case, there would be no *a priori* reason to exclude the possible existence of different potential realities of another kind, such as "life", "soul" and "spirit" as we find in Waldorf. They may after all be an "*inference to the best explanation*", of course based on *inner* as well as outer observation. According to this way of thinking, one could postulate the existence of an objective and independent world of soul and spirit based on the inner observations of individuals. I would propose that the inner phenomenological qualities observed could provide a scientific grounding for this; at least it is better than assuming they are ultimately reducible to physical properties, which they clearly are not due to the fact that their phenomenological properties are not identical. This is as a fundamental condition for reduction to be possible at all is that there is a content identity between the reducing and reduced phenomenon and / or theory. This could equally apply to the other theorised universal psychological realities such as perception, memory, feeling, cognition and will as a theorised universal existence across all human beings.

There is a further aspect to the question of ontology. An interesting development here is the theory of emergence. Today, emergence is a fairly common view amongst scientists and philosophers of science, in fact it may be fair to claim that it is on its way to becoming what Kuhn (1970) calls *normal science*. This is the theory that new *levels of reality* can emerge in the evolutionary or developmental process. These new levels have new qualities that arise from a base which did not contain them. This could recognise the existence of things comparable to "soul" and "spirit", but which are usually considered to have no autonomous agency (causality) only new qualities. Popper and Eccles "*The Self and its Brain 1977"*, on the other hand, make a different case. They argue for downward as well as upward causation between the levels. This means that to them, emergent higher levels such as life, sentience and cognition become autonomous in the evolutionary process and have downward causation on the physical as well

as the reverse. In contemporary science and philosophy of science there is extensive discussion of this, but this is beyond the scope of this paper.

A final discussion in this section concerns the scientific the stance towards realism. With this, it is supposed that as modern science is anti-realist, therefore Steiner's anthroposophy is not science because it advocates realism. The problem is this though: within the history of ideas there have been two basics types of realism. The first concerns the possible reality of *Ideas*. Within the context of middle age scholasticism, the debate concerned whether or not ideas truly existed objectively in the World or if they were mere names of things. Realism was the view that the answer to this question is that yes ideas are real, nominalism was the view that ideas were just names. This is a debate that rarely occurs today within scientific circles only philosophical ones.

The other realism question is quite different in that it is not the reality of ideas that is debated, but the reality of their *denotation*, their *reference*. The question here is: do the possible realities that *theories* refer to *exist*? Examples might be the *theory* of sub-atomic particles. In this the question is whether or not the reference of the theory (the particles), really do exist, and if so in what way.

Sometimes the difference between the two realisms gets confused in anthroposophical circles. This leads to the assumption that science is anti-realist, or nominalist, because it rejects the idea that Ideas have an existence of their own. But science is mostly not nominalist in terms of the *reference* of theories. It is fairly uncommon that a scientist doubts the existence of metaphysical entities. There is however, a minority scientific view that does this and this is, as we have seen, *constructive empiricism*. Even here, observable objects are considered to be real, whilst their supposed metaphysical causes are considered meaningful, but just helpful stories.

It might be interesting to note that Steiner was a realist of Ideas, but he did not always agree that the *reference* of metaphysical theories existed. As we will see later, in the "Discussions with Teachers" he recommended the use of "archetypal phenomena" rather that metaphysical laws as explanatory principles. Today, Steiner might have been a realist of phenomena, phenomenological laws and Ideas, but an anti-realist of *some particular* theoretical metaphysics. In this sense, he might have agreed with Cartwright's concept of phenomenological laws as real and the *purely* metaphysical laws as unreal. But he would have

made the case for the reality of Ideas as such. In fact, in his article "Philosophy and Anthroposophy 1904", he did so.

Human Nature is concerned with what the human being is and therefore is a special part of ontology / metaphysics. An understanding of this is crucial to anthroposophy and Waldorf education. The determinist position sees the human being as determined by either biological/physical forces or by social forces. The voluntarist view considers the human being to be a centre of independence or freedom. One of the questions that may arise from the above scheme is the polarising of the two views: the objectivist and the subjectivist and their supposed derivation from the natural sciences and social sciences respectively. Cohen *et* al describe the positivist view as being concerned with "universal laws regulating and determining individual behaviour" and the interpretivist view as attempting to understand "how people differ from *inanimate* natural phenomena and, indeed, from each other" and that the difference between these views is based on their "different conceptions of social *reality*" (Cohen *et al* 2011, p. 5) (My italics). As Educational institutions are, for them, an example of social reality, these ideas would apply. They go on to argue for a form of "mixed methods" research as the most appropriate one for education and that this notion would challenge, to some extent, the incommensurability thesis of "Post-positivists" (Kuhn 1970, Feyerabend 1988). From this, it would appear that Cohen *et al* see positivism as being concerned with universal and deterministic *laws*; whilst Interpretivism they see as being interested in *individuals*. Put like this, such views, in their extreme form, have polar opposite and incompatible interests and approaches. One of the consequences for education is that rather than learning being based on deterministic, i.e. causally necessitated, laws, it would grounded in an understanding of learners as individuals as independent agents. Such an idea would, I think, would resonate with Waldorf teachers, or any experienced teacher, as it is a common observation that learners cannot be forced, i.e. be causally determined, to learn.

Moreover, one of the central concepts of Human Nature in Waldorf is that the human being is more than just a physical body, there is a soul and a spirit too. Interpretivism, whilst insufficient by itself, provides some grounding to the notion that there is something about the human being that goes beyond physical causation, or indeed universal causation of any kind. Using the principle of "*inference to the best explanation*", if there is something to the human being that is individual, there is *prima facie* evidence that this transcends physical and universal causation. Using anthroposophical terminology, one might call this the "individual

spirit" or "I". More on this will be discussed below in terms of the goals of explanation and method.

Methodology is to do with how we find out about the world, it is a kind of specialised version of epistemology. Cohen discusses this in terms of a *nomothetic* approach of the objectivist accounts as opposed to an *ideographic* one of interpretivism. In that sense, the topic of discussion is largely to do with the *aims* of the methodology rather than the *means*. The nomothetic approach is concerned with the discovery of *universal* causal laws. In effect this means that what the researcher is looking for is what is true of all human beings irrespective of individuality. One may see in this a similar conceptual form to that of a law of physics or maybe even biology. The ideographic approach comes closer to understanding the individual in their learning activity, but this requires a recognition that the individual exists, or may exist, as a distinct reality from that of the physical and biological reality that constitutes the human being as a whole; i.e. spirit/soul individual and the bio-physical body. This type of methodology, in the context of Waldorf Education, requires the potential existence of spirit/soul or their observable activities. A methodology based only on the presumed exclusive existence of bio-physical and social forces could not understand a soul/spirit individual learner as they exclude *individual agency* in favour of *universal causation*. On the other hand, Waldorf education also includes the idea of age specific learning universals, as in the age phases; and character universals as in the theory of the temperaments. In this way, Waldorf Education strives to find the balance between the individual and universal modes of learning.

One of the questions concerning the above Fig 1, is where to locate Waldorf Education in terms of research methodology. In his ontology, Steiner was a realist concerning body, soul and spirit, and not just of the physical. Clearly, he wasn't a positivist in the sense that his epistemology is not restricted to the outer senses as it includes inner perception too. In this way, Steiner may be described as an "extended empiricist" in that he includes observations of body, soul and spirit (Steiner 1904).

In terms of the human 'I' or spirit aspect of human nature, Steiner might be considered to be a voluntarist in that he was committed to its own agency in its fundamental freedom from external causes. He also would not have denied that the human being, in its physical and biological nature, was partially explicable in terms of physical and biological determinism. As for his methodology, he would have attempted to research societies in terms of a combination

of the idiographic and the nomothetic (law seeking) approaches. With the first of these, he would have tried to understand individuals and their influence on society, with the second of these to understand the influence of societies in individuals (but not in a deterministic way). Seen like this, Steiner can be seen to try to bridge the 'objectivist' and the 'subjectivist' camps. But this, I will show, is due to his 'pluralist methodology' derived from his 'pluralist ontology'.

One of the things that can be said about modern approaches to education research is that its scope is often confined to *learning*. The *content* of education is normally left to specialists outside of education. For example, the content of the physics curriculum comes from physics specialists, not from physics teachers or education researchers. The task of the latter is normally seen as being confined to the best way to 'deliver' the package given from the other fields of inquiry. The primary focus of education researcher and teachers is how to help students *learn* the given content.

In the context of Steiner education, however, the term 'research methodology' takes on a broader meaning. It is no longer only concerned with the researching of educational methods, such as learning theory etc, it is also about the *content* of education and the integration of this with the *ontogeny* of the human being. It is expected of Waldorf teachers that they not only research good ways of *learning* a topic but with the *content* of this topic itself. For example, in physics teaching in Waldorf schools it is not just a case of researching new ways of teaching the existing ideas, but also the ideas of physics themselves. In this sense, research into physics and the philosophy of physics is important to Waldorf teachers. The same follows for biology and the cultural 'sciences' such as history and psychology, etc. In the following, we will discuss Steiner's recommendations for these. Steiner's theory of learning is presented fundamentally in the "*First Teachers' Course*" (1919) and in his other education lectures, but will not will not be discussed here in any detail as it requires extensive consideration way beyond the scope of this text.

Steiner's Scientific Research: the Methodology-Ontology-Explanation Complexity

The relationship between methodology and ontology is a complex one. The nature of explanation acts as a kind of bridge between the two. So, for example, should a scientist aim to explain a human being, an animal or a plant through the laws of physics, then the methodology to attain this type of explanation would be pre-determined by this aim. Not

surprisingly, perhaps as a kind of self-fulfilling prophecy, the end result of such methodology would be explanations of these kinds of beings merely from the laws of physics. These beings then would only be understood in their physical nature.

Below, I outline the main dimensions of Steiner's scientific research methodologies and their relationship to ontology and explanation. These are represented in Fig 2. Each of these dimensions is a distinct area of investigation and indicates Steiner's conviction, obtained from his Goethe studies, that *the method of understanding nature should come from the nature of the being concerned* (Steiner 1978, p. 7). So, as the world itself is an existentially diverse place, this leads to what today would be called "*methodological pluralism*": the idea that there is a diversity of scientific methods, not just one as is the case with classical positivism or reductive physicalism (Rose 1997). For Steiner, the scientific approach was not one of "dual epistemology" but "multiple epistemologies" derived from the diverse forms of reality. For him, the epistemic method required to understand the physical dimension of reality is a different one from that required to understand the living realm as well as different from the methodology suitable for researching human culture and societies.

Having said that, due to Steiner's view, which will be discussed below, that the human 'I', or spirit, is the active agent or *entelechy* in all knowing, it is reasonable to assume that Steiner recognised an element of the spirit in all forms of knowledge. As I will try to show, this is a sense in which all research of any kind involves elements of *spiritual* science, i.e. in that all forms of research have an real existent "I" at their centre. This is particularly the case with *self-conscious* research activity: in order to know the world one also needs to know oneself; that is: the spirit cognises itself in cognising the world. I will explain this in more detail later:

Fig 2

From: "A Theory of Knowledge Implicit in Goethe's World Conception":

General Research Epistemology (Chapters A-D):

1) Introduction to Research Methodology:

a) Presuppositionlessness as a research method.

b) Thinking and Observation

Natural Science Methodology (Chapter E):

2) Inorganic Methodology.

3) Organic Methodology.

Cultural / Humanities Methodology (Chapter F & G):

4) Psychological – Sociological

5) Freedom and Morality

6) Artistic Creation.

From Spiritual Scientific Works

7) Self-Transformation as in Anthroposophy and as a Spiritual Science

In the next figure, you will find an overview of the connection between the curriculum in Steiner education and the research method that is valid for each of the topics. This occurs in the first two columns. In the third column, you will also find a summary of the particular type of explanatory principle that Steiner thought appropriate for each type of Being and research method. As you will see here, and also more deeply in the book, that Steiner argued that each type of Being should have its own research method; it also should have its own type of explanation:

Fig 3 Waldorf-Steiner Curriculum	Type of Research Method		Type of Explanation
Humanities: History, Human Geography, Art, Literature, Philosophy, Society.	7) Self Knowledge & Self- Transformation	Cultural Research Method	The Individual and Society
	6) Art as World Transformation		Matter as Image of the Idea
	5) Freedom research		The I as manifestation of itself
Psychology and Society (also in the Humanities)	4) Psychological-Social-Historical: Self- Knowledge		The Individual and Society
Biology, Life Sciences	3) Organic Method: Evolutionary / Comparative Intuitive method		The Organic Type "Eco-System"
Physics, Chemistry, Mathematics	2) Inorganic Method: Proof / Conditionality / Causation Rational Empiricism		The Natural Law The Cosmos
General Epistemology	1) a) Presuppositionlessness b) Pure Cognition as Observation and Thinking		Pure Concepts & Ideas of the things themselves and for themselves

I will now consider the research methods highlighted in fig 3, starting from the bottom:

1) General Epistemology

By this, I want to refer to two elements of Steiner's research methodology: "presuppositionlessness" and "general cognition" or "epistemology".

1a) Presuppositionless Research

In his *Truth and Science (1892),* Steiner argues for a *presuppositionless* approach to all forms of knowledge, including all the sciences: the physical, biological and cultural (psychological, social and historical). It is not dissimilar to Husserl's (1970) concept of the "*epoché".* Arguably, it is a form of research that requires the self-activation of *inner freedom*. As a research method, this stands in contradistinction to all other kinds of knowledge which *assume* the truth of a *specialised* content as the basis of further research. It is a method that requires of the individual to free their minds from all assumed knowledge either of their own or that of existent science and society. In modern terminology, it is a process through which an individual can free themselves from an existing paradigm (Kuhn 1970). In other words, presuppositionlessness, the *epoché,* is a paradigm-transcending principle. By this, *inter*-paradigm research is not excluded, but any research that goes beyond the extant accepted body of knowledge needs a frame of mind that temporarily suspends the parameters and content set by it. It is only in this way that innovation can occur that transcends tradition and the dogmatism that can sometimes come with it.

Steiner's primary aim in this book was to refute Kant's view that one cannot know the "thing in itself" which supposedly lies behind the world of phenomena. A great deal of modern science is in a sense 'Kantian' in so far it is believed that the true causes of the world are behind the veil of perception. Today, this view is reflected in the "ultimate physicalist ontology". But for Steiner, Kant's view is an assumption. So the question for him was how to create a view of knowledge free of assumptions.

As a research method presuppositionlessness may be taken to recommend the *temporary* suspension of knowledge or conviction in order to establish truth in general and those specialised kinds of truth found in science. *In essence presuppositionlessness is an act of self-awareness* and *self-agency* by the knower. But it is also a kind of 'holding back', a kind of 'freeing the mind'. The knower self-consciously holds back from consciousness particular contents of knowledge so that new content may arise. Without this, it is arguable that no new ideas within science can emerge. Take for example the development of the Copernican view of the solar system; this could only become the mainstream view after the old Earth centred system was 'suspended' from belief by a significant number of people. Such "self-aware" acts of consciousness are central to all changes of scientific paradigm. Without the development of this, it is arguable that culture would remain within an old paradigm, forever fine tuning but never truly innovating.

Presuppositionlessness is crucial to science in general and anthroposophy in particular. For anthroposophy as a science, presuppositionlessness is the fundamental starting point; it is the scientific equivalent to openmindedness. In a sense, it asks the mind to 'know itself' in order that it may know the world in a free way, without assumptions about what is true and what exists. Presuppositionlessness is, in principle, a scientific practice that is common to natural and spiritual science alike whereby the knower makes an act of self-consciousness and self-agency in knowing the World.

In this sense, when the Self or "I" knows its own consciousness it is already a form of spiritual science. When the "I" knows nature, the contents of consciousness are either sense perceptions or ideas about sense perceptions (for example a scientific theory is essentially a set and ideas and concepts that are ideally testable through sense-perceptions). When the 'I' is the *agent* of presuppositionlessness, it transcends the givens of the natural world and its inner world of ideas in order to know itself and its consciousness. To enact presuppositionlessness, the 'I' knows itself as an active agent of knowledge and knows its own processes of consciousness. From perceptions of nature to the consciousness of 'I', the *epoché* is central to both natural science and anthroposophy as spiritual science. It is then arguable that a form of spiritual science is present in all forms of science as the 'I' needs to know, and be an agent of, itself in all cases.

One of the things which Steiner stressed in the process of creating the "*epoché*" is that of *self-knowledge* coupled with being *self-critical*. Openmindedness can only be achieved if one practices self-knowledge and is willing to be critical about what one thinks one knows. As a researcher (and this applies to teachers and parents as well as critics too), if one does not do this, then one would be inclined not to reflect on the content and methods of science or method of teaching, or parenting and caring, let alone make an evaluation of any of them.

Philosophically, Steiner contrasted being self-critical with being "*naive*". Husserl also referred to this as the "naive or natural attitude" which is a kind of *zero point on the scale of self-reflection and self-criticality* concerning one's knowledge and practice (Cohen 2011). In the naive state, a researcher would not be in a position to ask themselves if what they are doing is right or of value. In contrast, the first step in self-knowledge, however, is that of self-observation of one's own thoughts, feelings and actions and finding what is working there:

> It is possible, however, to *observe oneself*, and enquire into the *laws* inherent in *one's own activity*, thus abandoning the naive consciousness just described through

> knowing exactly the scope of and justification for what one does. *This I shall call critical*. I believe this definition comes nearest to the meaning of this concept as it has been used in philosophy, with greater or lesser clarity, ever since Kant. Critical reflection then is the opposite of the naive approach. *A critical attitude is one that comes to grips with the laws of its own activity in order to discover their reliability and limits***.** Epistemology can only be a critical science." (Steiner, R, 1892)(My emphasis)

For Steiner, the starting point for all scientific research and method is the establishing of the epoché: *temporarily freeing the mind; self-observation; searching for laws in one's activity and being self-critical*. These are hardly the recommendations of a dogmatist as the Waldorf critics would believe, but the highest possible level of an openminded *critical* science.

1b) Thinking and Observation: Epistemology

The "*Philosophy of Freedom*", together with his "*Truth and Science*", "*Goethean Science*" and "*Theory of Knowledge*", are quite rightly interpreted as the philosophical foundations of all of Steiner's works. They can also be seen as his scientific research methods. One clue to this is in the sub-title to the former of these books: "*Results of Introspective Observation according to the Methods of Natural Science*". Steiner's exposition describes the necessary conditions for all forms of knowledge, including that of natural science and spiritual science. For him, knowledge arises when a perception is unified with a concept (Steiner 1894, ch 5). In more recent terminology this may also be expressed as the unification of theory with observation. More importantly, this is a research method. When the knower has a perception, they cultivate the self-awareness as to whether or not they have the corresponding idea, concept, or theory. Likewise, if the knower has a theory they ask themselves if they have the appropriate perception, or observation.

As a guiding principle, Steiner accepted Goethe's view that may be formulated in such a way that there should be a kind of identity between the concept and percept:

> Therefore, to our knowing contemplation, the reality we experience must appear to emerge as though out of a thought-process, in the same way as pure thought does. To investigate the essential being of a thing means to begin at the centre of

> the thought-world and to work from there until a thought configuration appears before our soul that seems to us to be *identical* to the thing we are experiencing. When we speak of the essential being of a thing or of the world altogether, we cannot therefore mean anything else at all than the grasping of reality as thought, as idea. (Steiner 1883-87, p. 121) (My emphasis)

In other words, in this identity there needs to be a complete match of concept and percept for something to count as knowledge. In principle it appears very simple, but as a methodological discipline it requires an inner act of consciousness to accept only that as knowledge which has the unity of perception and idea. What this suggests is that concepts that have content that do not have a corresponding content in perception are not part of what Steiner would call knowledge. In other words, unobservable metaphysical assumptions would not be knowledge. In other words, what we may call knowledge in this sense could well not actually be so. A great deal of learning may lack one or the other of these. We may find ourselves having to re-classify our so-called knowledge as either only theory or as a collection of perceptions or of theories. This can only be done so with an act of self-consciousness as to what we really know.

But Steiner's view of observation is also not restricted to that of sense-perception such as in natural science; it includes also that of inner perceptions: of thoughts/ideas, feelings, awareness, etc. An example of this is "*observing thinking*"**.** In this sense, it is also possible to have a scientific knowledge of our own inner life of thought: through having observations of thinking and then ideas about it we can be said to have knowledge of our thought life. Knowledge of thinking then becomes the act of unifying perceptions of thought with ideas about thought. This is may be considered to be Steiner's idea of the *science of thinking*. Likewise, inner perceptions of our feeling and will life are possible in Steiner's conception of knowledge. In that sense, one can speak here of a science of the soul.

As it is our 'I' that is active in knowledge, in that sense, it is arguable that our individual spirit as "I" is present in all acts of knowledge. Knowledge is seen here to include the knower as spirit in all deeds of knowing. Extended to science, this means that science includes a science of the spirit: to know what we know, the spirit self-reflects on how and if it has genuinely unified perception with idea, observation with theory. This is the case for all the further more specialised sciences.

1bi) Self-Cognition and the Epoché as means to overcome Theory-Ladenness

One of the problems with the objectivist and subjectivist views of knowledge is that there is no purely *logical* way to determine if either is correct. Steiner made the case, however, that all perception is infused with thought content: "we never do confront a sense world completely devoid of all thought-content" (Steiner 1988, p.123). In the current context this could also include "theory". If so, some may think he would lean towards the subjectivist camp. However, he also argued that, in the practice of the *epoché,* the knower could become conscious of their concepts and predispositions and thereby overcome them. This means in effect to transform the epoché from merely a *conceptual* determination into an *inner empirical practice*. In this sense, Steiner's approach is not to reject the principle possibility of subjectivism in singular acts knowledge, but see it as a temporary problem that may be overcome. In that sense, Steiner turned the issue into an empirical question rather than just a purely rational one. In modern terms, theory-ladenness can be transcended in the search for possible "objective truths".

1bii) Essentialism as a Question of Tolerant Perspectivism

A question that needs addressing at this point is the assumed opinion that Steiner's *essentialism* leads to the alleged pseudoscience and dogmatism in his views (Schieren 2011; Ullrich 1988). As a generic term, and in this context, essentialism is the notion that in cognising the *Idea* of something this is the *essence* of it. Ullrich's critique anthroposophy is that:

> "In contrast to the conscious detachment, plurality and unresolved openness of scientific method, Steiner and his disciples desire dogmatic knowledge, or visionary experience, of the world as a well-ordered whole resembling an eternal, unchangeable truth. […] Their way of thinking is degenerate philosophy, mere worldview. […] With the formulation of the anthroposophical 'occult science' Steiner fell prey to all the dangers of such a way of thinking. Here the pre-modern, dogmatic-metaphysical speculation of neo-Platonism is transformed into the contrived, re-mythologised world picture of theosophy" (Ullrich, 1988, p. 174).

To begin with, dogmatic knowledge, like all forms of dogmatism, is the rigid adherence to *one* point of view, or concept or theory, rejecting all evidence contrary to the theory (Blackburn 2005). Dogmatism, allows for no flexibility or multiplicity of perspectives on a specific issue or

body of knowledge. Ullrich's hidden assumptions of this are twofold. Firstly, that science in its conceptual content does not have important essentialist elements. Secondly, that there is a correlation between essentialism and a dogmatic World view. Neither of these is necessarily correct.

To begin with, the aim of scientific method is not to remain in "unresolved openness" rather it is to find explanations and solutions that have a distinct definiteness, a "this-ness", about them. Yes, science is frequently open to revision of its ideas, but this does not mean that there are no conceptual boundaries around its concepts and explanations. Take for example the Darwinian theory of evolution; it is defined in terms of very specific concepts such as variation, inheritance and adaptation. These concepts are open to interpretation and refinements, but they cannot be removed or the theoretical edifice will collapse. Similar arguments could be made for quantum physics, relativity theory and even Pythagoras's theorem. Each and every one of them *must* have explanatory "essences" in order to be what they are. In sum, these scientific explanations have "essences" that they can't do without and still be what they are. After all, this is the definition of an "essence": *a set of properties that something has to have in order to be what it is* (Kim & Sosa 1995, p. 136). This is the case whether one is referring to a being, or a form of reality or an explanation.

Moreover, Ulrich's argument also fails because Steiner's view is not a dogmatic form of essentialism at all. Granted, an individual who thinks they have a conceptual grasp of the essence of something *as a totality* can lead to dogmatism. But this dogmatism lies in the person rather than in the essential concepts themselves. In this case, it is just personal dogmatism leading to world-conception dogmatism. Steiner's view on this is completely different; in his formulation of essentialism he made the case for a *perspectival* interpretation. This does not lead to dogmatism but tolerance of a multiplicity of interpretations:

> Manifold consciousnesses think one and the same thing; only, they approach this one thing from different sides. It therefore appears to them as modified in manifold ways. This modification is not a differentness of objects, however, but rather an apprehending from different angles of vision. The differences in people's views are just as explainable as the differences that a landscape presents to two observers standing in different places. If one is capable at all of pressing forward to the world of ideas, then one can be certain that one ultimately has a world of ideas that is common to all human beings. Then at most it can still be a question of our

> grasping this world in a quite one-sided way, of our taking a standpoint from which this world of ideas does not appear to us in the most suitable light, and so on. (Steiner 1888, p. 123)

> This makes it explainable to us how people can have such different concepts, such different views of reality, in spite of the fact that reality can, after all, only be one. *The difference lies in the difference between our intellectual worlds*. This sheds light for us upon the development of the different scientific standpoints. We understand where the many philosophical standpoints originate, and do not need to bestow the palm of truth exclusively upon one of them. We also know which standpoint we ourselves have to take with respect to the multiplicity of human views. We will not ask exclusively: What is true, what is false? We will always investigate how the intellectual world of a thinker goes forth from the world harmony; we will seek to understand and not to judge negatively and regard at once as error that which does not correspond with our own view. (Steiner 1888, p. 131)

The only thing that one can deduce from this is tolerance of other people's views and a multiplicity of explanations about the scientific understanding of the World. This is the exact opposite of dogmatism. Steiner's "*perspectival essentialism*" leads to openness and tolerance of many World Views, but at the same time being inclusive of change and potential falsehood. After all, modern science also does not aim for "unresolved openness"; it is a highly critical process in which it is not afraid to consider a theory may be partially incorrect or even just false. Science is in fact very critical of itself and does not tolerate the vague notion of "unresolved openness" indefinitely.

The other aspect of this is Steiner's *conditional essentialism*. Rather than his view being one of absolutism, it is conditional upon individual capacity:

> We have the task, with regard to every single entity, of working upon it in such a way that it appears as flowing from the idea, that it completely dissolves as a single thing and merges with the *idea*, into whose element we feel ourselves transferred. *Our spirit has the task of developing itself in such a way that it is capable of seeing into all the reality given it, of seeing it in the way it appears as going forth from the idea*... Goethe grapples with things in just the way we have shown to be the valid one. He himself sees his inner working, in fact, as a living helper in learning

> (*Heuristic*), a helper that recognizes an unknown, dimly-sensed rule (the idea) and resolves to find it in the outer world and to introduce it into the outer world (Steiner 1988, p. 125).

For Steiner the question is: are we *capable* of cognising the essence as idea, not that necessarily we have it. The search for the essence of something is a *heuristic*, a *way* of discovering what something really is. This depends on our capacity and is not a merely given, we have to find it. To modern ears, this might sound a little strange. But even modern science is on a constant search for understanding what something *is, was* or might *become*. To know what something is, *if and only if* one knows what something is, this meets the criterion of "essence": *a set of properties that something has to have in order to be what it is* (Kim & Sosa 1995, p. 136). This does not exclude the multiplicity of perspectives or indeed refutation or error.

The Natural Sciences:

One of the difficulties in some modern views of research is the assumption that there is only one kind of method, such as positivism and only one kind of reality: the physical. In addition, as has been shown, modern education research has often tried to apply versions of the scientific method which are drawn from the physical sciences of the 19th century (Alexander 2006).

Steiner's view, on the other hand, is that there are many kinds of reality and many kinds of methods derived from them. As we shall see below, other kinds of reality, such as the purely human, are not susceptible to physicalist reductionism. For him, the methods, principles of understanding and forms of reality are distinct to each realm.

As in all of Steiner's suggestions concerning the practice of science, the phenomenological-empirical approach is central to all the sciences. In that sense, this converges with Cartwright's (1986) views on phenomenological laws which are fundamental to all forms of modern physics and even science generally. Of course, standard modern physics adds the theoretical-metaphysical laws and models in an attempt to integrate with the contemporary physicalist world view. Steiner would aim to focus on the phenomenological laws and in that sense would align, in that one respect, with contemporary constructive empiricism. In this way, I would

like to suggest a rather radical understanding of Steiner's scientific method as developed from Goethe:

> *The Goethean-phenomenological element to science is identical with the empirical-phenomenological perspective of modern science*. In fact, it cannot be otherwise in so far as they both converge on testable observable reality and its attendant truths. Another way of putting this would be to say that modern science *is* Goethean in its *empirical-phenomenological perspective.*
>
> *Looked at this way, the achievements of modern science are grounded in the empirical-phenomenological. Goethean science from this perspective is scientific empiricism; and modern science is Goethean science in its empirical dimension. The overlap between modern science and Goethean science is their common empirical-phenomenological dimension. From an empirical perspective they are identical.*

There are of course some important differences that shouldn't be overlooked. Building on Cartwright's (1986) three levelled distinction to modern science: *phenomenological laws*, *models* and *theoretical laws*, we can find an overlap between modern science and Goethean science as well as the differences. Goethe's Science is empirical science without the theoretical laws and hypothetical models of modern science. This includes the proposed existence of metaphysical realities of modern physics. From *one* perspective therefore, Goethe's science would agree with the constructive empiricism in its rejection of *purely* theoretical entities.

The other side of the question, however, concerns the difference from modern scientific realism. Steiner had a particular name for a Goethean approach to the sciences generally, and this is "*objective idealism*":

> This view is in a position to unite two things that are regarded today as completely incompatible: the *empirical method*, and *idealism* as a scientific world view… *The only satisfactory way to grasp reality is the empirical method with idealistic results.* That is idealism, but not of the kind that pursues some nebulous, dreamed-up *unity of things*, but rather of a kind that seeks the concrete ideal content of reality in a way that is just as much in accordance with experience as is the search of modern hyper-exact science for the factual content… *Proceeding strictly according to natural-scientific methods*, I found in *objective idealism* the only satisfying world view. My epistemology shows the way by which a kind of thinking that

understands itself and is not self-contradictory arrives at this world view. (Steiner, 1988, p. 93) (My emphasis)

Later on in the text, Steiner also calls this "*empirical idealism*" (Steiner 1988, p. 232). As said, Cartwright's argument is correct, that the theoretical propositions of scientific realism cannot be directly tested through observation only its phenomenological contents can. So whilst Steiner would agree to the significance of the empirical method, he also made the case for transcending the merely empirical with "*Ideas*". But these ideas do not contain elements that cannot be observed empirically, they express *relationships* in the phenomenal world which are accessible to *thinking consciousness* (Steiner, 1988, p. 121). In practice, from a mundane perspective, modern science does this too and is not trapped in the mere describing of phenomena as you would get with a naive interpretation of empiricism, which would be a mere cataloguing of phenomena. The search for phenomenological *laws* also does this and thereby takes naive empiricism to the next level. Steiner attempted to locate himself by uniting empiricism with idealism, a task not normally attempted and which requires the *inner self-consciousness* of *Ideas* of *relationships*. In this way, his suggestions avoid the naive approach to empiricism as well as the untestable metaphysical theories of scientific realism. For Steiner, the combination of the empirical with the self-consciousness of "*Ideas"* constituted the only satisfactory world view. For Steiner, these "*Ideas"*, as derived from Goethe, are the *spiritual* unity of the phenomenological world (Steiner 1988, p. 232). In this way, the spiritual, as *Ideas* of relationships, is embodied in empirical-phenomenological practice. For Steiner, the spiritual is already present in natural science as *Ideas*. His *empirical idealism* takes on a number of more specialised forms as described below.

1) Inorganic Method

In Waldorf schools, the inorganic research method is particularly relevant to the curricula in the physical sciences, technology and mathematics. The former of these include physics and chemistry which begin as separate subjects usually in class 6. The concept of this field of research is encapsulated in an interchange between a teacher at the first Steiner/ Waldorf School and Rudolf Steiner:

"*A teacher: I am having trouble with the law of conservation of* energy in thermodynamics.

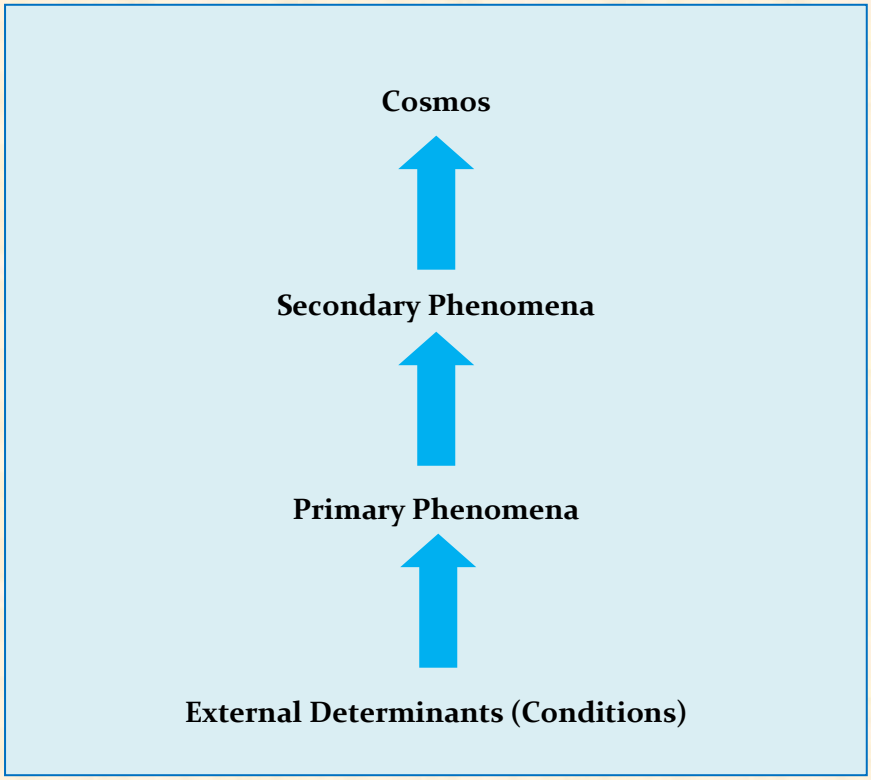
> *Dr. Steiner:* Why are you having difficulties? You must endeavour to gradually bring these things into what Goethe called "archetypal phenomena"... Such things are phenomena, not laws. You will find that you can keep such so-called laws entirely out of physics by transforming them into phenomena and grouping them as primary and secondary phenomena. (Steiner 1919-22, p. 28/29) (*Faculty Meetings with Rudolf Steiner*, p. 28/9).

So what did Steiner mean by "archetypal phenomena" and "primary and secondary phenomena"? This is a reference to his early work "*A Theory of Knowledge...*" especially chapter XV. As stated, Steiner recommended the use of the "*phenomenological approach*" which leads to the discovery of *phenomenological laws*. This approach avoids the use of metaphysical theory and laws. Metaphysical laws would be more likely to be taught in the upper school as an introduction to modern physics and science generally. Especially when it comes to teaching, Steiner wanted teachers to develop this phenomenological approach in order that natural science remained within the sphere of experience that the children have direct access to and which is not beyond their personal perception. Let us see how Steiner described this type of nature and how the structure of inorganic science can be built up:

> "THE SIMPLEST form of action in Nature seems to us to be that in which an occurrence results wholly from factors ***external*** to one another... The system of actions which happen in this fashion, so that one fact is always the result of others of similar sort, is called ***inorganic nature***... Here the course of an occurrence or the characteristic of a relationship depends upon ***external determinants***; the facts bear marks in themselves which are the results of these determinants"...
>
> In this way the mind resolves all phenomena of the inorganic world into those in which the effect seems to the mind to come directly and of necessity from the causative factor. (Steiner 1886, pp. 73-77)
>
> Now, a phenomenon in which the character of the occurrence can be seen in transparently clear fashion to result directly from the nature of the factors under consideration is called a *primal phenomenon*, or fundamental fact. This primal phenomenon is identical with *objective natural law*. For in it there is expressed the fact, not only that an occurrence happened under certain definite conditions, but that it had to happen. (Steiner 1886, p. 77/8)

> Scientific satisfaction will come to us from a point of view only when it leads us into a *totality* complete in itself. But the sense-world as inorganic does not appear at any point as brought to a conclusion; nowhere does an individual whole appear. Every occurrence points to another upon which it depends; this to a third; etc. Where is there any conclusion in this? The sense-world as inorganic does not arrive at individuality. *Only in its totality is it complete in itself.* We must strive, therefore, if we would have a whole, to conceive the assemblage of the inorganic as a system. Such a system is the *cosmos* (Steiner 1886, p. 81 (My emphasis).

So, for Steiner, we can deduce that, there is a distinct structure to the levels of inorganic method and explanation. This leads to a *system* of the inorganic sciences:

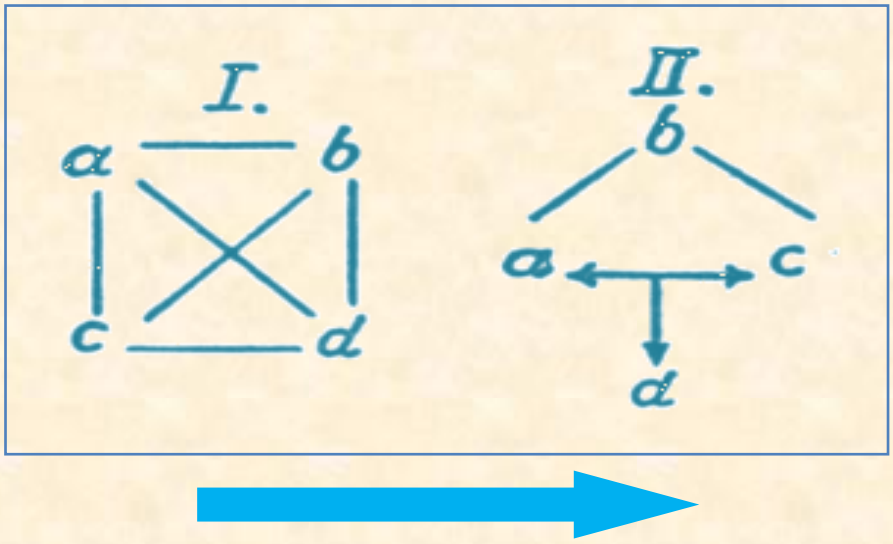


The inorganic realm was, for Steiner, only one kind of reality for which there is a distinctive method. To be clear, it is a *phenomenological system* not a metaphysical one. It is a well known method that modern science calls "the separation of variables" (Oldroyd 1986). So for Steiner, we can begin with simple primary phenomena, lead these over to secondary phenomena and then, after many levels of research (possibly taking decades or even centuries), come eventually to the explanation of the cosmos. What we find in modern cosmology, for instance, is an attempt to bring together the unity of all primary and secondary

phenomena, using *phenomenological laws*, into a total system, but with the addition of the metaphysical laws of modern physics. But the proof of this beyond the scope of what we are trying to do here.

Steiner then saw the inorganic realm as the simplest form of Nature. A phenomenon of inorganic nature, for him, came into being through a given set of conditions that were *external* to the phenomenon itself. In other words: *the existence of inorganic nature is completely conditioned by the external determinants and has no existence of its own*.

You will find the following methodological diagram in the original text which expresses the general set of *potential* relationships between the observable phenomena and as the starting point for discovering the primary and secondary phenomena and the conditions which produce them. He presented the following picture of the research procedure involved in inorganic nature:



In any given nature situation a researcher will be confronted with a complex set of observable phenomena. The task is to explore which of these are conditions, which are primary and secondary phenomena. The aim is to move from the left to the right side of the diagram to find that which is essential for the production of the primal or archetypal phenomenon. Steiner gives the following examples of archetypal phenomena:

> "Every natural law, therefore, has this form: When this fact interacts with that, this phenomenon arises. It would be easy to show that all natural laws really have this form:
>
> 1) When two bodies of unequal temperature are in contact, heat passes from the warmer to the less warm until the temperature of the two is the same.

2) If a fluid is contained in two vessels which are connected, the level becomes identical in the two vessels.
3) If a body stands between a source of light and another body, it casts a shadow upon the latter.

In mathematics, physics, and mechanics, anything which is not mere description must be a primal phenomenon." (Steiner 1886, p. 79)(My numbers and formatting)

One of the central things that come to light here is how *systematic* and *phenomenological* Steiner's methodology is. In each case, the primal phenomenon consists in a simple reality extracted from the complex web of nature. The scientific procedure requires the focus on the observable conditions which give rise to the primary and thereafter the secondary phenomena and ultimately the complete system, such as the cosmos. In this way the *Idea* of the observable relationships is grasped by the human mind with no need for unobservable physicalist entities, states or processes. Obviously, a phenomenological approach to science would lead to quite a different world view if the metaphysical components were dispensed with. However, the advantage of constructive empiricism would be that these would not be considered meaningless even if they were not accepted as real. A Goetheanist may then place themself in a dual position in accepting the phenomenological laws as being real, but with the metaphysical laws as unreal but informative. Goethe himself called his method "*rational empiricism*" in order to distinguish it from mere empiricism on the one hand and rationalism on the other (Steiner 1886, p, 80).

3) Organic Nature

Steiner's organic method of research is particularly relevant to the Life sciences and Biology (plant and animal studies). Steiner's "*Theory of Knowledge…"* takes a slightly different approach than the biology aspects of his education lectures the "*Kingdom of Childhood*" in that it focuses on the inherent capacities of the living to express itself in particular conditions. The latter of these looks more at the environment of plants and animals in a holistic way. The two approaches are complementary.

Steiner describes the difference between the organic and the inorganic in the following way:

> Every single organism is the moulding of the *type* in a special form. It is an individuality which governs and *determines itself* from a centre outward. It is a totality complete in itself - which in inorganic Nature is true of the cosmos alone. The ideal of inorganic science is to grasp the totality of all phenomena as a unitary system, in order that we may approach each phenomenon with the consciousness that we recognize it as a member of the cosmos. In organic science, on the contrary, the ideal must be to have in the utmost entirety possible in the type and its phenomenal forms that which we see *evolving* [or *developing*] in the series of single beings. *Tracing the type back through all phenomena is here that which matters.* In inorganic science the system exists; in organic the comparison (of each single form with the type). Steiner, R (1888): *Theory of Knowledge.., Ch XVI Organic Nature.* p. 98/99, (My emphasis and addition in square brackets)

At the time (ca 1880), the scientific method was dominated by an attempt to understand the living World through a mechanistic approach, frequently focussing on temporal *causation*. Steiner considered this to be an inappropriate projection of the inorganic method onto the living realm. Following Goethe, Steiner wanted to cultivate an approach that was unique to the realm concerned, in this case the organic or living realm. For him, the central explanatory principle of the organics is the *Type* not the *Cause*.

The scientific method that Steiner advocated also aims to cultivate the scientific *intuition* and *imagination* through observation and human participation in nature's unfolding. The organic research method has two basic processes:

A) Comparative process between whole life forms

and

B) Developmental / Evolutionary over time.

One of the first things to notice about Steiner's organic method is that it directed primarily at *whole* organisms. Many mainstream approaches focus on the *parts*. In modern biology this frequently means the genetic composition of living organisms or their environment. Whilst these also have their place in a Waldorf setting, there is also the methodological need to

research whole organisms for what they are in themselves. One might call this an intrinsic understanding of living organisms, both in their comparison with other living organisms as well as their developmental and evolutionary processes.

The Type and the Environment: Self Identity and External Influences

For Steiner, in the organic sciences, the aim is to search for what he calls the "*Type*". He makes the case that the Type is not merely a result of environmental forces, as is the case in the inorganic realm, but has its own self-determined reality with some influence from the environment:

> Before everything else, we must direct our thought to this question: Whence do we derive the content of the general class of which we consider the single organic entity a particular instance? We know perfectly well that the specialization is due to the *external influences*, but the specialized form itself we must derive from an *inner principle*. The fact that this specialized form itself has evolved we can explain when we study the *environment* of the entity. Yet this special form is, none the less, something in and of itself; we find it possessed of certain characteristics. We see what the essential matter is. There comes into relation with the external phenomenal world a certain *self-formed content* which provides us with what we need in order to deduce these characteristics. In inorganic Nature we become aware of a certain fact and we seek a second fact and a third in order to explain this; and the result of the inquiry is that the first seems to us the inevitable consequence of the second. In the organic world this is not the case. Here we need still another factor besides the facts. We must conceive at a deeper level than the influences of external conditions something which does not passively allow itself to be determined by these conditions but *actively determines itself under their influence* (Steiner, R (1886), p. 88).

Today, it might be thought that what constitutes the "inner principle" is the gene. But for Steiner, this would be just another manifestation, or particular instantiation, of the Type. The Type is all inclusive of every single phenomenon of individual organisms so would necessarily include their genetic composition. So, for Goethe and Steiner the "inner principle" is the *Idea* of the organism.

The Unity of the Type and Individual Forms: Universality and Inclusivity

Steiner makes the case that the Type is inclusive of the observable individual forms of the organism. There is no separation of identity between Type and Instance, there is only the difference of "all inclusiveness" and singularity:

> But what is this fundamental? It cannot be anything else than that which appears in the particular in the form of the general. But what always appears in the particular is a definite organism. That basic element is, therefore, an organism in the form of the general: *a general form of the organism which includes within itself all particular forms*. Steiner, R (1886), p. 88

From a cognitive perspective, the Type therefore is only experienced in its totality in a certain kind of *thinking - imagining* and only in perception when this is brought to it by human consciousness. This scientific method would be to strive towards an inner cognising of the type from a multiplicity of perceptions and back again.

Observation, Rationality and Idea

Steiner is keen to show that organic science, in the fashion of Goethe, is a rational activity based on phenomenal observation, not given to mysticism:

> This general organism we shall call, after the precedent of Goethe, the *type*... This type is not elaborated in its entirety in any single organism. Only our *rationalizing thought is capable of grasping this by abstracting it as a general image out of the phenomenal*. The *type* is thus the *Idea* of the organism; the *animality in the animal*, the *general plant in the specific plants*. Steiner, R (1886), p. 88

Philosophers of science might recognise that as being similar in some respects to scientific induction. The difference being that here the scientist is encouraged to create a series of images which are abstracted from the *observable* individual phenomena and thereby create a cognitive pathway to the Type. This is cognised as the *Idea* of the organism. We have three stages here to the scientific process: 1) observation of individual organic forms; 2) the production in the human mind of the images of the multiplicity of forms, bringing these into continuous flux and 3) the cognitive grasping of this as the *Idea* of the organism: the *Type*.

It might be important to note here that the term "Idea" has at least two meanings for Steiner. To begin with, there is "Idea" as an act of cognition; secondly, that "Idea" can also refer to the generative principle of individual instances of things. This has existence in the World whether or not someone is thinking it. The task of cognition is to actively enable this to become a part of consciousness in another form.

From the Type to Families, Genus and Species: Infinite Multiplicity

For Steiner, the Type is the most general of living things. It is not to be seen just as a species, Family or Genus:

> Under this term *type* we must not imagine anything fixed... The type is something entirely "*fluidic*" out of which may be *derived* all separate *species* and *families*, which we may consider *sub-types*, specialized types. The type does not exclude the *theory of descent*. It does not contradict the fact that organic forms evolve one from another. It is only [that here I make] the rational protest against the idea that organic evolution proceeds merely in the successively appearing objective (sense-perceptible) forms. It is that which is basic in this entire evolution. *It is the type that establishes the interconnection amid all the infinite multiplicity*. It is the *inner aspect* of that which we experience as the *outer forms* of living creatures. The Darwinian theory presupposes the type. Steiner, R (1886), p. 90, (My emphasis and addition in square brackets)

Steiner writes here of a derivation of organic categories of species and families from the Type. For this to work conceptually, the Type – Idea needs to be fluidic and inclusive of all possible forms which may be classified as sub-types. These are also not sense-perceptible forms in their entirety. Moreover, what Steiner here proposes is a different understanding of the process of evolution by descent. Rather than one individualised, and sense-perceptibly manifest, species of an individual organic form evolving from another, the successive species evolved from out of the Type as Idea, or the species as a sub-type Idea. That is to say that evolution occurs through the "Idea" of an organism, understood *ontologically*. *Epistemologically*, the scientist cognises this process in consciousness through the relationship from: *perception to memory & imagination to Idea as a manifestation of inner consciousness.* What occurs in the epistemic inner consciousness of the researcher is a reflection of the ontological outer existences in evolution and development.

Rational Organics: Scientific Hypotheses and Individual Organic Form

One of the questions that may arise in relation to the organic sciences is that of prediction. This is often seen as one of the defining principles of something if it is to be called a science at all. In part, this is a derivative of the predictive capacity of the inorganic sciences. For example, given the equations and special conditions of projectile motion, physics can predict where and when a projectile will reach its goal. Similar predictions can be made concerning other physical states and objects in thermodynamics, electromagnetism and optics, etc. The question is if there is something similar in the organic realm?

> Therefore, a science of organics that sets out to be scientific in the sense in which physics or mechanics is scientific must show the *type* as the most *universal* form and then in various ideal separate forms. Mechanics also is such a grouping together of various natural laws in which the requirements of reality are presupposed theoretically throughout. The same must be true in organics. Here also, if we are to have a rational science, we must presuppose *hypothetically* determined forms in which the type takes shape. One must then show how these hypothetical forms can always be reduced to a definite form lying before our eyes [observation]. p.92. (My emphasis)

> Here an objection may be raised. If the typical form is something altogether fluid, how then is it at all possible to set up a chain of special types in a series as the content of an organics? It may well be imagined that, in each special instance observed, a particular form of the type is to be recognized, and yet we cannot merely assemble such actually observed instances in the name of science. But we can do something else. We can allow the type to follow its course through the *series of possibilities* and then *fix* (*hypothetically*) in each case this or that form. In this way we arrive at a series of forms *deduced by thought* from the type, as the content of a rational organics. p.93. (My emphasis)

Observation always produces a finite set of things perceived. As a consequence, there would always be gaps in the observational sequence. In mathematics, this is known as the problems of extrapolation and interpolation. What Steiner is discussing here is a similar process in the organic sciences: by deducing a currently unobserved organic form and creating a form

hypothesis for the gaps in observation. These can then be tested out empirically. This is comparable to prediction in the physical sciences, or extrapolation and interpolation in mathematics.

Scientific Intuition as a Method

Modern science isn't accustomed to reflecting on the kind of cognitive process exercised in particular cases. In Goethean science however, this plays a pivotal role:

> As the type in organic nature replaces natural law (the primal phenomenon) in the inorganic, so *intuition (perceptive power of thought) (anschauende urteilskraft) replaces the power of judgment through proof (reflective judgment)*... For organic science, however, intuition is the right method... For us, intuition is the actual *being-within*, an entrance into the truth which gives to us all that comes in any way under consideration in regarding truth... Insight gained by way of intuition is just as scientific as that won by proof. p.98. (My emphasis)

From a certain perspective, the contemporary World View of science is a derivative of that specialised way of thinking that Steiner calls "reflective judgment". This type of thinking involves reflecting on the relationship between sense-perceptible realities. As such it can only grasps those kinds of laws we earlier called "phenomenological laws". Steiner considered this inadequate for an understanding of the organic realm. For him, the essence of life cannot be understood in this way only the inorganic conditions can. This is why he put forward this Goethean concept of Intuition as a "being within" as it requires the inner access to the Type itself as Idea. It is through this additional kind of thinking that the genuinely organic could be understood. In part, this consists in that human ability that can become aware of the transcendent potentialities of the Type and how it can manifest in immanent actualities.

One way to see the *perceptive power of judgment* (anschauende urteilskraft), is as a conscious bringing together of the Idea-metamorphic-flux within human consciousness with specific observations. The endlessly changing ideal form comes to rest in the singular one of observation.

From the Type to Development and Evolution

From a methodological perspective, most modern scientists would want to know how this all relates to the central concept of biology, namely: evolution.

> The ideal of inorganic science is to grasp the totality of all phenomena as a unitary system, in order that we may approach each phenomenon with the consciousness that we recognize it as a member of the cosmos. *In organic science, on the contrary, the ideal must be to have in the utmost entirety possible in the type and its phenomenal forms that which we see evolving in the series of single beings.* Tracing the type back through all phenomena is here that which matters. In inorganic science the system exists; in organic the comparison (of each single form with the type), p. 99. (My emphasis)

Methodologically, the research pathway toward a concept of development and evolution consists in observing individual organic forms and comparing them to the ideal Type. Modern genetics would fall on the side of being one instantiation of observed "forms" and as such is not the terminus of the research procedure. Development and Evolution, from a Goethean perspective would be explained in terms of how the Type manifests in its particular adaptations to specialised environments and how this is carried forward through reproduction and inheritance. The idea of the Type could only be acquired over a long period of time and is perhaps never complete. Science is an ongoing process and the cognitive grasp of the essential idea of a being is partial to begin with and becomes more complete over time, maybe never entirely.

The Cultural Sciences (Geisteswissenschaften)

Steiner's concept of the cultural sciences may be encapsulated by the methodologies of "Self-Knowledge" and "Other-Knowledge". Within this framework, Steiner includes the humanities, arts, psychology, history, education, etc. Essentially, *culture is everything that is a creation of the "individual human spirit"* as distinct from a creation of *nature* (Steiner 1886, p. 101).

The distinct methodology is described simply as "*the spiritual is grasped (understood) by the spirit*". This marks a methodological shift from the natural sciences in that there the individual human, defined by Steiner as the spirit, aims to understand the beings of nature. There the

human Self researches that which is Other than itself. In the cultural sciences, *the Self researches its own Self as well as that of other human Selves*. This has a number of different qualifications as described in the following.

The leading motive in Steiner's approach to research in the cultural science is the essential differences between the explanatory principles of the different realms. This leads to different trajectories for the methodology applied:

> The human being should not, like a being of inorganic Nature, act upon another being according to external norms, according to law which dominates them; nor should they be the single form of a general type; but they should themselves fix the purpose, the goal, of their existence, of their activity. If their actions are the results of laws, these laws must be such as they give to themselves. What they are in themselves, what they are among their own kind, in state and in history, — this they must not be by reason of external determinations… Here originates the mission which psychology, the science of peoples, and the science of history have to achieve (Steiner, R 1886, p.101/2).

Steiner's warning, particularly to the researcher, is that they should not to aim to understand the human being to be merely an object of inorganic nature or organic nature: the human being is self-determining in their essential nature. The methodological implications are that, how we approach the human being, including ourselves, should not have the goal of researching in terms of inorganic laws of necessity or indeed as organic Types. In fact, it may be argued that to do so would only enable an understanding of human beings in so far as they are inorganic, determined by laws of necessity, or organic, explained by a typology under environmental conditions. The methodological goal of the cultural sciences, in contrast, is the explanation of the human being in terms of the self-determined individual coupled with the method suitable to meet that goal. There are a number of different forms of the cultural sciences described below.

4) Psychological-Social-Historical Method

When Steiner writes of the psychological sciences he does not only mean this in the narrow sense of the term. In this, he also means social spheres, a science of the state and a science of peoples. This includes also a historical perspective. The starting point for this consideration is his definition of the locus of methodology and its goal:

> The first science in which the human spirit deals with itself is psychology. The mind here stands *observing itself*… the psychological method consists in the immersion of the mind in its own activity. Here then *self-cognition is the method*… It is obvious that in this discussion we do not restrict psychology to being the science of the fortuitous characteristics of any one human individual (this one or that one). We release the single mind from its fortuitous limitations, from its accessory traits, and seek to raise ourselves to a consideration of the *human individual in general*… What is otherwise intuition becomes here *self-contemplation.* (Steiner, R, 1886 p. 104-06) (My emphasis)

So the question is: what is the human psyche observing when it contemplates itself:

> The unitary soul is given to us in experience just as are its single actions. Every person is conscious of the fact that their *thinking, feeling, and willing proceed from their ego (Ich)*. Every activity of our personality is bound up with this centre of our being. If, in the case of any action, we ignore this union with the personality, it ceases to be a manifestation of the soul. It belongs under the concept either of inorganic or of organic nature. If two balls lie on the table, and I thrust one against another, all that happens is resolved into physical or physiological occurrence, if my purpose and will are ignored. In all manifestations of the human spirit — thinking, feeling, willing — the important thing is to recognize these in their essential nature as expressions of the personality. It is upon this that psychology rests. (Steiner, R, 1886, p. 107) (My emphasis)

Steiner prefaced this with a warning that the modern psychology of his day was in danger of creating a "theory of the soul without any soul". A part of this concern is the misapplication of the methods of the inorganic sciences to understand the human psyche. This arises from the notion that the goal of psychology is to understand the human being in terms of laws of necessity, rather than in terms of the independence of the psyche. This had its culmination after Steiner's time in the development of behaviourism and also reductive physicalism. Sometime these views converge on the elimination of the human mind, the inner life, from scientific consideration: "Behaviour can be described and explained without making ultimate reference to mental events or to internal psychological processes. The sources of behaviour are external (in the environment), not internal (in the mind, in the head)" (Graham 2010). In this view we have the realisation of a "theory of the soul without any soul".

For Steiner, however, the opposite is the case. For him, the focus of psychology and other related sciences are the human faculties of thinking, feeling, willing and "I". These are clearly *inner* "phenomena", rather than outer ones, and which are the subjects of psychology. These are to be scientifically approached through "self-contemplation". The goal would be to understand the relationships between these in a general human sense.

The more social orientated sciences, for Steiner, are, in a sense, more specialised as they are to do with the understanding of states, peoples and their history. Arguably, this includes a more specific understanding of how thinking, feeling, willing and "I" are, or could be, related to each other amongst a collective of individuals and self-determined individuals. Steiner saw these sciences as being about how states and societies can create forms for the fulfilment of self-determined individuals. Scientific methodology then goes beyond merely discovering *what is* to *what could be* for the cultivation of freedom. In contradistinction to behaviourism, Steiner's methodology saw the *sources* of behaviour (action) as being in the *inner* life of the human being, in thinking, feeling and the will impulse to action.

In the modern context, the social orientated sciences, on the basis of Steiner's views, require the researcher to see themselves, even as a researcher, as a part of the social life. This raises a dual research procedure: 1) to know themselves and 2) themselves in relationship to the Selves like themselves. In this context, the self as "I", thinking, feeling and willing comes into a research relationship with other selves as "I", thinking, feeling and willing beings. In that context, the practice of the *epoché* is of eminent value as it makes possible the genuine knowledge of the "Other" without the influencing veil of the "own Self". As discussed above, the *epoché,* as an *inner empirical practice*, frees the mind from personal prejudice thereby enabling the acquisition of genuine knowledge of the Other. Here, this also means the principle overcoming of the subjectivism sometimes associated with the interpretivist framework of modern education research.

5) Freedom as a Method

Freedom as a scientific methodology is a natural consequence of the above. Its consideration appears in Steiner's "*Goethean Science*", "*Theory of Knowledge"* and, more importantly, "*The Philosophy of Freedom".* Here the primary concern for Steiner is how to understand the human individual as a free being. This is the complementary side to the discussion in the previous paragraph. There the questions concerned the prerequisite social conditions whereby

an individual could be free, here, on the other hand, is question is: what is individual freedom and how is it brought about by the individual?

> We take this opportunity to call attention to the very excellent treatment of the subject by Kreyenbühl in *Philosophische Monatsheften* (Vol. 18, No. 3). This paper correctly explains how the maxims of our conduct result directly from the determination of our individuality; how everything which is ethically great is not given through the power of the moral law but is performed on the basis of the direct impulse of an individual idea. Only from such a point of view is a true human freedom possible. If man does not bear within himself the reason for his conduct, but must guide himself in accordance with commandments, he then acts under a compulsion; he stands under a necessity almost like a mere entity of Nature. (Steiner 1886, p. 110/11)

From methodological perspective, this, for Steiner, is a question that each individual needs to ask of themselves: to what extent am I free and unfree? How are my "I", thinking, feeling and willing free or determined by processes outside or inside myself? How can my unfreedom be transformed into freedom? Again, this to begin with is a research method based on inner empiricism in relationship to outer empiricism. In terms of the former, the consideration here involves the inner "phenomena" of "I", thinking feeling and willing, and the conceptualisation of them in relationship to inner self-determination.

6) Artistic Method

Here, Steiner describes the similarities between the methods of natural science and that of the arts:

> In science, Nature, as "that which includes every single," appears purely as Idea; in art, an object of the external world appears as a representative of the all-inclusive. The infinite, which science seeks in the finite and endeavours to represent in Idea, is stamped by art upon a material taken from the world of existence. What appears in science as the Idea is in art the image. (Steiner 1886, p. 117)

The difference is essentially one of direction. The natural sciences proceed from the sense-perceptible World towards the Idea, such as in the form of a conceptual explanation of observations. In art, the process begins as "Idea" and moves toward the sense-perceptible.

Clearly, there are elements that Steiner does not explicate here, such as the nature of this artistic Idea as well as the practical conditions through which it may be realised in the world of observation. But for our purposes here, the method is highlighted in which "Our mind rises to the vision of that fountain-head in which all these potentialities are contained… The same infinite is the object both of science and of art". Clearly, the mere copying of the images of nature is not why Steiner is here describing. The method consists in cognitively grasping what these "infinite potentialities" might be and how to implement them in the actualised World.

7) Self-Transformation and World-Transformation: Science and Anthroposophy

Before we go into this question, below I want to look at modern science from a higher perspective and highlight some *generic* aspects common to all modern science which throw some light on anthroposophical methodology as a science. This is important as it is well known amongst supporters of anthroposophy that Steiner conceived it as a "spiritual science". This is even written into the constitution of the anthroposophical society as being the centre of its activities. So this question is central not only to an understanding of anthroposophy but also its daughter movements such as Waldorf Education, Anthroposophical Medicine and Biodynamic Agriculture, etc. Anthroposophy as a science is in this sense the most fundamental question of all the sub-divisions and sections of the anthroposophical movement.

As previously stated, it is also known that critics of anthroposophy, and indeed of Waldorf Education, argue that it is not a science, rather it is a pseudo-science. As noted, this has been said by representatives of the British Humanist Association and is currently making the rounds amongst Waldorf critics in Germany and even believed by some Waldorf supporters. There, it has been stated that anthroposophy is Waldorf's "World view problem" and that it would be better off divorced from it: a "Waldorf without Steiner… it is in fact the case nowadays that this demand has already become reality in many schools and other anthroposophical institutions. The success anthroposophy has had in many areas of modern life seems to have gone hand in hand with a sell-out of its own basic principles" (Schieren 2011, p. 90).

A part of the difficulty with the critics' views is that they often have a misguided view not just of anthroposophy but also of modern science: a kind of ignorance to the power of two. From the latter of these, they judge anthroposophy on a false basis. This view is often represented that modern science is largely defined by its empirical methods. As I will show, this view is one sided.

Natural Science as a Whole Process

As previously discussed, contemporary *popularised* version of science describes it as being defined primarily by empirical facts and developing an understanding of them. Science as beginning with observation is derived from this and which becomes an urban myth which some consider unwise to doubt. Of course, science can seem to begin empirically or even be defined by its *empiricism*, but observation can also have *theoretical* antecedents as well as consequents. Despite this popular belief, science is not only about empirical facts, nor does it *necessarily* even begin with its corollary: observation. Modern science has transcended the purely empirical as has had, what some commentators claim: a distinct turn to *realism* (Papineau 2001). What this means is that science is not conceived as a mere documentation of empirical facts, but is also a striving towards a real "*World Image*". The entities, process and states which it uses in attempts to explain the empirical facts are considered to be real and not mere fictions by the large majority of scientists.

Consequently, a better approach to defining science would be to see it as a holistic process in which each interdependent part is conceived as an element which defines science as a total process:

1) Literature Analysis: the deep Contemplation of Theories and Laws and the creation of Realistic Imaginations

Modern science proceeds from and leads to *theoretical imaginations* of the World. One only has to consider a couple of anthologies concerned with this imaginative dimension such as "Nature's Imagination" (Cornwell 1995) and "Physics and our View of the World" (Hilgevoord 1995); each written by over twenty scientists and philosophers of science. Apart from a few honourable exceptions, modern science research frequently begins and ends with a literature analysis which engages in *Imagination Building*. One reason for this is that science is in an ongoing process of creating a *World-View* based on empirical evidence, but moving towards a theory-based imagination. It does not stand still at the mere empirical stage. Another reason for this is that the scientist needs to consider the *theory context* for their work in light of possible observations that they may later make. This enables the contextualisation of possible observations within theory. So rather than science beginning with observation, in many cases it begins with a contemplation of theory and its imaginations. This can also mean a conceptual framework, a theoretical picture or a model (also a picture of a kind). For example, a cosmologist may analyse the theory literature concerning the beginnings of the universe and through which laws of physics it is thought to have unfolded. Scientists then create inner and

outer images for this process or may see them depicted in journals and books. At this stage of the scientific process, no observations are being made, only theoretical contemplations and imagination making. This stage is an essential part of any scientific activity in the modern world.

It is in this activity that our views, imaginations, of the world are created. You might say that we have a natural science that strives towards a metaphysical world view (Hilgevoord 1995). Metaphysics is a study of reality and what it is thought to be made up of. In natural science, there are many theoretical entities, processes and states which are impossible to "test" directly through observation. Instead, what we have in this activity is *evidence based metaphysics*. This is the norm these days and simultaneously indicates the demise of logical positivism as well as pure "sense-based empiricism" which preceded it. Modern science certainly makes empirical observations, it is a crucial part of the scientific activity, but the phenomenological content of these does not necessarily coincide with the metaphysical realities that are theorised to produce them. An example might be colour perception. Physics explains this though the theory of wave-particle duality. But physics does not make the case that these wave-particles are coloured, rather that colour is produced in the interaction of light with the human organism. I am not arguing that the explanations of physics are correct, or incorrect, but simply that this is what it does as part of its practice.

2) Forming Research Concepts and Hypotheses

But science does not end with a literature review and the creation of imaginations. On the basis of the literature analysis, additional concepts and hypotheses can be formed that are later able to test the theory. Making observations by themselves say very little. It is only when they are placed within the context of a theory or a hypothesis that observations take on significance: the observation of spectral red-shift has little meaning unless seen in the context of electromagnetic theory, via the Doppler Effect and, in cosmology, placing this in the context of the theory of the big bang singularity. The aim of this part of the scientific process is to go beyond the existing theory and observation to establish new theories and observations that would test out the original theory.

3) Instruments and Observation

Not all objects can be observed unaided. Many objects of science need instruments in order to enhance observation or even make an observation possible (Hacking 1986). Before the development of microscopes and telescopes, the very small and the very distant could not be seen by unaided observation, very small organisms and distant planets could not be seen but indistinctly. When these aided observations became possible, world views were shaken and changed.

Later, after the discovery of electricity and instruments based on it, other observations could be carried out. For instance, observations could be made through the so-called electron diffraction experiment. It is experiments like this that the existence of the electrons could be deduced. One has to add here the electron and other sub-atomic particles are not directly observed, their existence is deduced and imagined on the basis of observational evidence. This is a part of science that I have called "evidence based metaphysics": it is the creation of imaginations which transcend the physical but which are based on sense-observations. Whether this is justified or not is another question.

4) Making observations and doing experiments

When people think about natural science, more often than not the empirical side of the activity comes to the fore. The making of systematic sense observations is most frequently seen as its *defining* characteristic. But science is much more than this and requires observation to be embedded in theory. To most people, the blue sky is just that: blue. To a modern scientist, the observation of blue is contextualised in the theory of the dispersion of the wavelengths of light. Likewise, for observation, an object falling to the ground is no more than a phenomenon. But to a physicist, objects fall due to the gravity field surrounding all objects with mass and which causes mutual attraction: the *observation* of falling is situated in gravitational *theory*. The observation takes on scientific meaning due to its location in theory and the imaginations of the gravity field implicated by it.

The other side of the coin is that theory needs observation for it to be tested. If a scientist has two or more competing theories, then one way to decide which is the better requires observation. Which means that *observation needs to have something independent from the theory* otherwise it cannot be tested. If there is no independence in a practical situation, then the problem of the "theory-ladenness" arises. If that occurs, the observation cannot refute the

theory, it can only confirm it; effectively the "theory" becomes pseudoscience and thus has no scientific validity.

5) Analysing Information

After a theory has been duly tested, analysis of the information gathered can be analysed. This would be done after observations have been made and their role in testing a specific theory. Other deductions such as the possible need for further observations would arise at this point as well as the nature of the theory under scrutiny.

6) Comparing to other Theories

A broader activity would be the comparing of the above specific theory with other theories. In many instances, there are competing theories not just one. Although there are cases in which one theory, or modifications of it, are the only game in town (at least for the present). In the case of the former, an example might be the classical mechanics *vs* relativistic mechanics. In the history of science, it was decided that the latter is the better theory due to the fact that it could be used to make a broader set of predictions that the former.

7) Writing and reporting literature

As a scientific activity, the writing and reporting of scientific literature, based on the preceding activities is crucial. Whilst this is predominantly a *thought* activity, it also involves the creation and mediation of transformed images, models and imaginations derived from the former activities. This is where the "World View" change is communicated with other scientists and which enables further work which follows the preceding activities on a higher level. This part of the scientific activity enables progress for the scientific community.

Natural Science as *Evidence based Metaphysics*

Natural science is frequently occupied with "the big picture", imaginations of the past and future with the aim of understanding the place of the human being in the Universe. The past and the future, however, have deep knowledge problems in that we can only know the relative

present. Consider the following epistemological problems involved in creating "World Imaginations":

Retrodiction: the Fundamental Untestability of the Past

Sciences like cosmology, geology and evolution are initially concerned with creating a view of the past and how this plays into the present. They are based on a principle called "actualism": the laws and principles that are active in nature *now* are used to create a view of the past, a principle formulated by the British naturalist Charles Lyell (1797-1875) and is now the foundation of modern geology. It is based on the assumption that at least some of these laws and principles were still present in the past either in *degree* or also in *kind* (Ruse 1986, Balashov 1990).

There is no sense in which these views can be tested in the usual sense of the term as we are dealing here with past epochs of time to which no one can return and make observations. The distant past can simply not be observed: it can only be imagined. The big bang singularity is then a rational deduction based on actualist principles; it is a theory founded on the natural laws of the present and the rational coherence of scientific logic and mathematics. These are transformed into scientific imaginations.

Evolutionary theory is no different even though it concerns relatively smaller time scales. Laws and objects, such as fossils, are found in the present and logically coherent stories are told about how living things came about and evolved into the present. Observations of this past cannot be made, only observations of the present which are then checked for coherence with the imagination of the evolutionary past: the theory of the past is tested for logical coherence with the observable present.

My argument is that both of these theories are "scientific" even though they cannot be directly tested through observation only by coherence with evidence in the present. *Both are a form of evidence based metaphysics*. This does not detract from their scientific status; it is not metaphysics in the abstract philosophical sense, i.e. the kind that is based on pure logic and one can find in philosophy books on the subject. Cosmology and evolution are, at least in a part of their scientific activity, a form of metaphysics derived from observational evidence based in the present.

Prediction: the Fundamental Untestability of the far future

When scientists talk about prediction they usually mean within the relatively current time frame. A theory may postulate an outcome when certain conditions are set up. The outcome would be in the near future which the combined theory and initial conditions determine. This near future may be in a few seconds, minutes, hours or even nano-seconds.

There are other predictions that scientists make which are in the far future. By this I mean hypothesised events such as the "big crunch" or the "big whimper", i.e. cosmological theories estimated to end the current round of cosmological evolution in billions of year's time (Guth 1998). Such theories are not testable within the current time frame and should be given the label of a *scientific imagination*. No observations of these potential events can be made in the present so they lack an empirical base. What may be observed are events and laws within the *present* which constitute the principles through which events of the far future can be "predicted". Such a view constitutes a part of science which essentially is a part of *evidence based metaphysics*. But this is still a part of science.

Anthroposophy as Spiritual Science

In anthroposophy there are similar activities which may justify its claim to scientific status. For some, it is an extended form of empiricism involving *inner* observation in addition to outer observation, for others it may be interpreted as a kind of *evidence based metaphysics*.

At the first stage, for most people, spiritual science begins with a study of the literature. Whilst the majority of this is from the works of Steiner, this is not exclusively the case. The activity consists in thinking through and creating images of what to begin with is of a purely *metaphysical* content. Whilst the content of this literature may have been knowledge for the writer, for the majority it is theory and should be treated as such. This means that for the researcher, it can only become knowledge (the union of observation with idea) later when tested out through soul and spiritual observation. However, this does not exclude the literature analysis and imagination creation of a soul and spiritual metaphysics from their scientific status just as in natural science metaphysics is not excluded from its practices.

The second stage is more complicated and there are few who can, or have, created new concepts and hypothesis concerning spiritual realities. But, this needs to be linked to the third stage, namely the development of "instruments". Clearly, this is not meant in the same sense that a scientist may create a physical instrument such as a microscope or telescope. In anthroposophy we have the potential development of "inner organs of perception" which make observation possible. For example, through the six virtues (exercises) and meditation, it is thought that these enable the development of these inner organs. Somewhat like the microscope or telescope, these inner "instruments" enable observations to be made which were not possible before. Obviously these "instruments" are not the same as their physical counterparts, but are living inner soul and spiritual realities which enable deeper observation.

In the fourth stage, the making of actual observations of the soul and spiritual realms becomes possible. This could then be followed with "analysing the information", comparing to other views and reporting the outcomes in literature in the fifth, sixth and seventh stage respectively.

Self-Knowledge as a Scientific Gateway to Higher Worlds: an Evidence based Metaphysics

As a part of its practice, modern science attempts to bring together sense-observations and theories (complex concepts and ideas) in a complex set of ways. Anthroposophy tries to do the same, with the important addition that *inner*-observations are also a part of its practice. In the act of self-knowledge, the spiritual scientist strives to find the appropriate concept for its inner observations of thinking, feeling and willing.

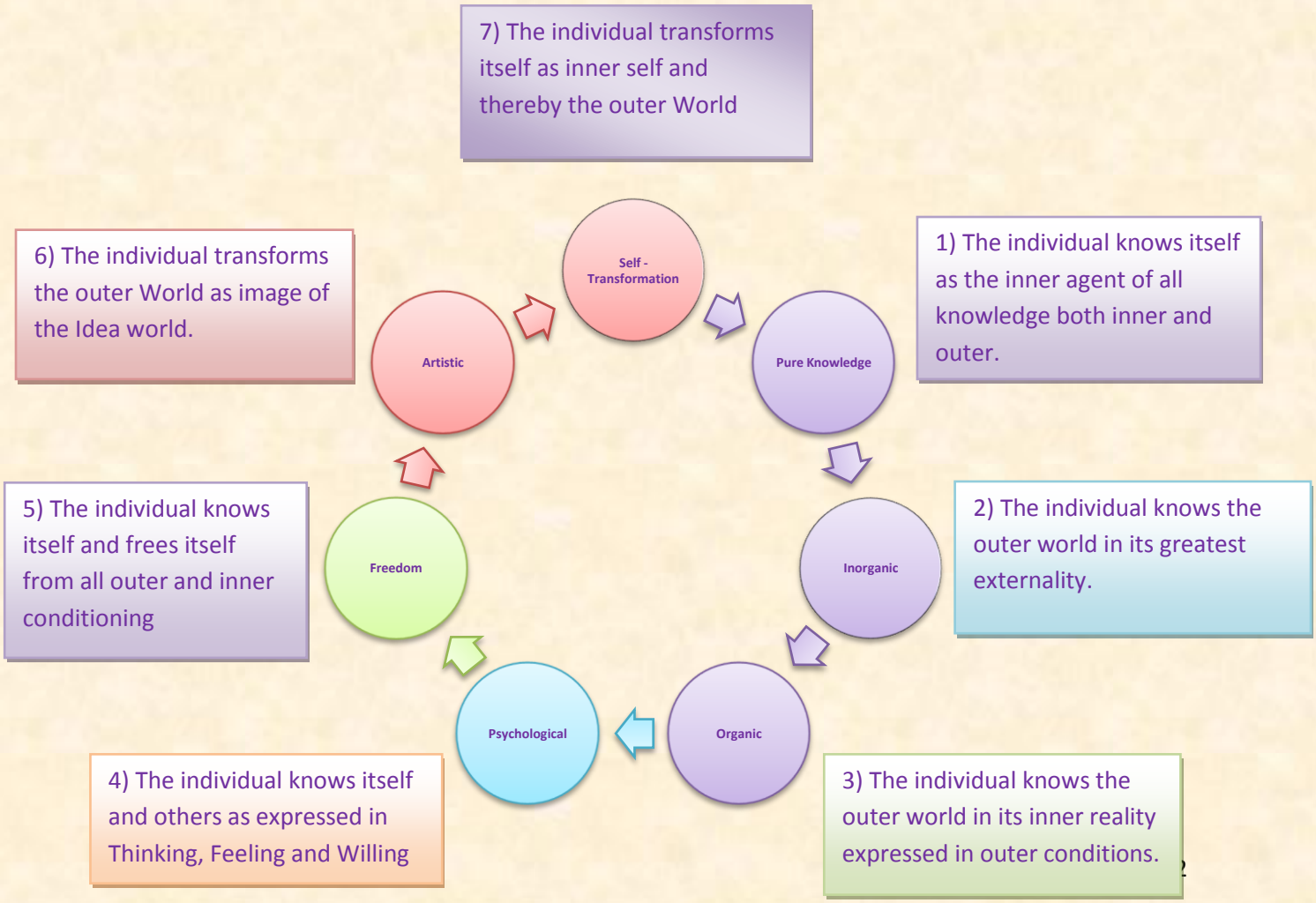
This is a practice which Steiner describes near the beginning of his book "*Knowledge of the Higher Worlds*". One could see this activity as the foundation stone of all the other exercises, virtues and meditations recommended by spiritual science. In the modern World, it may be perceived as a rather unusual practice as well as its designation as a "spiritual science". The activity consists in enabling the "I" to become conscious of itself as well as the soul life as thinking, feeling and willing. You might say that through this, the "*Self becomes aware of itself* and *knows* itself through *inner perception and conceptualisation*". In that sense, it meets one of the criteria for scientific status: the *union of observation and thought*.

But there is more to this. This scientific activity can enable one to come to an understanding of the "I" and the "soul" as transcending themselves as the manifestation of one individual; one

can also scientifically recognise them as revealing an earthly manifestation of the objective and universal dimension of "I" and "Soul". In his book "Theosophy" Steiner calls these the higher Spirit and Soul Worlds. In a sense, through such inner scientific activity, the individual "I" begins to see through the lenses of itself into an objective higher World. Just as modern science observes and infers the very small and the very distant through microscopes and telescopes to create an evidence-based metaphysics of the physical World, so too anthroposophy, through the development of living inner soul "instruments", one can begin to infer and create an *evidence-based metaphysics of the higher Spiritual and Soul worlds*. Later, these observations may be confirmed or refuted through deeper observation.

As each part of this holistic process is a scientific activity in natural science, Anthroposophy follows a similar pattern; consequently anthroposophy may, in this respect, be seen in this light: as a science. It is important to understand where one stands in this process as an individual as well as the anthroposophical movement collectively.

Summary: a Circle of Research Methodologies based on Steiner's works



Conclusions

Critics of Waldorf and Anthroposophy may rightly be accused of trivialising modern science as well as education research. In an abysmal attempt to discredit the education itself or its foundation, anthroposophy, they have essentially discredited themselves in their ignorance of modern research. Or perhaps they show a deliberately distorted appeal to a pop-culture approach to science present in modern media. What we have seen here, however, is that modern science and its philosophies have a complex set of interpretations, some of which are completely in disagreement with each other. *This does not disqualify them from scientific status*; merely that they are a complex set of perspectives, some of which may indeed turn out to be wrong.

The Waldorf / Anthroposophical are a part of this picture. They demonstrate agreement with some aspects of modern science and its philosophies and disagree with others. This does not disqualify them from scientific status, merely that they have a set of contending positions across a complex set of viewpoints. With constructive empiricism, anthroposophy agrees that sense-phenomena are a part of reality, but that there are other levels of reality too. It disagrees, though, that theoretical entities are *necessarily* unreal, but that in many cases they might be. In that sense, it may disagree with scientific realism in some cases but not others. Moreover, anthroposophy would disagree with that form of scientific realism that leads to reductive physicalism and Ultimate Physicalist Ontology. Anthroposophy would make the case that the physical is only one form of reality, in terms of its phenomenological laws, but there are soul and spiritual realities within World Being. *All of this is a normal part of critical science not a dogmatic pseudoscience*.

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