The Causality of Thinking

A Research on Rudolf Steiners`s Monism

by Michael Muschalle

Translated from the German original “Kausalität des Denkens. Eine Studie zum weltanschaulichen Monismus Rudolf Steiners“ by Terry Boardman and Gabriele Savier

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Some years ago the mathematician, physicist and cosmologist Roger Penrose made the attempt to revolutionise physics by means of a theory of consciousness. In particular he was concerned to bridge the incompatibilities between Einstein's Theory of Relativity or Theory of Gravity on the one hand and quantum theory on the other.

At first glance such a project may seem to be a fantasy. Nevertheless, Penrose has made a clear impact on the scientific world. In the few pages of this essay I hope to communicate an impression that despite some fractures and inconsistencies in his argument, it is consistent in its fundamental train of thought and could be of real interest to anthroposophical readers. From an anthroposophical perspective, one could hardly choose a better point of departure in order to revolutionise modern physics than the one selected by Penrose: the study of the processes of cognition.

Penrose begins with an analysis of these processes in his 1991 book *The Emperor's New Mind - Concerning Computers, Minds, and the Laws of Physics*, which appeared in German under the title *Computerdenken Die Debatte um künstliche Intelligenz, Bewußtsein und die Gesetze der Physik*. 1). The

German title makes it clear: it is a matter of a critical divide between many scientific contemporaries about the thesis that human thinking is ultimately comparable to the electronic process that goes on inside a computer; the difference is held to be at best merely one of a certain complexity but not one of fundamental quality. Thinking is therefore a physical process, and once one has largely overcome the physical barriers of the current computer architecture, then one will certainly soon have also eradicated deficiencies in achievement in regard to human thinking.

Much of the book *The Emperor's New Mind* reads like a plea to save human thinking from the blind and uncomprehending achievements of the calculating machine. Penrose's plea certainly has its strong points. Real thinking, based on *insight*, is according to Penrose, something completely different from the algorithmically driven, automatic procedures of the calculating machine, which remains basically alien and separate from the lawfulness of the process. (p.407f). Mathematical statements of truth do not allow themselves to be formalised and mechanised without limits, but rather always demand at some point decisions of true or false, which the programmed formalism of a still more refined machine principally cannot achieve (p.107f; p.406). Penrose goes further: the nature of mathematical insight, he thinks, not only consists in the abstract and rational cognising of mathematical lawfulness but is actually based on a kind of contact with *ideal platonic beings* which exist completely independently of the human thinker. Mathematical ideas are not invented or constructed, but are discovered on the path of an intellectual perception of these beings (p. 92 f; p.416f). This will seem somehow familiar to the anthroposophical reader.
For Penrose, the instant of contact with the platonic beings at the point of insight is an important moment in the physical aspect of the thought process.
What is stimulated in thinking as thought content chiefly in the moment of *insight* can indeed be something extraordinarily complex and span enormous areas of knowledge. But although it may be rich and disparate in itself, for consciousness it constitutes a meaning that hangs together in itself; it is a unity. *The unity of this consciousness* in the moment of insight is what confirms Penrose in his idea of bridging, by means of a theory of consciousness, the irreconcilables in the great theories of contemporary physics. For there evidently occurs in this process of insight something that is similar to quantum processes, but this something occurs in a realm in which quantum theories do not apply. Something or other must be *working* from thinking, physiologically and physically, into the hugely entangled network of nerve cells, neurites and synapses, for thinking has a physiological correlate. What is working in this way must be initiating exact physiological processes, and indeed simultaneously, for in the moment of insight the most variegated contents of consciousness are often instantly linked in fractions of a second to something new. Who or what, asks Penrose, links up in the same instant such complex contents and organises physiological processes? The *simultaneity* of the occurrence leads him (p. 389) to accept that there could exist here a connection between simultaneous processes, which in quantum theory goes by the name of *quantum parallelism*. But quantum processes are only operative in the world of the miniscule, whereas by contrast, the relevant areas of the brain are truly gigantic and of a completely different order of

magnitude. Penrose's hope is that if one could understand what happens here, one would then have a new physics.

These then, to begin with, are Penrose's fruitful trains of thought. It is essential to note that he rarely leaves the territory of natural scientific thinking. The thought thus occurs to the reader as to whether Penrose is actually seeking merely to check and revise concepts of physics by means of a study of thinking, or whether he is not more concerned to discover a refined, more subtle mathematical-physical super-formalism which can explain *what is at the roots* of thinking and consciousness? Observations of consciousness in the sense of a phenomenology of consciousness occur in the book *The Emperor's New Mind* only sparingly, and in his following book, *Shadows of the Mind* 2) almost not at all. Penrose rejects mysticism (whatever that may be - *Shadows of the Mind* p.15) and instead, is convinced that *within an expanded science and mathematics there will be found sufficient mystery ultimately to accommodate even the mystery of mind and consciousness*. For Penrose, the science of consciousness is mainly commensurate with a methodology oriented towards physics and the natural sciences, which remain rather far from, and suspicious of, a method of *inner* and direct observation of the phenomena of consciousness. If one tries to approach the problem from the side of physics, however - and here is the achilles heel of his undertaking – consciousness is not at all directly perceptible. That is no new insight, but it was only recently reconfirmed by analytical philosophy.3) This methodological one-dimensionality appears somewhat enigmatic and ambivalent. In this sense Penrose is the child of an age that until now has hardly opened up any other avenues for scientific thinking and in which academic knowledge has for almost a century wholly shut out and discredited direct experiential access to consciousness. Only in the last few years has cognizance been taken of renewed serious efforts to free a path once again for such access. 4)

Despite these weak points, Penrose seems to me to be on an important track. One can get a sense of this when one takes a glance at discussions in recent years which have developed around the so-called *body-soul interaction*, or in the jargon of analytical philosophy, around *mental causality*. This question in itself has a long history. It returned in virulent form in 1977 with the publication of the interdisciplinary work of Karl Poppers and John Eccles, titled *The Self and its Brain* 5) With the combined forces of the well-respected philosopher and a Nobel Prize winning brain psychologist, the attempt is made in the book to counter the widespread conception that the phenomena of consciousness are ultimately the same as physical-physiological processes, or else, through these, are conditioned, inconsequential and in terms of causality ineffective ancillary appearances of such processes. Against this, the authors posit the view that there is a realm of consciousness, independent of physics, which has its own direct, causally determinative influence on physiological processes, notably on the brain.

For physics, such an approach is disturbing, because it collides with an almost sacrosanct notion: that the physical world constitutes a unity, a causally closed system. For if there were to be a primal causal influence, stemming from consciousness, on the processes in the brain, then energy would in fact

be produced from nothing, which the law of the conservation of energy rules out. Many critics therefore mobilised themselves against Popper and Eccles 6), while Popper on his side argued that the idea "that the works of Michelangelo are merely the result of molecular movements and nothing else" seems much more absurd than an offence against the First Law of Thermodynamics. (Popper/Eccles, 1982, p.641). Finally, Popper also argues that the development of physics is open, and that no-one knows how the physics of the future will turn out. (ibid., p.640)

In any case, the influential book by Popper and Eccles has had a lasting impact on the academic debate about consciousness and freedom. In some pregnant sentences the philosopher Peter Bieri later summarised the physical and epistemological consequences that had become evident in the debate around mental causation following publication of *The Self and its Brain*:

> *If mental phenomena are not physical phenomena and if there is mental causation, then the realm of physical phenomena cannot be regarded as a causally closed system. If, however, it is causally closed and if mental phenomena are non-physical phenomena, then, contrary to all appearances, there can be no mental causation. And if there is mental causation despite the causal unity of the physical world, then it cannot be held that mental phenomena are non-physical phenomena.* 7)

As became only too clear in this dispute, questions of consciousness, of cognition and freedom, are very closely and consequentially intertwined with fundamental questions of physics. If one draws out the essential thought processes of the opposing positions, the following picture – somewhat closer to the position of Popper and Eccles – becomes discernible: the causal unity (or closed system) of the physical world excludes cognition and freedom. Logically grounded cognition, on the other hand, includes freedom and mental causality and implicitly lifts our current understanding of physics off its hinges in that it makes clear that the Law of Conservation of Energy is invalid.

For in the physical world applies the principle of causality, according to which everything that happens is, without exception, determined by physical processes. If one explains consciousness as nothing but a physically caused and determined appendage of the physical organism, then cognition and freedom are an illusion. What we think and how we act are then not the results of free, logically grounded insight, but rather, all our thoughts and actions are determined by physiological relationships within the brain. But this places natural science itself in an awkward spot, for cognition is based on logically grounded insight and therefore presupposes freedom from physical causality. If the process of cognition is redefined as a mere physically caused event, then this implies that all knowing and logical grounds are illusory. Natural science would then saw off the branch upon which it sits, for it exists wholly through the logical element of cognition, which is physically unbound. 8)

If one acknowledges cognition and freedom, then one must also acknowledge mental causality, which has far-reaching consequences for the understanding of the physical world. To put it another way, the question of knowledge is *also* a physical question. This aspect of the problem is what makes Penrose's approach so noteworthy because he, like almost no-one else, is looking to renew physics directly from the facts of thinking, and all the questions around mental causality are concentrated again in the fact of free cognition. His attempt follows from the conception itself, even if in some respects it is not stringently thought through to the end. But above all, from an anthroposophical perspective, it seems conclusive, since for Rudolf Steiner, all processes of the normal soul life are very dependent on the physical life, even if not in the way that natural science conceives of the matter. But there is one significant exception: even at the level of the ordinary soul life, thinking is to a high degree independent of physical-physiological processes. If there are primary influences stemming from the inner life of the soul on bodily processes, then one must surely be able to discover them in the physical reflections of thinking and conceiving, which is actually where Penrose seeks the evidential basis of the new physics: in the processes and micro-structures of the brain and the nervous system.

I would like to throw a little more light on this matter from an anthroposophical perspective: many readers will know the following passage from Chapter XI of Rudolf Steiner's *Philosophy of Freedom*.[9)] In this addition to the book's 2nd edition (1918), he speaks directly about the relationship of thinking and the human body and writes (p.147):

> *For ordinary experience, human thinking only appears in and through this [physical-psychological - MM] organisation. This appearance normally comes so much to the fore that its true significance cannot be grasped unless it is recognised that nothing whatsoever of this organisation plays a part in the essential nature of thinking. Once this is appreciated, one will then no longer fail to be aware of the very particular nature of the relationship between the human organisation and thinking itself. The physical organisation contributes nothing to the essential nature of thinking, but rather, it recedes whenever thinking makes its appearance. It holds its own activity back, which makes a space free, and in this free space thinking appears. The essential element active in thinking thus gives rise to two phenomena: first, the activity of the physical human organisation is pushed back, and second, thinking sets itself in the place that has been made free. Even the pushing back of the bodily organisation is the consequence of the activity of thinking and in fact, it is the consequence of that part of that activity which prepares the* ***manifestation*** *of thinking. One sees from this the way in which thinking finds its counterpart in the bodily organisation, and when one realises this, one will no longer misjudge the importance of this counterpart for thinking itself. Whoever walks over a ground that has been made soft leaves his footprints engraved in that ground. One will not be tempted to say that footprints are created from below by the forces of the ground. One will not ascribe to* ***these*** *forces any part in the production of the footprints.*

This passage has its actual function in the middle of the discussion about mental causality and takes a decided position with regard to the question of *the suppression of the physical organisation by the process of thinking*. The spirit works directly and causally on physiological processes and forces them to recede. Steiner does not go into physical details here, which might lead some readers to think that his use of the word *suppression* is merely metaphorical, which would actually leave physics as it is and would perhaps present an image of the compatibility of this suppression with the current understanding of physics. But in fact this is not the case – there is no compatibility. For Steiner, the study of thinking has direct consequences for the understanding of the physical world and puts in question the causally closed system of current physics. The process discussed here undermines the Law of the Conservation of Energy and indeed, fundamentally, as Steiner went on to say in 1921.

In later lectures Steiner became very explicit on this matter and spoke unequivocally of an *annihilation* of matter through the process of thinking, for example, in 1921, when he said:

> *One experiences something mighty when one enters intuitively into the nature of knowing. One knows then how one is materially organised as a human being. One knows how far this material organisation reaches; but one also sees through Intuition that it extends only to that which provides a resistance, a ground so to speak, on which thinking can then develop itself, but also that where real thinking appears, the material processes in themselves have to be destroyed. Thinking, ideation can take hold in place of the annihilation of the material to the same degree to which the material processes are destroyed. I am aware of all that can be said against what I have just now expressed, but intuitive thinking leads to the insight that in relation to what is material, where thinking unfolds itself, what can be seen is a material void. This leads one to say: If I were to regard material existence, which otherwise one acknowledges as definitive, to be the only existence, then insofar as I think, I am not. Matter must first draw back into the organism and make way for thinking, for ideation; then this thinking, this ideation, sees the possibility for its unfolding within the human being. Therefore, where we perceive thinking in its reality, we also perceive destruction, annihilation of material existence. We look into how matter passes over into nothingness. Here we stand at the boundary of the Law of Conservation of Matter and Force. One must recognise the limits of the applicability of this Law of Matter and Force so as to be able to summon up the courage to contradict it when necessary. No-one can ever penetrate the being of thinking objectively there at the place where matter annihilates itself who holds that the Law of Conservation of Matter is absolute, who does not know that it applies to the outwardly visible realms of physics and chemistry and so on, but does not apply where our thinking appears on the stage of our own human organisation. If it were not necessary, for certain*

> *underlying reasons, to place this knowledge before the world today, one would not have to put up with all the scorn and objections which, quite understandably, must come from those who, because of known preconditions, hold that the Law of Conservation of Matter and Force is absolutely valid without exception.* 10)

If one follows Steiner here, then the essential power of what is active in thinking is directly and *causally* opposed to physiological processes. And in the boundary region between the life of the body and the life of thinking, where these forces encounter each other - *there* would be the place in which Penrose should be able to discover his new physics. He could probably count on theoretical support from Steiner as long as he does not fall into thinking that this physics will explain spirit and consciousness but rather, conceives of it as a physics which is derived from the existence of spirit and consciousness.

*

In its very futuristic technical possibilities this new physics will eventually come to seem like something bizarre, and *very futuristic* here is to be understood as something completely relative. Perhaps one can gain an insight into this when one takes a look at the novel by Bulwer Lytton that Rudolf Steiner expressly recommended Guenther Wachsmuth to translate into German. 11) On occasion, when one has discussed this with anthroposophical partners, it is as if a picture of the future such as Bulwer Lytton presents actually seems for them to be something truly incredible, unreal, or else that it is very futuristic fiction which might come true in the very distant future, if at all, and which has no direct relation to the present reality. All in all, however, all this seems not to relate so much to the agenda of anthroposophical interests, even if now and again short contributions on similar themes can be found in anthroposophical magazines. The reason for this [lack of interest], I believe, is, as is so often the case, an inadequate understanding of Rudolf Steiner's epistemology. In my estimation, this leads to the fact that many anthroposophists, in terms of how they understand things, are not monists, which would correspond to Steiner's conception, but dualists, who wonder how spirit interacts with matter and can bring about causal effects. Only a few seem ready to accept that Bulwer's picture has anything to do with Steiner's epistemology. And yet – and of this I am convinced – it is the case.

What the British novelist brings forward in his story in a very free literary form is in its fundamental reality also a clear logical consequence of what Steiner assumed as the basis of his epistemology and philosophy of freedom. In addition to the urgency with which Steiner addressed the issue, this also explains his engagement in the matter of the translation of the novel. For all this most probably stands much closer to the precursors of our own time than many people suspect. When making projections of the future in relation to this novel, one should think rather not in terms of many centuries or even millennia, but much closer to home – decades or a few generations. In its development natural science progresses not in a linear fashion but exponentially and in leaps, and many astonishing discoveries which now have a profound effect on our lives could certainly have been imagined by only a

very few people a hundred years ago. Who in 1907 could have thought that around a hundred years later the contents of a library of thousands of books could be stored on a chip no larger than one's thumbnail and be accessible to someone by means of a cheaply obtainable device anywhere in the world? (cf. Rudolf Steiner's book *The Philosophy of Freedom*, available from the Gutenberg online library fits more than 2000 times on a 1 gigabyte SD memory chip of the type commonly used in digital cameras. And Steiner's entire collected works can be carried about on a little USB stick which costs just 20 Euros; this would leave plenty of space for a huge amount of other data and books.) Finally: what distinguishes the natural science of today from that of 40 or 50 years ago is a new openness for questions which at that earlier time would have been regarded as far out in the realm of unserious fantasy and imagination.

In his thinking Rudolf Steiner was much more robust and firmly-grounded than a first glance at his philosophical writings might suggest. Much that appears to the reader of these writings and lectures to play itself out only in etheric heights of the spirit has rather solid and sometimes very brutal effects in the earthly world of the senses. This is occasionally overlooked or is not thought through to its final consequences with sufficient energy.

In the years 1904-06 Steiner gave different lectures to the members of the esoteric school (GA 93, Dornach 1982) in which he shared some facts with a narrow circle of selected people. These were facts which had originally been protected as secret knowledge in esoteric societies but which now needed to be revealed because, in Steiner's view, natural science, in the course of its development, was striving towards a point which called for countermeasures to be taken.
What was this about? It had to do with the fact that around the turn of the century it had been realised that science would have to abandon the dualism of material atomic physical structure on the one hand and energy on the other. From then on, both were seen as equivalent: matter was a part of quasi-condensed energy. The physical world was thereby a good deal more unified than it had been previously. And since then, there have been many more steps in this direction, though they are still far from an end in the development. But for Steiner, this very significant step of unification in the sense of the equivalence of matter and energy was only a beginning. A further step was in the offing, and this was what actually prompted his lectures. It seems to me less a matter of going into the physical details, which are bound up with the state of knowledge at his time, and more of the trends which he was indicating: natural science now knew that electrical phenomena and atoms were, from a certain physical perspective, the same. They would, sooner or later, come to understand that the same powers are at work in human thinking as lie at the basis of the electrical phenomena of nature, and this would enable them to create a link from thinking directly into the atom: the *factual power* of thinking would be able to work into the atom. What Steiner was pointing to here in the narrower sense was not the nuclear forces known to us, but something far beyond them and which, when fully developed, would unlock mastery both of the mineral and of the organic realms. (See in this connection the publisher's special note on p. 354 of GA-93). In this lecture appear the name of *Bulwer Lytton* and his futuristic novel

Vril, to which I alluded to above. According to Steiner, (p. 281) Bulwer Lytton had knowledge of Rosicrucian secrets.

According to Steiner, the future development of the natural sciences will have immense consequences for humanity.

> *The secret which will be discovered is that electricity is exactly the same - provided one is able to observe it on a certain plane – as human thought. Human thought is of the same nature as electricity, seen at one time from inside, and at another from outside [....] Whoever knows what electricity is, knows that something lives in him, which, in a frozen condition, forms the atom. Here you have the bridge from human thoughts to the atom. ... As soon as human beings have recognised this most elementary occult truth about thoughts, electricity and atoms, they will understand something which will be most important for the future... They will be able to build with atoms through the power of thought* (p.113)

Human beings would not only build, operate machinery and organise life processes by the power of thought, but would also be able to destroy to an unprecedented extent. (p. 123; p.285f). When, incidentally, Rudolf Steiner said (p. 287) that humanity was dancing on the edge of a volcano and simply did not know it, he certainly did not have in mind the great world-embracing events which occurred soon after as a result of political developments and the two world wars that followed them, but rather, discoveries relating to this connection between thinking and nature forces and possibilities linked to them which would eclipse everything that modern humanity had acquired until then.
Even if these statements resulted partly from fragments of lectures combined by their hearers, one can scarcely doubt the basic factual content of his listeners' accounts. These matters must be taken with absolute seriousness. As I shall seek to show shortly, this is also because Steiner's epistemologically grounded, ideological monism makes such developments appear fundamentally realistic and plausible. So there is no Steiner who in his youth developed his epistemology and then later, simply assimilated eastern, theosophical ideas completely independently of this epistemology or came to such ideas by another route. These things certainly relate to each other in a systematic fashion. As a consequence, in his lecturing Steiner later essentially made it clear that these future forces would only be able to work in a beneficial way if human beings made use of them in a spirit of complete selflessness. Using them in an egoistic manner would result in destructive and chaotic consequences – the war of all against all, of which he frequently warned (p.114; p.123), and which also occurs in Bulwer-Lytton's novel. It is abundantly clear from these lectures that alongside spiritual cognition, Steiner regarded the threefolding of the social organism as a decisive instrument for pre-empting the worst precursors of such developments.

Whoever is familiar with this context will at first be amazed by how close the positions of Penrose and Steiner are to each other and also how they resemble each other in many other details, which I have not mentioned above. To revolutionise physics by means of a theory of consciousness,

especially one of thinking, which focuses on the relationship between thinking and quantum electrodynamic phenomena, lies exactly in the direction that Steiner was elucidating for the members of his esoteric school. This is why in one of my works on the Internet I have said that Penrose is one of those who are on the trail of what Steiner calls the etheric or formative forces. There is one serious difference: the result for Penrose would be a physics of the spirit – a kind of theosophical materialism. For Steiner, on the other hand, natural phenomena are the consequences of *spiritual forces*.

Now a word on Steiner's epistemological underpinning of the future scenario he depicts: the inner relationship of nature and spirit is also the theme of a speech repeated in the above-mentioned lectures (p.101; p.112f) by the British Prime Minister Arthur Balfour on the position of natural science, which Steiner referred to in November 1904 in the magazine *Luzifer-Gnosis* (GA 34, Dornach 1960, p. 467ff). What Steiner draws attention to here is the relative proximity of modern natural science to the ideas of (what was then for Steiner still) Theosophy. His discussion of Balfour's comments is reflected in the statement: *the kernel of nature must be found within the human soul; then it will also be revealed in the universe*.

With this we are in Steiner's early philosophical writings. There is a direct line from the lectures to members mentioned earlier and the epistemological foundations of anthroposophy. The closing thoughts from Balfour's speech - *the kernel of nature must be found within the human soul; then it will also be revealed in the universe* – can be found expressed in similar vein at the end of the second chapter of the *Philosophy of Freedom* (GA 04, 1978):

> *We can only find nature outside us, if we first recognise it in ourselves. What is the same nature in our own inner being will be our guide. This shows us the way forward. We do not want to make any speculations about the interaction of nature of spirit, but we want to go down into the depths of our own being in order to find the elements there which we have preserved in our flight from nature*.

What Steiner expresses here is by no means only to be taken in a philosophically aesthetic or speculative sense but has, as already noted, rock-solid consequences for the interrelationship between human thinking and outer nature. In thinking can be recognised from a different side what a being is in nature and its forces. Because it reaches beyond the opposition between subject and object, this overcomes the dualism of I and the world and recreates in thinking the original monist unity of the world. It is yet not only a theoretical means of monistic liberation from a dualistic captivity but at the same time an object of experience in which the inner being of the one nature shows itself both in its inner essence *and* in its outgoing force. The spirit that lives and works in thinking is the actual *primeval force* of nature, which also lives in all natural phenomena. It is the all-encompassing Idea. The kernel of the world, not only in the abstract philosophical metaphorical sense but also in a very real and forceful sense, which does not produce only ideas but also sets arms and legs in movement by means of which actions arise out of thoughts. The same power which acts in the eruptions of distant galaxies and makes plants and animals grow and flourish works also in the human

being in thinking. It is both meaning and force together. The one force which has the capacity to explain itself out of itself because it is determined by no other (GA 04, p. 145f). In his later, anthroposophical works Steiner calls this spirit that is active in thinking also the etheric or formative forces – which can be expressed by the philosophical term *living universals (lebendige Universalien)*.

I think that Steiner means these etheric forces when in those lectures he refers to thoughts as the *inner* aspect of electrical phenomena. Thoughts or ideas are the *active being* (*wirkende Wesen*) of these phenomena. Unmistakeable statements in this direction, relating to the double nature of the spirit (meaning and force), are found already in various places in *A Theory of Knowledge Implicit in Goethe's World Conception* (GA 02). For example, at the end of chapter 8 (3rd ed., 1978, p.35) he points out that the thought-content of the world shows itself from two sides:

> *In the one instance, it appears as an activity of our consciousness; in the other, as the immediate manifestation of a conformity to law, complete within itself, a self-determined ideal content.*

Then in chapter 13, in summing up (1978, p.66):

> *Our theory of knowledge leads to the positive conclusion that thinking is the essential nature of the world, and that individual human thinking is the only phenomenal form of this essential nature.*

This amounts to saying: the nature of the world as a whole is spiritual and consists of thinking. The forces present in this nature are active spiritual forces, forces of thinking. What first appears as percept reveals itself to be something spiritual and conceptual as soon as thinking turns its attention towards it. Steiner's early philosophical works were concerned to show this. A particularly pregnant expression appears at the end of chapter 11 (1978, p.55):

> *All sciences should be permeated by the conviction that their content is solely a thought content and that they sustain no other relationship to perception than that they see in the perceptual object a specialised form of the concept.*

For our understanding, that applies not only to objectively material percepts of all kinds, such as stones, flowers, and butterflies, but also to all forms of perceptual or enclosed forces. Within 20 years of the appearance of this book at the latest, the natural scientific world had turned away from the previously obtaining concept of matter and had come to explain matter in terms of force or energy, so that from then on the world, seen physically, consisted only of special configurations of forces. This was exactly what Steiner drew attention to in 1904 in Balfour's speech: matter was now held to be what Steiner - accurately identifying the trend - then described in his lectures as *frozen electricity*, the inner aspect of which was thought. This was not meant as a pictorial image; there was a very real, concretely graspable background to it. In *A Theory of Knowledge*..... he speaks in this

connection (1978, p.67) not only of thinking as "being" or "essential nature of the world" but already quite explicitly indicates that it is a "primal force" (*Urkraft*) without going any further into this at this point or even referring to any physical or technical examples. Those appear somewhat more clearly on the horizon in *Goethean Science* (GA 01, 1988) where in the chapter *On the ethical and historical sciences (the title in the 1988 translation is: Relationship of the Goethean Way of Thinking to Other Views* – transl.) (p.163f), he writes that human will is itself Idea, "conceived as force". In this connection, he holds that the philosopher Eduard von Hartmann completely unrealistically dismantles the unity of the world in the way he sees the aspects Idea, Force and Will as being independent of each other. Such a dismemberment, according to Steiner, can not stand up to more detailed investigation. Will or force are only to be understood as aspects or forms of appearance of the Idea itself and never as autonomous entities alongside it. According to Steiner's conception, there are no forces in the world that in themselves are blind and devoid of meaning and which help an isolated and, by itself, equally powerless Idea to become effective. Rather, the forces themselves belong to the Idea and are of ideal nature; that is, they are constituent parts of an all-embracing spiritual world foundation and cannot therefore be separated from this all-encompassing meaningfulness.

See in this connection also the analogous text from Steiner's *A Theory of Knowledge...* (GA 02, 1978, p.68f):

> *Another fallacy must be corrected at this point. It is that which considers thinking insufficient in itself to constitute the world; as if something else (force, will, etc.) must supervene in order to render the world possible.*
>
> *However, on closer reflection, we soon realise that all such factors really amount to nothing more than abstractions drawn from the world of percepts and must themselves await elucidation through thinking. Every other constituent of the world-being other than thinking would immediately require another kind of apprehension, of cognition than that which is given through thinking. We would have to grasp those other constituent parts by some other means than through thinking. For thinking provides only thoughts. But as soon as we try to explain what share these constituent elements have in the fabric of the world and seek to do this by means of concepts, then we contradict ourselves. Moreover, no third instrument is given to us besides sense perception and thinking. And we cannot consider any part of the former as the core of the world, because closer consideration of all its constituents shows that they do not as such contain the essential nature of sense perception. That can be sought only by means of thinking.*

Seen from this perspective, meaning and force are the same. Statements made in later lectures by Steiner on the nature of pure thinking correspond with this: he speaks of how, in pure thinking, will and thinking become one – and that for pure thinking, "one might just as well say pure will". (See GA 202, Dornach 1980, p.202; lecture of 19.12.1920; and also GA 322, Dornach 1981, p.124, lecture of 3.Oct. 1920). Force and Idea are, accordingly, also one in pure thinking : in pure thinking willed thinking expresses, so to speak, the essential world-will or world spirituality – directly and undivided.

Expanding on this, one could add further statements by Steiner that are scattered throughout his lectures on the theme of how the human will is related to certain forces of nature, but to go into further detail in that direction here would lead too far, especially as the fundamental point has anyway already been sufficiently discussed.

With complete clarity, in his book *Goethes Weltanschauung* (Goethe's Worldview) (GA 06, Dornach 1979), Steiner writes (p.83f):

> *As long as the human being remains in any place, perceiving objects around him and considering the laws which are implanted as principles within them and by which they are ruled, he has the feeling that they confront him as unknown powers and which work upon him and impress upon him the thoughts of their laws. He feels himself to be unfree in regard to the things; he senses the lawfulness of nature to be rigid necessity with which he has to comply. Only when man*

realises that the forces of nature are nothing other than forms of the same spirit which also works in himself, does the insight come to him that he participates in freedom. The lawfulness of nature will only be felt as pressure so long as one sees it as an alien power. If one lives into its being, one feels it to be a force with which one works; one feels oneself to be a productive, cooperating element in the becoming and being of things. One has become one with all the forces of becoming.. *One has taken up into one's own doing that which one otherwise only feels as an external driving force.*

A little later (p. 85), we read:

> *Man can therefore only understand the actual nature of the world of ideas if he beholds his own activity. When he looks at anything else he is penetrating only the active idea (*wirkende Idee*); the thing that is 'worked out' (produced) through the active Idea remains as percept outside his spirit. In beholding the Idea, both elements, the productive and the produced, are wholly contained within his inner life. He has the whole process completely present within him. The beholding no longer seems to be produced by the Idea, for the beholding is now the Idea itself. This beholding of that which produces itself is the beholding of freedom. In observing thinking, man sees into world processes. It is not a matter of researching this process in accordance with some idea, for the process is the Idea itself.*

And, expressed in other words:

> *If all nature processes are only manifestations of the Idea, then human actions are nothing but the Idea itself acting.* (GA 01, in the chapter Relationship of the Goethean Way of Thinking to Other Views, Spring Valley, 1988)

This applies just as much to action in thinking as it does to any other human action.

The observer of thinking is – as Steiner had already indicated in *A Theory of Knowledge*.... and in the *Philosophy of Freedom* – not only a spiritual researcher but at the same time also a *natural science researcher* - a natural science researcher who has as the object of his study the *inner* nature of that which conventional natural science researchers observe from the *outside*. While the latter only draw their conclusions about the ideal content of nature through their experiments and observations and never achieve a direct beholding of the productive Idea - that is, of the essential foundations of the world - through their methods, this is precisely what the observer of thinking is able to achieve. He sees directly the productive and the produced in the beholding of the Idea in action, that is, of his thinking, and with this, he sees also that which is the essential driving force at the basis of the outer phenomena of nature. (See also the clear exposition of these ideas in *Vom Menschenrätsel* (The Riddle of Man) (GA 20, Dornach 1984, p.171f)

In this context it is interesting that whereas Steiner is in general only sparingly critical of Goethe, in the book *Goethes Weltanschauung* he makes quite forthright and brusque remarks about a not insignificant opinion of Goethe's such as the following well-known comment from Goethe's essay *Bedeutende Fördernis durch ein einziges geistreiches Wort* (Significant Help from One Single Intelligent Word):

> *Hereby I admit that the great and significant task **know thyself** always appeared suspicious to me, like a trick by a band of conspiring priests who confuse men with unattainable goals and who would distract them from outer activity into an inwardness of false contemplation. Man only knows himself insofar as he knows the world, of which he only becomes aware in himself, just as he only becomes aware of himself in the world. Every new object, well observed, opens up a new organ in us.*

On this, Steiner comments (GA 06 Dornach 1979, p.91):

> *Precisely the reverse is true: man knows the world insofar as he knows himself. For within him is revealed in its most primal form that which exists to be observed in external things only as reflection, example or symbol – that which man can otherwise only speak of as unfathomable, impenetrable, divine: that, in its true form, is what appears to him when he looks at himself. Because he sees the Ideal directly in beholding himself, he also gains the power and capability to find and recognise this ideal in all external appearance.*

This amounts to saying that whoever does not sufficiently confront the nature of his own thinking will never really grasp the outer world either. We recall Steiner's comment from the *Philosophy of Freedom*, quoted earlier:

> *We can only find the nature that is outside us if we have first found it within us.*

The same line of thought reappears here in the form of a very sharp criticism of Goethe. With this we have come full circle back to Steiner's concluding remarks about Balfour's speech and to the above-mentioned lectures to his pupils.

To summarise once again: The external forces of nature are forms of *the same spirit*, which man activates within him through thinking. It is the spirit which works in man and which can be experienced and observed *directly* in its active essential being - in thinking. Or to put it another way: In his thinking man observes *the inner aspect* of the forces of nature, which natural science observes from an external perspective. The productive, ruling meaning of the world (the Idea) – which is differentiated further by Steiner into a multiplicity of spiritual entities and individualities – arrives, as Steiner describes it here, in human consciousness to a self-consciousness and a direct consideration of itself. This is why natural science and anthroposophy – as Steiner frequently indicates - are not irreconcilable. What the natural scientist only unlocks with his formation of concepts, but does not behold

directly, the spiritual researcher beholds directly from the inner perspective. Expressed concretely, the spiritual observer beholds directly the working of those quantum electrical dynamical phenomena – which are at the same time the light from *within* - the existence of which the physicist Penrose can only infer through his processes and can never experience directly with his scientific instrumentation.

In very general terms, the inner observer experiences on this path a direct picture of the wisdom that permeates the world and is operative everywhere within it and which also lives and weaves within himself. (The account of the Steiner lecture referred to earlier speaks in an extremely abbreviated and simplified form only of *thought* as *the inner aspect of electricity*. One cannot of course remain bound to this but must rather expand this fragment of understanding and fill it with more content.) The external observer experiences only an indirect, highly abstract, mathematical-physical, formulaic structure that is also a purely ideal pattern of concepts which, in the ideal and thus yet far from realised case, describes the relationship of all these forces to each other. This then appears to the external observer as a multiplicity of interrelated and interacting forces; from the inner perspective this becomes a multiplicity of mutually related and interacting spiritual individualities – all seen naturally within certain limits. As long as their research is conducted correctly, the pictures which both perspectives provide do not exclude each other but are related like a photographic positive to a negative and therefore despite the difference between them, they are from a certain angle somehow congruent. It is only a consequence of misunderstandings on one side or the other when they appear to get in each other's way. One may compare what Steiner has to say on this theme in the book *Von Seelenrätseln* (Riddles of the Soul) (GA 21, Dornach 1976, p.32f). Instructive too is what he says in his book *Vom Menschenrätsel* (The Riddle of Man)(GA 20) in the chapter *New Perspectives* (p.146, especially p.171f).

It is only that the physicist with his methods – and this ought not to be overlooked here – cannot make any statements about questions of meaning and still less so about meaning that is motivating or productive. He is unable to explain thinking and thus the inner dimension of the forces which he researches. He cannot explain the spirit and can at most only make inferences about it. p.14 He always stands *outside* it and never *within* the natural process that he investigates, experiencing not the productive agent but only the produced result. To elaborate this further at this point would take us into detailed questions of epistemology and exceed the intended range of this paper. Methodologically, the physicist could not fundamentally assume the inner perspective unless he were to become additionally the observer of this thinking and bring both perspectives together concretely.

It is greatly to Penrose's credit that here and there he at least tries to hint at this and at the same time also comes forward with some astonishing ideas. For example, if one takes Steiner at his word and translates what he expresses in his lectures of 1904-06 under the rather time-bound term *electricity* into the language of later quantum physics, then human thought is the inner aspect of what is today understood as a quantum electromagnetic phenomenon; light phenomena are also considered as such. When Penrose

sees the relationship between thinking and quantum physics, then from Steiner's viewpoint, he is remarkably correct, indeed so remarkably correct that (purely speculatively) the question then arises as to whether his thoughts do not originate from other (unnamed) sources. He would not be the first important western physicist whose thought formation has been inspired by the teachings of eastern wisdom. From another perspective, the biophysicist Fritz Albert Popp is even closer to Steiner than Penrose. In his book *Biologie des Lichts* (The Biology of Light)(Berlin, Hamburg 1984, p. 139) Popp raises the question as to whether the structure of living matter ought not to be understood in terms of the special nature of electromagnetic interactions. If one brings the two perspectives together here as well, then – to put it sloppily and of course very summarily – one only needs to add together one and one, for what appears from without as active electromagnetism is from within seen as active thought. With this, one has arrived at Steiner's concept of the ether body which supports the whole human life organisation as well as the life of thinking. But when particle physicists sometimes use popular expressions, speaking of how they occupy themselves with *what holds the world together in its inmost nature*, then that is certainly an inappropriate metaphor which does not have much to do with its literary origin.

Because the same forces work in thinking that are active in the outer physical world, only perceived from another perspective and unmediated in their nature, the dualism between spirit and world is merely an apparent one. The difference is only one of *perspective* and not of essence. It is determined by the different mode of access, outer or inner, and, if supposed to be an absolute one, caused by cognition that misunderstands its own nature. The question of how spirit and matter can work upon each other simply does not arise for Steiner's monist position, and from this position it actually seems absurd because the essential nature of matter is itself spirit – spirit which in its outer manifestation only appears like matter, but which shows, or rather, begins to show its real spiritual nature when the inner perspective attainable through thinking is adopted. In reality, it is only the spirit working upon the spirit, and the result of this interaction can to external sight then *appear* as physically material effect.

It is this fact that in 1907 Steiner roughly outlines in a comment on the collapse of the 19th century's theoretical natural scientific concept of matter. In essence this is nothing other than what he had already expressed in his early philosophical writings: the physical world of the senses is on closer examination spiritual in nature. It only *appears* to be material and has been made to seem such as a result of natural scientific abstractions. Natural science is now (1907) at the point of throwing this abstract and unrealistic concept of reality overboard and will itself later come to realise that all the matter it deals with dissolves and only spirit remains.

> *"This material world will atomise and disintegrate and what lies behind it will be recognised. Then must come an advance in what one experiences and can experience. Then people will know that the atom can be nothing other than frozen electricity, frozen warmth and frozen light. And then they will have to go still further so as to understand that condensed and formed spirit is to be seen in*

> ***everything***. *There is no matter! Matter is related to spirit like ice to water. Dissolve the ice and there is water. Dissolve matter and it disappears as matter and becomes spirit. Everything that is matter is spirit, the outer form of the appearance of spirit.* (GA 56, Dornach 1985, p. 59, lecture in Berlin 17 October 1907)

By *This material world will atomise and collapse* is meant: in the sense of the formation of concepts about the physical world. The dissolution of the material world therefore takes place in the dimension of thought and above all, within an element that understands itself. This is why I have made reference to Steiner's early works, for a central focus of Steiner's concern in those works is to indicate that matter is, in its essence, spirit.

For further detail, see also Steiner's book *Die Schwelle der geistigen Welt* (The Threshold of the Spiritual World, GA-17, Dornach 1972, p. 77f):

> *When supersensible consciousness enters this spiritual world of living thought-beings, it feels itself to be in a completely new relationship towards the physical world, which confronts it in the spiritual world as another world, just as in the physical world the spiritual world appears as another world. But to spiritual sight, the physical world has lost everything which can be perceived of it within physical existence. All those qualities which are grasped with the senses or with the intellect which is bound up with the senses seem to have disappeared. On the other hand, it is obvious from the viewpoint of the spiritual world that the true, original nature of the physical world is itself spiritual. To the soul's gaze, looking from the spiritual world, there appear instead of the previous physical world, spiritual beings who unfold their activities in such a way that through the converging of those activities, that world comes into being which, seen through the senses, is the very world that man has before him in his own physical existence. Seen from the spiritual world, the qualities, forces, materials, etc., of the physical world disappear, and reveal themselves to be mere appearances. From the spiritual world man beholds only beings. In these beings lies true reality.*

Steiner could probably at least count on partial agreement from scientists such as Roger Penrose or Fritz Albert Popp when already in 1910 he said that external matter including the human body is nothing other than "condensed light" :

> *There is a fundamental nature to our material earthly being, in which all matter only came into being through compression. And to the question: what then is the fundamental matter of our earthly being? spiritual science answers: all matter on earth is condensed light! There is nothing in material being that would be anything other than some form of condensed light...We must therefore see light as being at the basis of all material existence. And when we behold the physical human body, it too, insofar as it is material is woven of nothing other than light. Insofar as the human being is a material*

being, he is made of light. (GA 120, Dornach 1992, p.192; lecture in Hamburg 27 May 1910).

A modern quantum physicist like Popp or Penrose would have hardly any fundamental difficulties with such a view, for one finds this metaphor of matter as *frozen light* amongst quantum physicists too, such as David Bohm. When Steiner finally on other occasions informs his listeners in a lecture course (1920) on the being of colour that light and thought are "the same thing, only seen from different sides" then that practically reads like an invitation to interdisciplinary cooperation between anthroposophists and open-minded physicists such as Penrose or Popp. (See GA 291, Dornach 1991, p.116; lecture in Dornach, 5 December 1920). A central task primarily addressed to those anthroposophists interested in epistemology and natural science is to make plausible to their scientific contemporaries the idea that the light of which physics speaks is essentially nothing other than the working of spirit or of thought. (One may compare here Steiner's detailed exposition on the forming of concepts in modern physics in the chapter 'New Perspectives' in his book *The Riddle of Man* (*Vom Menschenrätsel*; GA 20, Spring Valley 1990, p.125f).

What is at work in thinking then is no impotent spirit, which merely interacts somehow in a formal manner with man's physical body - a view that a mistaken dualism could impose. Rather, the "core of nature" has quite strong and direct effects even on this physicality: thinking's activity and interaction with the human physical organisation are thoroughly dynamic, because one and the same force is at work in both the activity and the organisation. This is why an epistemology and philosophy of freedom such as that of Steiner inevitably has direct consequences for a physical understanding of the world.

That meaning (Idea) and force are one and the same thing, only seen from two sides, is perhaps one of the most difficult problems in philosophy. A somewhat more technical and certainly inadequate expression for this would be *active infomation*. A philosophically educated reader will surely be more likely to think of the mediaeval doctrine of universals to which Steiner occasionally links (as in GA 21, p.138f).

For Steiner incidentally, this does not mean that the Ideal must *always* also be present in the actions of external forces but rather, that where external forces are at work, these are in essence *always* spiritual in nature.

In view of this background, it seems only consequential that when thinking interacts with other forces of nature, this relationship should at some point result in technical applications. From here, or from epistemology to the lectures to the members in GA 93, therefore required no further fundamental logical step; rather, what Steiner says in those lectures is only the expression of his idealistic-monist worldview applied in a consistent manner to the approaching physical, technical developments of the near and distant future. What Steiner elucidated for the members of his esoteric school and brought to their attention in relation to real, ongoing developments in natural science is therefore a very drastic consequence of his idealistic conception of the world which had already been laid out in his early philosophical writings. In

other words, he was bringing to his pupils' attention nothing other than an essential line of thought in his epistemology, only this time not in the general terms of abstract philosophy but in relation to the very concrete case of the development of technical science. Therefore, when one has become sufficiently familiar with this epistemological groundwork, this connection has as little to do with fantasy as a TV weather forecast compared to the magical dance of a shaman. A particularly bright listener among his students would not have had to join the theosophical movement; if he had wished, he could have acquired this knowledge already in 1894 from a study of *The Philosophy of Freedom* or even earlier, from *A Theory of Knowledge Implicit in Goethe's World Conception*.

Evidently, the lectures in question were given at a time when physics was on the way to the formulation or the recognition of the Theory of Relativity. There was as yet no quantum physics such as exists today, and Steiner would certainly have formulated many things differently 70 years later against the background of all the subsequent changes in physics – more in the language of quantum physics. Possibly, he even believed then that physics would more speedily reach that point at which all the forces of nature could be conceived of as metamorphoses of a single fundamental physical force. This point has not yet been reached, and the two great physical theories – relativity and quantum physics – have still not been unified. One ought therefore not to focus too narrowly on *electricity*, the concept Steiner then selected, for there are things in this realm of forces which are still unknown and remain to be considered. But that changes nothing as far as the most fundamental aspect of his remarks goes: since the forces working in thinking and those in the rest of nature do not differ but are identical, it is more than evident that one can speak here of the factual activity of thinking right down to the level of elementary particles. If one takes Steiner's epistemology seriously, then this activity takes place permanently at the level of natural human thinking. For the possibility as such is predicated in its potential by the monistic unity of the world. From this perspective it cannot be otherwise. The question is only when and in what circumstances humanity will be in a position to work with this to any significant degree in order to achieve purposive technical goals. In my view, if I am reading the signs of the times aright, then we are now standing directly on the threshold of these developments; they are beginning now. That is to say, when one reflects that the merging of neuro-biology and artificial intelligence has now reached the point where it is already possible to control artificial limbs by means of electromagnetic impulses that proceed from thinking, then essentially, we are already well within these developments.

In conclusion therefore I shall add another word on the time perspective behind Steiner's lectures when he spoke about these drastic radical changes in natural science and following them, those in the social and global dimensions. Even if Steiner was naturally then thinking of distant periods of time from very different points of view, when one studies these lectures from 1904 to 1906 one has the impression that he himself reckoned that the first phenomena of this kind would very soon be appearing. He already indicated wireless telegraphy (p. 114) as a beginning of these, and also something that today is seen as an electromagnetic phenomenon in

association with other phenomena of light and whose physical foundations are rooted at the level of quantum physics. This impression becomes still stronger when one considers some developments of modern natural science. I said earlier that natural science today is much more open and unprejudiced with regard to certain problems than it was perhaps forty or fifty years ago. This makes feasible perspectives which scientists in earlier decades would have refused to adopt. Then through the networking of disparate scientific disciplines – headword: interdisciplinary studies – and the powerfully refined technical equipment of science today it is now possible to pursue questions experimentally which thirty or forty years ago at most would have had to remain at the level of thought experiments and theoretical ideas. Today it is possible – hardly imaginable 50 years ago – with the help of meditating Tibetan monks to bring clarity to questions in the psychology of the senses which have given psychologists a host of headaches since the time of Hermann von Helmholtz. 12). In these experiments, for example, biological cells and whole plants or animal organisms communicate and interact with each other by means of ultra-weak coherent light phenomena (in effect via micro-lasers) and in so doing the whole range of biological phenomena of growth and metabolism have to be subjected to quantum physical observation and re-evaluation, all of which could hardly be corroborated at the beginning of this science of biophotons in the 1920s because there were then no appropriate measuring instruments that could register such ultra-weak light emissions or isolate them sufficiently from light emissions of other kinds. 13) This only developed further to a level that was scientifically useful in the 1970s and 80s. A few decades ago it was also hardly conceivable that a man like Fritz Albert Popp, who is now one of the most internationally renowned researchers in the field of bio-photons, should have carried out research into the effectiveness of spiritual healers, an undertaking that very probably would have lost him his scientific reputation 40 years ago, and should have had his work published on questions of quantum physics by the top class publishers Springer alongside great scientific names such as Anton Zeilinger and Hans Peter Dürr. 14)

Many more examples of this kind could be cited. A popular science book of recent years *Die letzten Rätsel der Wissenschaft* (The Last Riddles of Science) (Frankfurt/Main, 2005) by Felix R. Paturi gives a good overview of the new openness and what it has made possible. The author, a physicist and science publicist, does not consider himself an esotericist and he seems to me also far from any striving for fantasy-laden effect, but for a writer of a popular science book, comparatively, he deals very soberly with some of the facts which can be addressed by science these days – facts which, as he says on p.14 of his book, the science of the old school would scarcely have tolerated. Explaining and justifying the rather unusual content of his book, Paturi writes in his introduction on p.14, that "some readers of this book will...seek in vain for a firm divide between phenomena labelled either scientific or "esoteric". It is not that I have an inclination towards esotericism but that the boundaries of natural science themselves these days are experiencing a marked expansion – a phenomenon which, nevertheless, the army of scientists of the old school still largely oppose.... However, today more and more leading researchers at internationally renowned universities and scientific institutes are engaging seriously in areas which two decades ago would have been

completely taboo for their future careers, among them telepathy, telekinesis and teleportation. It is not only the occupants of chairs of paraphysics and parapsychology that are busy in these areas but also specialists in quantum mechanics and material science, information scientists, neurologists and geneticists. If the book deals, among other things, with healing at a distance, with "rays", with mental influences upon water, apparitions of Mary and other remarkable things then it never does so from the perspective of the airy-fairy esotericist but as an expression of the fact that natural science has begun to expand its horizons and to reformulate its picture of the world from the ground up; it is summoning up the courage to open up such a new world."

Some of the examples Paturi presents are very close to what Steiner was saying to his pupils in the years 1904-1906: the direct effect of thinking on physical-biological processes at different dimensions of scale. In the narrower sense, this has to do with mental effects at a distance, sometimes over distances of many thousands of kilometres.

It is worth taking a look at such a book in order to get a feel for what is going on in scientific fields these days and what will in a few decades be a reality that determines our everyday life. It is an open question as to whether these developments and the new openness will offer only great opportunities that benefit mankind. And very much in question already is whether the anthroposophical movement is really well-equipped to cope with what is heading towards us.

End

Notes

1) Roger Penrose, Computerdenken. *Die Debatte um künstliche Intelligenz, Bewußtsein und die Gesetze der Physik*. Heidelberg 1991.
Original title: Roger Penrose, *The Emperor's New Mind*, New York, 1989.
2) Roger Penrose, *Schatten des Geistes. Wege zu einer neuen Physik des Bewußtseins*. Heidelberg, Berlin, Oxford 1995.
Original title: Roger Penrose, *Shadows of the Mind*. Oxford Univerity Press, New York 1994
3) See also: Godehard Brüntrup, *Mentale Verursachung*, Stuttgart, Berlin, Köln, 1994, esp. p. 250 ff.
4) See also for example the contributions of various authors in *Journal für Psychologie*, 7th year, Vol. 2, 1999, pp. 2-62. More details on this research can be found at : www.introspektion.net\index.html
5) Sir Karl Popper, Sir John Eccles, *The Self and Its Brain - An Argument for Interactionism*, Heidelberg, Berlin, London, New York, 1977
German edition: Karl R. Popper, John C. Eccles, *Das Ich und sein Gehirn*, München 1982
6) See: Mario Bunge, Rubén Ardila, *Philosophie der Psychologie*, Tübingen 1990, p. 14: "In the philosophy of mind of Popper and Eccles the following is evident: first, that it is half-baked because its key concepts – above all 'world', 'spirit' and 'interaction' remain undefined and beyond this, by no means does it contain precise hypotheses about spirit and its alleged interaction with the brain. Secondly, it goes against the fundamental

physical principle of the Law of Conservation of Energy (as it postulates that the immaterial spirit can set matter in motion). Thirdly, it ignores an unstated premise that lies at the base of every experimental science, namely, that the spirit cannot work directly on matter..."

7) Peter Bieri (Publ.), *Analytische Philosophie des Geistes*, 3rd ed., Königsstein/Ts., 1997, p. 6.

8) "Physical determinism", writes Popper (Karl R. Popper, *Objektive Erkenntnis*, [Objective Knowledge] Hamburg 1984, p. 232 ff) excludes logically grounded insight, because then the process of cognition is itself accomplished through necessity. For according to determinism anyone presents any theory – determinism for example – on the basis of his own predetermined physical structure (e.g. that of his brain). We deceive ourselves therefore (and are physically predisposed to this) when we believe that there are such things as arguments or grounds that lead us to accept determinism. Or, in other words, physical determinism is a theory about which, if it is true, one cannot argue, for it must reduce all our reactions – even one which appears to us as a conviction based on argument – to purely physical conditions. Such purely physical conditions, to which our physical environment belongs, cause us to say or accept whatever we say or accept;... But that means: if we believe that we have accepted a theory such as determinism because of the logical force of certain arguments, then in accordance with the theory of physical determinism, we are deceiving ourselves; or more precisely: we are putting ourselves in a physical condition which predisposes us to deceive ourselves."

9) Rudolf Steiner, *Die Philosophie der Freiheit* (The Philosophy of Freedom), Collected Works GA 04, Dornach 1978, p. 146 f.

10) GA-78, Dornach 1968, p. 142 f; lecture in Stuttgart, 5th Septemer 1921

11) Edward Bulwer Lytton, *Vril - oder eine Menschheit der Zukunft*. (Original title: The Coming Race) Translated by Guenther Wachsmuth, 3 Dornach 1981.

12) See: *Meditation alters perceptual rivalry in Tibetan Buddhist monks*, By O. L. Carter, D. E. Presti, C. Callistemon, Y. Ungerer, G. B. Liu, and J. D. Pettigrew at www.current-biology.com/7 June 2005

13) See: Fritz A. Popp, *Biologie des Lichts*, Berlin, Hamburg 1984

14) See: Fritz Albert Popp, *Quantum Phenomena of Biological Systems as Documented by Biophotonics*, in: A. Elitzur, S. Dolev, N. Kolenda (Eds.); *Quo Vadis Quantum Mechanics?* With a Foreword by Roger Penrose, Springer, Berlin Heidelberg New York, 2005, p. 371 ff.