ПРИЛОЖЕНИЕ К СТАТЬЕ КОФЛЕРА В. В. ОБ УНИФИКАЦИИ РЕАЛЬНЫХ НАУК. ПОДХОД А: О ВАЖНОСТИ РЕАЛЬНЫХ ФИЗИЧЕСКИХ ФАКТОВ ПОДХОД Б: ПРИМЕНЕНИЕ РАСШИРЕННОГО ЭВОЛЮЦИОННОГО ВЗГЛЯДА

SUPPLEMENT TO THE PAPERS' SERIES ON THE UNIFICATION OF THE REAL SCIENCES APPROACH A: ON THE RELEVANCE OF ACTUAL PHYSICAL FACTS APPROACH B: THE USE OF THE EXTENDED EVOLUTIONARY VIEW

SUPPLEMENT — ADDENDUM

It consists of three parts.

SUPPLEMENT ON THE UNIFICATION OF THE REAL SCIENCES

It presents the additional opportunities associated with the introduction of this form of publication. The advantages are particularly significant for publications that lead to a better understanding between previously seemingly incompatible disciplines and for joint solutions. The need is obvious, not only because a lack of networking of knowledge is the reason why current key problems in the world have turned out to have unexpected, unknown or unnoticed consequences of measures that were generally desired at the time. The current need arises from the now no longer negligible incompatibility of QT and RT. This is probably also due to the fact that they are not based on a unified world view. However, a world view cannot be created solely from the perspective of one discipline. For good reason, the positions of as many real sciences as possible should be incorporated into a common framework model. Paradigms that have not yet been taken into account also provide irreplaceable possibilities. For the necessary implementation, everyone must be prepared to understand their own position as a section of the world and to engage, at least temporarily, in a discussion «with the head of the other». The introduction is intended to serve this purpose.

FOCUS 1: THE SO-CALLED «GLOSSARY»

Without communication, such a discussion is not possible. In order to avoid misinterpretations due to differences in the meaning of terms, the «glossary» explains how terms should be understood in this work. Since the meaning of a previously unknown term can only be grasped if it can be inferred from known terms, a keyword-like definition is not sufficient. Therefore, insightful representations are needed. This cannot always be achieved with formulations and logical arguments. It is then necessary to resort to considerations of how the usefulness of conclusions can be empirically proven. Central differences in the world view become obvious, for example, in Schrödinger's cat. An experimentum crucis is therefore proposed as to how a decision can be made physically and empirically between the mutually exclusive positions on Schrödinger's cat.

FOCUS 2: STATEMENTS OF EXPERTS AS APPROACH FOR CONSIDERATIONS

The award of the 2022 Nobel Prize in Physics not only honored the justification of the 2nd quantum revolution, but implicitly at the same time the result of the empirical investigations planned by Freedman and Clauser in 1972 as Experimentum Crucis. This means that the scientific-theoretical justification for assuming that — like Newton's paradigm of mechanics and Maxwell's paradigm of electromagnetism before the SRT and Eddington's Experimentum Crucis — Einstein's paradigm of Theory of Relativity and Bohr's paradigm of quantum theory could coexist without interrelationships no longer exists. Now not only has the limit of the validity of RT been demonstrated, but also that the assumption has become untenable, according to which the microworld appears absurd to us, but is logically free of contradictions. Therefore, both Bohr and Einstein should have changed their world view in light of the Experimentum Crucis and the 2022 Nobel Prize in Physics. This now applies to their successors. Statements from leading experts should prove helpful.

The world view that has been developed via the real sciences, including physics, could prove helpful. Since neither QT is compatible with hidden variables and GRT obviously does not require any mathematical changes, the fortunate situation has arisen that conclusions can only be drawn on the basis of the modified world view. Since only the world view is modified, this has no current impact on the practical usability of the existing formulas.

It should therefore be possible to reconsider the derivations without hesitation. It should be borne in mind from the experience of the SRT and Newton's theory that such extensions of the area that can be covered by physics do not offer any operational advantages in the area of questions that can be dealt with so far. Their strength lies in the fact that it becomes possible to ask questions that could not previously be asked and to provide answers to questions that were previously unanswerable.

SUPPLEMENT TO THE PAPERS' SERIES ON THE UNIFICATION OF THE REAL SCIENCES[1] APPROACH A: ON THE RELEVANCE OF ACTUAL PHYSICAL FACTS APPROACH B: THE USE OF THE EXTENDED EVOLUTIONARY VIEW

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The supplement to the two-part article on the unification of the real sciences serves on the one hand to eliminate the expected differences in the understanding of the necessary terminology and scientific-theoretical methods depending on the subject. A glossary is provided for this purpose. A particular challenge was that the unification is presented using the example of physical processes. These are usually only analyzed from an energy perspective. However, this would be incompatible with the assumption of a single non-predetermined evolutionary process. In order to understand the processes of persons, their ability to assign meanings in relation to the given environmental circumstances and their own possibilities, to evaluate these in a weighted manner and to be able to discriminate between them, taking into account the consensus voluntarily entered into, and to make this the basis of the decision for energetic, observable effects, must be taken into account. The tension between observation and effectiveness thus becomes a key issue, as it was in the Einstein-Bohr debate. Its dynamics seem instructive for solving the current challenges. For this reason, appropriate space is provided for positions from key proponents of this discussion. The application of the arguments presented in the main article allows the invitation of a cross-disciplinary collaboration according to the objective of supplements. The Special Theory of Relativity can then be used to deduce the individual steps in the evolutionary formation of physical objects. In the process, the nature of mass also becomes deducible, something Einstein never managed to do. The compatibility of the predictions of the Extended View with the work honored with the Nobel Prizes in Physics 2022 and Chemistry 2023 suggests developing a separate Theory of Relationality and combining it with the Theory of Relativity into a Theory of Relation.

INTRODUCTION THE PREREQUISITES

Supplements are online-only materials to the main article of a journal. They are now standard in the leading journals for the real sciences. On the one hand, this makes it possible to implement requirements that are in the interest of the journals. Advances in methodology, the increasing volume of original data used, but also modern presentation options, particularly in conjunction with the requirements of the Transparency and Openness Directive, place new demands on journal editors. However, the aim of the guideline is more far-reaching. It is about «reconciling scientific ideals with practice» [15].

(1) The documents required for this often take up so much space that they cannot be meaningfully included in the main article. The guidelines of Cambridge University Press, for example, therefore stipulate a supplement of up to 15 MB [12]. Science demands that the entire methods and all data should or must be shown in the supplement and made accessible to every researcher for verification of the statements, depending on the level of the TOP used [22].

(2) In this way, the supplement serves a purpose that goes beyond that of the main article: it should help to ensure that the entire article, thanks to the supplement, promotes research and utilization and stimulates collaboration between scientists. This is a particular challenge for journals that want to appeal to a broader readership.

(3) For example, the Linguistic Society of America even recommends using supplements in a way that «makes the results more accessible to non-expert readers» [14]. However, this means that the content must be prepared in such a way that it can be understood across the boundaries of different paradigms.

(4) Another goal that can be achieved with the supplement is noteworthy: The protection against unjustified accusations of plagiarism. This probably relates less to the origin of the data and methods used, but rather to any conclusions that are considered useful, in which cross-disciplinary collaboration is sought and are therefore not detailed in the main article. This can be put up for discussion in the supplement, as it is usually released without the usual review process by the editor-in-chief. Therefore, considerations can be made in the supplement, that are later published in a peer-reviewed main article. However, the primacy of the idea can be proven by the supplement [13].

Therefore, anything that improves the comprehensibility and understanding, but also the future utilization of the core statements of the main article can be made accessible in the supplement.

[1] Dedicated to Prof. Dr. Matt Larsson, Department of Physics, Stockholm University.

The Supplement: an «Egg-Laying Wool-Milk Sow»?

Who doesn't welcome the fact that scientific findings can also be understood by laypeople, that comprehensive data and clever methods can also be used for further research work and that creative ideas should be discussed at an early stage beyond the narrow boundaries of the discipline if the intellectual property of others is taken into account? However, the methods and data on which a main article is based had to be selected for a very concrete, usually specific research question in order to have a chance of being accepted and assigned to specially designated reviewers. These reviewers check the appropriate methodology and the correctness of the statements made. Are they also authorized and responsible for assessing the application-oriented relevance, e.g. for the extension of the research to other disciplines? And must the author have considered this option beforehand? Surely the author must choose the title and keywords according to the narrow requirements of «his research segment». Science and Nature therefore motivate their readers to read main articles in their daily news with striking titles, editor summaries, but also with summarizing short articles aimed at a broad audience, whose subject-specific titles would not have aroused their interest. Who would expect the same thing behind the cleverly chosen title «The geological history of primary productivity» [4] as in «According to new calculations, there are more living cells than grains of sand or stars in the sky» [24]?

The fact is that the relevance of a publication for practice does not usually lie in a specific empirical methodology and the scope of the original data, which are comprehensively reported and available in the supplement. It lies in the conclusions that are relevant to practice, logically coherent, verifiable and comprehensible beyond the specialist discipline. Only then can it become clear whether or not the work is also worth reading for specialists from other disciplines and laypersons. These summaries are rightly recognized as scientific works in their own right and are therefore given DOI numbers, for example: There is not only an empirically scientifically correct approach to researching natural processes, but also a logically deductive approach. This also requires correct scientific methods, which must be selected and implemented in a problem-oriented manner. This should be taken into account when the TOP calls for the methodology to be fully disclosed. It is not enough to simply describe the empirical and mathematical techniques.

However, this is seen quite differently in practice. Anyone who wants to publish a main contribution to the unification of the real sciences using the example of physics and presents new scientific-theoretical methods without any new empirical data of their own, but does prove the conclusions with the help of empirical facts that are already available, must ask themselves whether it is a contribution to the real sciences or physics at all. Would it not be appropriate to assign this contribution to the philosophy of science or another area of philosophy and submit it for publication there? But wouldn't this position simply dismiss the physical problem under discussion with a philosophical position, according to which the physicists' view of the world assumes that natural research is based only on empirical techniques? But empirical techniques are only tools to arrive at the facts, which then lead to the justification and solution of the physical problem through correct logical reasoning. Without problem-oriented and therefore scientifically correctly selected empiricism, it is not possible. However, the analogous problem would also occur if one were only to deal with scientific-theoretical models of thought. They too are only tools to achieve the actual goal of application-oriented research in particular, namely to be able to orient oneself better in the world (Einstein) and to avoid preventable harm (Hippocrates).

This means that there are two tools side by side to be considered in empirical natural research: on the one hand the empirical experiment, on the other hand scientific logical reasoning, both based on a common paradigm. The position taken here is that both are irreplaceable for the real sciences. It needs to be clarified in what way or with what weighting these two approaches are to be considered in the real sciences in contrast to the metaphysical view of nature.

BASIC CONCLUSIONS

The four requirements described above posed a particular challenge for the supplement to an article on the compatibility of the real sciences. After all, the main article must address experts from different paradigms, even if the focus is on one subject area. Therefore, the question of how to deal with the methodological and conceptual differences arising from the paradigms used comes to clarify the weighting between empirical and logical reasoning. The aim of the Extended View (ES) is not to replace the individual paradigms with a common paradigm, but to offer a framework model into which all paradigms can be integrated in a problem-oriented manner. As in the main article, the explanations must therefore be detailed enough for the reader to be able to follow the reasoning and recognize the compatibility with their own paradigm, regardless of their area of specialization. Ideally, thanks to the supplement, readers should be able to understand that their own possibilities are extended to areas that are inaccessible with the current paradigm.

The Relevance of the Ambiguity of Terms and the «Elephant in the Room»

Comprehensibility is made more difficult because the content of one and the same term can vary greatly depending on the discipline. There is therefore a danger of arguing at cross purposes. The fate of the biopsychosocial medical model proposed by Engel in 1977 shows how great these differences are, especially in the scientific representation of processes at different evolutionary levels [8]. In his pioneering work in Science, Engel pointed out the limits of the scientific nature of the conventional purely scientific paradigm of medicine and recommended a solution that would enable causal links. A systems theory

approach proves its worth at every level — from the cell to society. Therefore, Engel's suggestion that causality could be achieved for biopsychosocial medicine by linking Bertalanffy's General System Theory [1] with the hierarchical sequence of a person's subsystems according to Darwin's theory of evolution was almost compelling. However, causality could not be achieved because the identical systems theory terms mean something completely different when used to describe processes in the cell or in society, for example [29]. And Darwin's approach did not provide a solution. The bio-psycho-social model is therefore a helpful, indeed irreplaceable, tool for explaining risks, but not causality. Engel's fundamental criticism of the scientific nature of medicine therefore remained.

This obvious deficit did not lead to the solution to this obviously worthy question being taken up in scientific circles. The search for techniques to achieve causality would have been possible in parallel with the development of purely statistically based techniques. In the meantime, even the cluster method has been accepted as the gold standard. This involves selecting a number of variables without any theoretical basis from among measured variables that, for whatever reason, correlate significantly with the occurrence or non-occurrence of the effect to be explained, grouping them into clusters and using their coincidence as sufficient for further studies. In 2018, Pfizer's Supervisory Board deemed the scientific-theoretical options currently available to be so inadequate that it no longer considers funding for in-house research in selected areas to be justified. Pfizer, formerly the leading research institution for Alzheimer's and Parkinson's disease, has abandoned (among others) this research and closed the relevant laboratories. The CEO emphasized that only scientific reasons were decisive [16]. This step also did not lead to a critical analysis of the scientific community's focus. In this respect, nothing has changed significantly since Engel [26]. A rethink does not seem to be in sight. The problem is the «elephant in the room» of the applied sciences: The fundamental problem that is generally known, but about which there is an unspoken consensus that nobody talks about it.

Non-Scientific Arguments

Obviously, there are non-scientific reasons for this. Two arguments deserve particular attention for the way in which a supplement should be drafted if it is to contribute to increasing the willingness to face up to the «elephant in the room»:

(a) Th. Kuhn has demonstrated that personal interests determine whether or not a paradigm shift occurs. Whether the old or new paradigm ultimately prevails in a ruthlessly fought battle therefore does not depend on the better performance of the paradigm [21]. Not even ignoring and assuming that senility has set in are the most harmless methods of the supporters of normal science. The supplement must therefore succeed in making it clear that not only are there no disadvantages in accepting the proposed framework concept, but that one's own possibilities and thus private advantages would be expanded if this common framework were used.

b) Max Planck assumed that «inner peace of mind» was also the highest good of the scientist. He would therefore not be prepared to follow even scientifically compelling logic if he felt that this threatened his «inner peace of mind» [25]. Dealing with this problem is a much more complex challenge than the one posed by Th. Kuhn. The advantages and disadvantages can be presented logically. But which world view is the basis of a reader's «inner peace of mind» and in what way the idea of science and a possible modification are compatible with it can only be assumed empathetically. It is true that empathy is a quality that belongs to every human being and is demanded of a good doctor. However, the successful use of empathy turns medicine into an art. Even a supplement to the unification of the real sciences should not be about art, but only about science. Therefore, the only way left is to clarify the scientific-theoretical and ontic foundations of the proposed framework concept in an appropriately plausible way, and to hope that the reader will recognize with his empathy whether or not there is an incompatibility with his own world view.

For this reason alone, the supplement uses the technique of providing the reader with key statements from proponents of the different positions of Bohr and the representatives of his world view, which are still so influential today, and those of Einstein and his followers, together with corresponding references. This should enable each individual to form his or her own opinion through reflection (FOCUS 2: PERSONAL POSITIONS).

The positions of the author of the supplement are disclosed in the main article: According to this, Bohr's world view is no longer needed today. Einstein did develop essential methodological foundations for the «Extended View» (but also for Popper's «Logic of Research»). His methodology forced him to consistently adjust his world view, but this went virtually unnoticed by the scientific community. However, his attachment to the religious philosophy of Baruch Spinoza prevented him from seeking a sufficient reason for the ability of physical objects to observe and self-align.

World views, but also all theories derived from them, are regarded as free inventions of the human mind, whose justification arises only from their usefulness. Therefore, the view is held that this world view, together with the principles derived from it (Einstein's «principles»), should be used which is sufficiently meaningful and easiest to use for the specific question. Worldviews are therefore understood as problem-oriented tools to be selected. However, the efficiency of problem-oriented selected techniques increases if the connectivity to other

disciplines is at least «considered». Einstein's technique helps here if, for example, Newton's formulas are used, but it is clear that there must be no passive movement and no machine models. In the concrete application case, however, it is sufficient to pretend that gravity and determinant laws of nature «exist». In this case, Popper's problem-oriented technique and a purely heuristic approach can prove to be appropriate if one is aware that one is proceeding in a problem-oriented, simplistic manner.

A hypothetical realist approach is used as a philosophical technique for the unification of theories. Therefore, an assumption made in the process is considered sufficiently proven if it can be traced back from the phenomena observed in individuals, assuming a single evolutionary process that is not predetermined or permanently determined from «outside», and allows for predictions that are consistent with the facts of observation.

Hypothetical realism is seen as compatible with constructive realism [18]. «Comprehensive simplicity» must also be adhered to. These guidelines go into Einstein's technique of principle theories. This technique is also presented in Focus 2.

CONCRETE CONCLUSIONS:

These arguments show how diverse and also challenging the supplement must be written for the reader if the opportunities offered are to be utilized. This is also reflected in the comprehensiveness of some of the descriptions, which may appear too extensive to some readers and too abbreviated to others — depending on the extent to which the explanations correspond to their own ideas. We ask for your understanding in this regard.

Communication — «Glossary»

The unification of the real sciences should enable a causal and comprehensible link. This must be made clear to others. This is only possible through communication. This requires consensus on the terms used. This is the purpose of. The terms contained therein are written in italics in the text.

Various aspects have been taken into account.

a) «Comprehensive simplicity»: Everything that can be observed separately or derived logically must also be able to be communicated distinctly. To this end, existing terms may need to be clearly characterized. Their characterization can be taken from the glossary. If a term is missing, it must be introduced and characterized in such a way that its usefulness can be tested empirically and logically. Particular reference should be made to the empirical-logical examination of the key term «discrimination ability» [19].

b) A glossary is only helpful if it enables the meaning of the term to be explained, to be grasped. This is only possible if the previously unknown meaning is derived from a clear connection between familiar terms in the user's own vocabulary. In the case of terms from an unfamiliar paradigm, this may require more detailed explanations.

c) The glossary also contains terms from different sectoral disciplines such as philosophy of science and ontics.

d) Obviously, there is an interdependence between these philosophical approaches and the required terms, but also in their use resulting from different positions. Statements of key positions should make it possible to clarify this.

e) No claim is made to provide a generally valid definition of the concepts presented. It is only a matter of clarifying how these terms are used in this paper. This approach is permissible. After all, everyone is free to choose their own terms. However, it is then necessary to describe the terms clearly.

Terms thus «stand» for something in nature or in the thought construct with which one can make statements about the processes. Therefore, their effectiveness for physical or intellectual processes depends on what they «stand for»: for something that really exists and is therefore capable of becoming effective on its own, or as a tool for orienting oneself in the real world or in thought constructs and being able to communicate with others via them. Without reference to linguistics, it seems helpful to make the following distinctions in this respect, for example:

- **«Names»** stand for objects that have the Janus-shaped «dynamis» and are therefore capable of being effective themselves thanks to their energy(s) and discrimination(s), e.g. actors, every reader, my cat
- **«Designations»** stand for properties that are assigned or ascribed to objects, for example. Unfortunately, many terms that are actually intended to convey properties give the impression that they are names for an object. Energy» stands for the property of an object to be able to cause a certain effect. That's why you can't buy «energy», you can only buy gasoline, for example. It would be more correct to use the term «energy ability».
- Terms that **«make a long story short»** (e.g. evolution, universe, society): They are not themselves effective. It is assumed that the interlocutor knows the long history (e.g. of the non-predetermined, one-off process from the Big Bang to the Big Mac). However, the actor with the name «evolution» or «universe» or «society» does not exist. But those who have caused the process, who exist within this area or the many individual people who will go to the polls tomorrow, can be named. They are empowered to become effective themselves. It is easy to pretend «as if» evolution has so wisely created this wonderful diversity. But «evolution» did not cause anything at all. It was the existing actors.
- **Black box terms:** They are introduced when predictable phenomena occur whose causality and interconnectedness is not known, e.g. the principle of indeterminacy. They only «stand» for something that can be described but not explained. They should be understood as a challenge for theory building and only be temporarily

necessary. One should clearly state that one does not know the connection.

- **Terms of order:** They should enable a structure between concepts, e.g. global terms: In ES, they stand for a characteristic that all evolutionarily younger objects have, e.g. limitedness, consensus orientation
- **Terms of the formal sciences** (mathematics, logic...): e.g. formulas, they describe abstract, logical relationships, i.e. inventions by people. They are therefore unable to achieve anything themselves. They stand for characteristics of objects and their processes.

This makes it clear that only «names» stand for something that can be effective itself, thanks to their capabilities or properties. If one assumes that something is independently effective, such as quantum coincidence, then the principle of comprehensive simplicity demands that this term is defined so clearly that it is revealed whether it really stands for something that is capable of independent effectiveness. The characterization must permit an empirical-logical examination. If this is not the case, it is a «black box term».

Interdependence of Theory and Empiricism on the Concepts

The result of the experiment determines what has to be communicated. Therefore, the experiment or what can be measured, and thus empiricism, determines natural science (Galileo).

«Theory determines what can be observed (Einstein)», what «cannot be observed» (Heisenberg), but also which conclusions can or must be drawn from what is observed and how this must be formulated in order to continue to belong to a particular scientific community. Therefore, the theory, and thus the paradigm, determines what can be formulated.

Nothing can be said about what there are no concepts for. Therefore, no experimental set-up can be described that goes beyond that for which concepts are available. Therefore, the available concepts determine the scope of a theory and thus of natural science.

This results in the great importance of comprehensive simplicity. It forces the introduction of concepts and thus opens up not only additional logical possibilities, but in particular additional possibilities for empirically verifiable predictions. This distinguishes the real sciences from the various philosophical disciplines.

The tools of philosophy are concepts and their intellectual and logical use. In contrast to the real sciences, the philosopher therefore does not need an experiment. However, he can use result and their terms from the real sciences for his considerations.

The area of Tension Between Philosophy (Especially Philosophy of Science, Logic and Ontics) and Empiricism in the Study of Nature

The philosophical disciplines concerned are independent subject areas. Even in the same disciplines (such as philosophy of science, logic, etc.) different orientations can be distinguished. They can therefore arrive at different, even contradictory statements on the same question. Philosophers can use real scientific positions as the starting point for their reasoning. It is therefore not surprising that one can come to different conclusions if one looks at the same phenomena from the point of view of a specific philosophical or scientific-empirical perspective. A decision must then be made: Does the natural scientist use philosophy as an auxiliary science, or do the observational facts only represent the starting point for their interpretation from a philosophical position. In this case, natural science is the philosopher's «aid». For the philosopher, empirical facts are not a tool for causal explanation. In the case of empirical deviations, it can therefore be argued that the necessary philosophical argument is currently still missing. Therefore, the philosopher does not have to give up his world view. He needs a «consensual» formulation that allows him to modify the content accordingly, if necessary, so that the reasoning based on the natural scientist's position then coincides with the philosophical position again. The position taken here is that the natural scientist should only use philosophy as an auxiliary science. If, for example, a physical process can be determined with a length measurement and a time measurement, the speed can be calculated from this. It can therefore be decided whether the process was slower or faster than the speed of light. This is independent of whether Einstein's philosophical world view assumes that no physical process can be faster than the speed of light. For the natural scientist, the process between entangled photons is faster than the speed of light for the empirically oriented researcher, i.e. «with spooky action at a distance» and not at the maximum speed of light. Whether one uses the term «common system» for the relationship between the two entangled photons does not change the phenomenon. The philosopher who wants to integrate entanglement into Einstein's world view will not be able to concede this, as he would have to give up the philosophical world view to do so. The philosopher will forbid speaking of faster-than-light speed, but will be satisfied if the term nonlocality is used. Whether entanglement is also used to transmit encrypted messages between persons is irrelevant to the question of the appropriate world view of physics, however relevant this may be for the everyday practice of persons.

For a limited period of time, it can be helpful to give priority to statements of the formal sciences over only logically justified assumptions that are based on a merely hypothetically realistic approach, if this can be used to establish connectivity to empirically justified subsequent states, e.g. for the mathematical characterization of the phenomenon of inflation, which is undisputed in terms of its effect.

Dynamis and Discrimination

The Extended View (ES) has been developed primarily for issues of health and sustainability. A person's health and well-being cannot be adequately addressed without recognizing the person's ability to differentiate

non-observable effects according to meaning, to change the personally attributed meaning and, if necessary, to make it the starting point for observable effects. It is therefore not enough to attribute only physical energy to a person. This would only make it possible to understand that the person can change its position anywhere in geometric space. Even for the movement that actually occurs, energy is not enough, as it cannot be used to justify the direction in which the position is changed. In accordance with «comprehensive simplicity», a quantity for which the term «discrimination» was chosen to correspond to the term «energy» therefore had to be introduced and characterized in such a way that its usefulness could be empirically tested in an experimentum crucis [19]. «Discrimination» is understood as the second aspect of the one, Janus-faced ability to be effective. This corresponds to dynamis (Greek) or potentia (Latin) in Aristotle's world view.

In addition, the Extended View (ES) assumes a single, non-predetermined evolutionary process. Therefore, the discrimination of a person must go back to the modification of discrimination, which must be conceded to the initial actors — together with their energy. Discrimination must therefore have been modified in the course of the evolutionary process and be attributed to the dynamis of objects in different qualities. This also corresponds to Aristotle's position. His world view envisages a gradual decrease in the quality of dynamis. The person has the highest and the inanimate the lowest quality of all objects on earth. In 1924, Nils Bohr proposed to grant quantum objects potentia in the sense of Aristotle, but abandoned this again [2]. Heisenberg took up this position in his 1955 lecture series and then defended it for the rest of his life [11].

Invitation to Discussion: Theory of Relativity and Theory of Relationality and Theory of Relation?

In the main article, all the prerequisites for the following considerations were presented in detail, but the concrete statement that, for example, the assumption of a Theory of Relativity and a Theory of Relation follows almost necessarily from this was not made. This is now put up for discussion in terms of the objectives 3 and 4 described above to promote the further development of knowledge across disciplines. Some statements need to be repeated for the sake of coherence.

Assuming dynamis with energy and discrimination, the dynamics of a change in the relation of an object to another object is characterized by two aspects:

(a) by the relativity in the geometrically spatial and thus energetically conditioned relation and

b) by the relationality in a meaning-related relation as a result of the effectiveness of discrimination.

The difference becomes clear in Einstein's example «for the reader's amusement: today I am called a «German scientist» in Germany and a «Swiss Jew» in England; but should I one day find myself in the position of being presented as a «bиte noire» [black sheep], then conversely I would be a «Swiss Jew» for the Germans and a «German scientist» for the English. This change, which requires explanation, would occur wherever Einstein is spatially («relativity»). The change in meaning has nothing to do with the location of Einstein's relation in a geometric system, but in a meaning-related one.

If we also assume a single, non-predetermined evolutionary process from the Big Bag to the present day, then it makes sense to consider the unification of the real sciences: It is then, after all, virtually imperative that the principles for the order in the currently given nature must go back to the inherent dynamics as a result of the initial characteristics of the actors that were present at the beginning of the scientifically justifiable process. This must also apply to the development of positioning in a space of meaning (relationality) and not just in a geometrically tangible space (relativity).

On the Theory of Relativity

Einstein's world view enabled him to grasp the essence of the energetic processes of mechanics and electromagnetism so fundamentally that he was able to modify their formula systems without contradiction until they could be expressed together by the Special Theory of Relativity. Central to this was the formula $E=mc^2$. However, the influence of Baruch Spinoza's religious philosophy meant that Einstein never put determinacy up for discussion, at least in his formulae. This meant that he was unable to understand the connection between the sub-steps of the evolutionary process he expressed in terms of energy, from the initial actor to the atoms. This process presupposes the ability of the actors to assign and reinterpret meanings and to place them in new relationships in a goal-oriented manner. Bohr briefly proposed such an ability with the dynamis in 1924, but Einstein did not take this up and rejected it solely on emotional grounds. He would rather be a cobbler than have to work as a physicist with such an assumption [7]. Einstein could therefore only assume an evolutionary process based on Intelligent Design. He had to assume a determined process — probably in order to maintain his peace of mind and remain a physicist.

This is reflected in Fig. 1: Einstein only took into account the energetic aspect of the effectiveness of the physical agents, which, however, also have discrimination ability.

The Extended View offers a model for the evolutionary process that is incompatible with Intelligent Design, but assumes that the evolutionary process starts from the respective existing actors, who (thanks to their discrimination ability) are capable of assigning different meanings to given things and entering into consensus with «fate comrades», which are then voluntarily adhered to. The corresponding effects can therefore be predicted.

This allows Einstein's formulations to be used as a proposal for the evolutionary process of physical objects. «Behind» — i.e. as evolutionary precursors for particles and the electromagnetic field — the energetic field must be taken into account. Einstein starts from the comprehen-

sive formula $E=mc^2$ for particles and the electromagnetic field. Although electromagnetic radiation has no mass, it has analogous effects if one assumes that «it has the mass h times ny». If we also consider Einstein's recommendation to continue using Newton's formulas in classical questions despite the Special Theory of Relativity, «as if» there were passive motion and determinant laws of nature, all objects in our world are also recorded in terms of their physical energetic effectiveness at the level of the energetic field.

If these statements are combined with the assumptions of the Extended View, then the Special Theory of Relativity allows the following picture of the evolutionary development of physical objects. The starting point is an actor whose energetic effectiveness corresponds to the energetic field. So far, we only know the energetic property of this actor, namely the energetic field. The binding nature of Comprehensive Simplicity made it necessary to assign a name to this newly introduced actor. «Mechanoeiton» was chosen. A Janus-faced ability with two aspects comparable to Aristotle's dynamis was ascribed to it.: the energy(ability) and the discrimination (ability). The name «mechanoeiton» for the initial actor was chosen because the very old Greek term «mechanao» expresses the processes of observing, grasping and goal-oriented action as a unitary process. This corresponds to the initial situation of the Big Bang. The terms «noeio» and «nous» in Greek for the mind without realization and «machina» in Latin for the mindless machine are derived from «mechanao». Therefore, «machination» and «noeiton» were introduced for the two aspects of the «dynamis» of the mechanoeiton. Both properties determine the evolutionary process of the Big Bang and modify each other within it. Therefore, a global concept is needed for all evolutionary levels. «Energy(-ness)» could be used for the machinaton aspect. «Energy» was empirically clarified in detail by the Theory of Relativity. The energy(-ness) of the mechanoeiton thus corresponds to the term «energetic field» introduced by Einstein! The global concept was missing for the noeiton aspect of the machinaton. «Discrimination (capacity)» was chosen. This newly introduced term for a property of actors that manifests itself in animate objects as capacity to organize was characterized in accordance with the requirement of comprehensive simplicity and its characteristics were used for predictions that were successfully empirically and logically tested in the context of an Experimentum Crucis [19]. This and the detailed characteristics of the mechanoeitons were discussed in detail in the main article.

Two mechanoeitons reach a consensus that they will no longer approach the consensually accepted future meeting point with all other mechanoeitons at the maximum possible speed (which could, for example, lead to Einstein's pulsating universe), but only at the speed of light, which is almost negligible compared to the non-local, inflationary spatial effect. Nevertheless, the principle of energy conservation still applies. Therefore, the energetic potential that is not used to reach the future meeting

Fig. 1. The Theory of Relativity explicitly considers only the energetic aspect of the energetic aspect of the Janus-faced effectiveness of physical objects

point must be utilized through appropriate detours. There are no specifications for this. The alignment and its modifications can therefore be varied according to the individual. The empirical facts prove that this was also used to form mechanoeitons «pair». According to the Comprehensive Simplicity, this «pair» must be given a name. This is «electromagnetic radiation». Its energetic effect is referred to as an «electromagnetic field», the individual effectiveness of the mechanoeitons involved as an electric and magnetic field. Electromagnetic radiation leads to observable effects: The frequency and the quantum. In evolutionary terms, this can be explained as follows: The «paired» mechanoeitons converge to a maximum in a predictable rhythm and then move away again. The stage of greater convergence can be observed as a quantum phase. Before and after this, the two mechanoeitons move in a self-tuned, mutually stimulating manner. Every dancer knows that using the possibility of being able to move with a partner in a self-determined and mutually stimulating way, while at the same time adhering to precise instructions, is a positive experience. They have also experienced that the pleasure of dancing does not come from adhering to the prescribed sequence of steps, but from the mutual stimulation through and to freely chosen activities. This gain can only be experienced internally, while adherence to the dance steps is also accessible to the strict eyes of the dance competition judges, for example.

In the quantum phase, the common energetic potential of both mechanoeitons is located in a very small space. This can be observed by the researcher. Its energetic potential corresponds to Planck's quantum of action. If several pairs agree on a common «dance community», all mechanoeitons maintain the same point of convergence. As a result, the energetic potential of the quantum increases the more electromagnetic radiations coordinate to form a radiation with a common quantum. Since the common frequency increases accordingly as the number of integrated radiations increases, the energetic effectiveness, i.e. the electromagnetic field, of each electromagnetic radiation can be determined using the product of Planck's effective quantum times the frequency. The energetic potential must then be taken into account so that it can be observed that the speed of light is maintained despite the «detours».

Particles can be understood as an evolutionary modification of electromagnetic radiation in which an additional consensus is maintained, according to which the electromagnetic radiation aligns itself consensually around a common point. It must therefore also be possible to prove their electromagnetic nature using a suitable experimental set-up. This was demonstrated by de Broglie with the mass waves [5]. Then the common quantum phase of the integrated electromagnetic radiations must inevitably lie within the area around which the electromagnetic radiations are oriented. The common energetic potential must therefore correspond to that of the integrated electromagnetic radiation in accordance with the conservation of energy. This energetic concentration needs its own name. This is «mass».

The same intention is also assumed for this consensus: To increase the creative challenge for self-determined movement. This will increase with an increase in the integrated electromagnetic radiation if the options already given by the consensus are retained to the same extent. The self-alignment of the electromagnetic radiations around the mass point (and thus quantum point), which takes place in addition to the forward movement, must lead to a reduction in the speed of the forward movement due to the conservation of energy, and this is proportional to the increase in mass.

By incorporating the discrimination ability, it is thus possible to make it clear what the term «mass» stands for and why particles have exactly the spatial effect that corresponds to their mass.

If the discrimination ability is not taken into account, the evolutionary process implicitly assumed in the Theory of Relativity and the concept of mass cannot be derived from the paradigm. Einstein expressed this with his famous comparison, according to which the symbol for mass relates to the other concepts in the formulae of the General Theory of Relativity «like the wooden nose of a snowman» [30]. However, the dependence of mass on the nature of electromagnetic radiation and thus on mechanoeiton with its energetic field can be expressed verbally with the formulation: The energetic effectiveness of — massless — electromagnetic radiation behaves as if the electromagnetic field had the mass Planck's quantum of action times the frequency.

The energetic potential that would have to be used to cover the distance directly at the speed of light would of course be negligible compared to the potential required for the self-determined alignment of the two mechanoeitons, which have assumed the role of an electric or magnetic field. However, the forward effect at the speed of light must also be integrated into the overall movement, which must be reflected in the energy requirement.

If it is assumed that the additional consensus to form a particle is only entered into because this increases the challenge for creative self-alignment, the essence of the particle — and thus the predominant use of the electromagnetic fields involved — is based on the even more demanding free movement alignment despite compliance with the «dance rules of particles». The author has no empirical evidence for this. However, this principle that the observable is not the essence in the utilization of the energetic potential can nevertheless be made empirically plausible. Then the formation of atoms from particles can also be traced back to a consensus that should allow even more creative self-alignments in interaction with the particles involved. This must also apply to the coordination of atoms into molecules. If this is the case, then the energetic potential that we can use from gasoline, for example, must be considerably smaller than that resulting from the formula $E=mc^2$. This is true. The energetic potential according to the Special Theory of Relativity is around a billion times greater than the potential accessible to us [23]. The same applies to nuclear energy.

Theory of Relativity also seems to be justified for the representation of the evolutionary occurrence of more complex physical objects thanks to the consideration of the discrimination ability. The integration of the evolutionary process does not require any special empathy with physical processes, but only the willingness to abandon the religious-philosophical attachment to determinism and to apply the principles of hypothetical realism in a consistently logical manner.

However, this does not result in any additional energy-related physical statements. What has changed, however, is the assumption about the oldest evolutionary actor. This leads to a modification of the very earliest evolutionary cosmological process. However, the proposed modification only concerns the phase of approx. 10–20 seconds. The statements made for this phase cannot be supported by empirical findings, but only by philosophical arguments. This was also explained in the main article.

On the Theory of Relationality

Anyone who assumes that there is only a single evolutionary process that is not predetermined and does not have to be continuously influenced from «outside» must assume that the evolutionary new is due to the effectiveness of the objects present in the previous state. Otherwise no one else was there. The researcher must therefore assume that these actors are capable of observing, assigning meaning to what they observe, changing it at best and making assignments of meaning the cause of energetic effectiveness, but not necessarily. These processes become understandable if one assumes that the actors have a «discrimination ability». But Einstein did not do this.

The inclusion of discrimination opens up the option, also envisaged for a supplement, of presenting a body of thought for discussion on the basis of the main article, which could gain in significance through the involvement of experts from other disciplines. It must then be possible and sensible to develop a theory that focuses on the effectiveness of the discrimination ability of the — in this case physically tangible — actors. There is a fundamental difference to the approach taken in the Theory of

Relativity. There, one starts from the observable effects and their generalizability. In the Theory of Relationality, one must start from the unobservable individual intentions of an actor, which are achieved on the basis of equally unobservable evaluations by causing observable effects. Nevertheless, the individual goal and the individual evaluation, however relevant they may be for the individual actor concerned, must not be taken into account if generalizable statements are to be made. This question arises, for example, in legal proceedings for plants, in which the generalizable goal of each neighbor must be taken into account, namely not to be unreasonably disturbed by perceptible physical and chemical stimuli such as odour, noise and vibrations. Here, as Kofler deduced in the instructions for the medical report, the individual can only be taken into account to the extent that this can logically be expected of a «healthy, normally perceiving person» who has been sufficiently informed about the health relevance and therefore has a legal right to this information, taking into account the circumstances [20]. This principle can also be applied to physical processes, for example. Just as every neighbor can be assumed to have the goal of not being unreasonably inconvenienced and every living being of not being killed, every physical actor can be assumed to have the «symbolic intention» of increasing their possibilities for individual creative movements and not losing acquired possibilities. To this end, predetermined consensuses must be adhered to, as in a game of chess. The specifications that must be adhered to if, for example, a horse is to be used correctly in order to achieve the goal of winning the game can be discovered by analyzing many games. Nevertheless, it remains undetermined which of the correct options the player chooses. The decision-making process is hidden from the observer, but not the actual movement of the piece. Thus, the assumption of «symbolic intention» and the chess model enable generalizable statements to be made in a theory of relationality in which indeterminacy and predictability logically presuppose each other.

This means that a theory that takes discrimination into account focuses on the researchability of evaluation-dependent processes. This can also be based on the mathematically expressible findings that Fechner [9] and Stevens [3] have demonstrated in the context of the subjective evaluation of physical and chemical stimuli. They demonstrate the meaning-related and biological relevance of natural objects in physiology and thus in everyday life, which are usually restricted to their energetic effectiveness in the disciplines of physics and chemistry [10].

Such considerations on the nature of quantum objects and their processes were part of Schrödinger's world view. In 1925, he openly addressed the challenge posed by the predictability of subjective sensations as a function of the intensity of physical stimuli with the help of Fechner's formulas when it came to the «deepest truth» about the nature of quantum processes [27]. This world view enabled him to empathize with the processes of quantum objects so successfully that he was not only able to develop the wave function on the basis of phi. It enabled him to postulate entanglement in 1935 and to assign nonlocality to entangled photons as an essential characteristic [28]. Neither of these can be explained on the basis of purely energetic physics. Spatial effects of any kind that go beyond the speed of light must appear «spooky» to Einstein. However, these positions become clear if one understands «entanglement» as an experimentally triggerable consequence of adherence to subset-constitutive consensuses.

Since the observance of subset-constitutive consensuses is seen as a prerequisite for evolutionary development, Schrödinger's prediction of nonlocal spatial efficiency coincides with the prediction of the Extended View in the case of photon entanglement. Nonlocality arises from the spatial effectiveness of the two mechanoeitons, which together form electromagnetic radiation. However, in the case of entanglement of electromagnetic radiations into particles, locality should be expected and not nonlocality: the initial arbitrariness acquired by the additional consensus to form a particle also includes the options acquired thanks to the consensus to maintain the speed of light. They must be preserved. The same can be predicted when particles enter into a further consensus to form an atom or when atoms form a molecule thanks to interaction with electrons. All these processes must take place with local spatial efficiency.

This has recently been confirmed empirically. Eckart et al. [6] explained the formation of molecules from atoms by a «fingerprint of entanglement», whereby the processes of the «entangled atoms took place on a femtosecond time scale». The processes are therefore local. This corresponds to the prediction of the Extended View.

For a better understanding of the evolutionary process, the Extended View offers the chess model. A distinction is made between two phases, which are a prerequisite for a creative idea — such as with wood-carved chess pieces on a playing field, the dimensions of which can no more be logically justified than the rules of chess — to be conceived and implemented at all and then outlive the inventor of the idea. The prerequisite is a corresponding environment in which wood exists at all and a creative player who can imagine that it is possible to carve distinguishable pieces out of wood for everyone and assign rules to them. They will then need partners who can be motivated to limit themselves and only carve these figures or, if necessary, use other materials to move them in accordance with the possible rules of the game. This initial phase can only be overcome if the game remains exciting enough for each of the few pioneers (WINWIN), although only one player has the chance to win (WIN). If this is not the case, the game will not be developed further or even abandoned. The material of the pieces may then be used differently and the pieces disappear, as can be observed with particles that only appear temporarily. However, if a large number of players can be inspired, the mature game will continue beyond the pioneer phase, even if individual

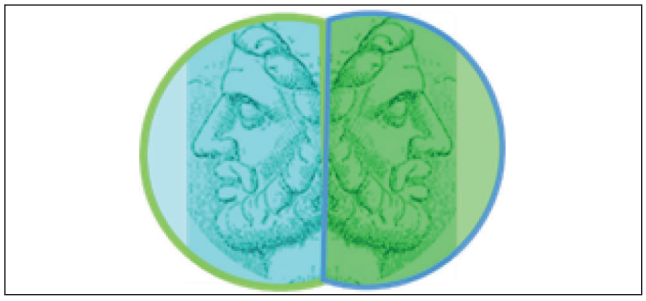

Fig. 2. The Theory of Relationality focuses on the discrimination-related aspects of the Janus-faced effectiveness of physical objects in the knowledge of their energetic nature and thus also influences the expressiveness of the Theory of Relativity, manifested by the colors

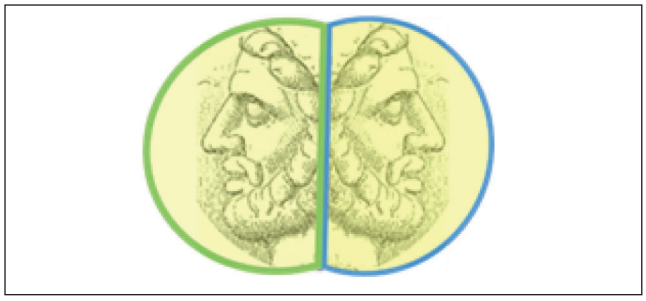

Fig. 3. Relational Theory should take into account the holistic nature of physical actors with their Janus-faced effectiveness, symbolically expressed by the color yellow - made of blue and green

players lose interest. After all, there are always new players joining. These people do not need to be as creative and consistent as the inventor and the «pioneers». It is enough to accept the rules of the game.

The work awarded the 2023 Nobel Prize in Chemistry not only supports the prediction regarding the local speed. They also show the dependence of the possibilities for any effectiveness on the environment, the dynamics involved and the transition from a few pioneers to a situation with sufficient «players». The organic metal compounds were introduced into an extremely hot solution. The organic components therefore evaporated. Individual metal atoms remained, which very quickly formed extremely small crystals. These reflected blue, i.e. high-frequency light with a very low amplitude corresponding to the extreme smallness of the crystals, regardless of which element they were made of. If the solution is heated again, the crystals can become larger. This also increases the space available in the crystal for the emitted photons and thus also the color, until the longest wavelength color with the highest amplitude, i.e. red, is emitted. If the crystals become even larger, the type of element invariably determines the color. This is shown by historical church windows: gold leads to red, copper to green, etc.

Subjective perceptibility thus depends on the principles that arise from the discrimination ability of physical objects and — despite the characteristic frequencies — have nothing to do with the theory of relativity. They can be understood as a consequence of a theory of relativity.

Subjective perceptibility thus depends on the principles that arise from the discrimination ability of physical objects and — despite the characteristic frequencies — have nothing to do with the theory of relativity. They can be understood as a consequence of a Theory of Relationality.

The keeping of subset-constitutive consensuses is only the consequence of one of the characteristics that had to be imputed to the mechanoeitons so that they allow all modifications to be understood that are necessary for the efficacies of a person to be understood as an expression of a non-predetermined evolutionary process. The implications of these characteristics for physical processes should not be stated from the author's position, as he is not a physicist. However, he — like any other representative of a subject in the real sciences outside of physics — can make statements about physical processes on the basis of a different world view if these are conclusive without additional empirical data. This is because representatives of all disciplines are responsible and necessary for the development of a world view that encompasses all real sciences, including physics. The proposal for the derivation of mass from the characteristics (or Einstein's «principles») of the Extended View in particular proves that the strength of a cross-disciplinary model approach lies in the fact that questions can be asked that could not be asked or answered without it. For example, the physicists' answers to the question of why natural processes are reversible in the microworld but not in the macroworld will be very interesting.

On the Theory of Relation

If the proposal for a theory of relativity proves successful, the next step would be logical: To examine to what extent the Theory of Relativity and the Theory of Relationality can be integrated into a common Theory of Relations. This should actually make it possible to connect the quantum theories and the theory of relativity. Then Einstein's hope that the general theory of relativity would become the mother of all theories as a theory of principles would probably be justified after all.

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FOCUS 1: EXTENDED GLOSSARY

PRELIMINARY

Where terms are missing,
A word arises at the right time.
Words offer an excellent way to fight,
With words a system can be constructed,
Words can be excellently believed in,
Not an iota can be robbed from a word.
Goethe: Mephisto in Faust
Reality and Wirklichkeit

Reality and Wirklichkeit

The author of this glossary is a doctor and pragmatic realist, not a philosopher. He assumes that he and everything exists without him or without other people. For the author, only that which has the Janus-faced dynamis and is therefore effective thanks to its own ability exists. The author describes that which exists for everyone, even if he would not exist, as real, even if he cannot observe the effect himself. Therefore, observability is only a tool for a section of reality. There can also be something that exists that no person can observe, like so many processes in the quantum world.

He describes as wirklich that which he himself assumes exists without having observed it. He also considers what he or others could realize to be wirklich. Therefore, the term «wirklichkeit» also includes the «possible», i.e. the potentially realizable. This means that the term «wirklichkeit» is no longer identical with reality. After all, you cannot know whether what you personally or «the others» consider possible and realizable can also be realized or has already been realized somewhere. Of course, this also applies to what one considers possible in a worldview of physics and what prerequisites, one assumes in order to be allowed to speak of reality. The decisive factor for the natural scientist is that the ability of objects to be effective is indispensable in order to be the subject of his statements. For him, therefore, only the aspect of wirklichkeit that concerns the possibility of realization is relevant. He only has methods for this. This is not a criterion for philosophers. Their concept of wirklichkeit is determined by their methods. These do not include empiricism.

This is essential for the assessment of arguments in the discussion between Bohr and Einstein. Both claim to present a world view for physics that relates to reality. Einstein assumes that the quantum world also belongs to the same reality as classical physics, but that there are differences in the methods, for which he introduces his own terms (such as energetic field) and principles (e.g. the equivalence principle). Bohr took the philosophical position that quantum objects would only exist in reality during observation, e.g. no electron would exist between observations. Quantum objects would only become real through observation or measurement. Therefore, in this model, a natural scientist has no competence to make a statement about the phase between the observations. He cannot use a scientific method for this. Therefore, such an assumption about the nature of nature falls exclusively within the realm of a philosopher, even if non-philosophers would share it. The author assumes that philosophy is an irreplaceable auxiliary science for applied research in the real sciences. But it is «only» an auxiliary science. If there is an incompatibility with the logical conclusions from observational facts, the conclusions from the scientific observational facts must be used in the model applied. Therefore, additional terminology is only needed if, on the basis of empirical facts, the previously only philosophically supported model turns out to be realistic.

It is not only the author — and possibly also many physicists, such as Schrödinger — who do not share Bohr's position. Should this view be made compatible with the real sciences on a causal level at some point, far-reaching changes could be necessary for the content of numerous terms, the use of which will be made clear in this main article with the help of the glossary below.

About Schrödinger's cat

This question is therefore dealt with in the glossary under «Schrödinger's cat». Proponents of Bohr's position assume that they can substantiate their position with this thought experiment. However, Schrödinger had tried to use this experiment to make it clear that there is only one form of reality in which an observation can only tell us what has or has not happened since the previous observation, for example. The observation itself has no influence on this. Bohr assumes that the process that would or would not lead to the death of the cat is only set in motion by the observation. Experiments have not yet been carried out to confirm or refute these positions. However, this should be possible with the modification of the experimental set-up described by Schrödinger using exclusively physical methods. Therefore, the implementation of this experiment is the responsibility of physics. Until the scientifically conclusive prediction that the body temperature of the cat, which is highly likely to have died after three days, has dropped, we can continue to address the particularly rele-

vant and pressing problems of the day. Their solution would be facilitated if the interconnectedness of the influencing variables, which also belong to different evolutionary levels, could be causally taken into account. This should be possible through the unification of real sciences.

However, this presupposes that the necessary terminology is available or can be made available if necessary.

Need for terminology for the generalizable and the generalizable individually

A limit in the statements that are currently possible results from the fact that these have so far only been made from the perspective of the outside observer, as if all the necessary information can be obtained by the researchers placing themselves in a position mentally outside our world. However, this means that essential information must remain hidden: Our world is the way it is because it is the expression of the evolutionary process. However, the evolutionary modifications were caused by individuals and adopted by many for individual reasons. We must therefore consider why they acted in this way and not others in order to be able to adequately discuss the conditions of our everyday life and our current possibilities. This requires an additional set of terms. Only then will it be possible to communicate about these processes and the different positions that are essential to them. Numerous terms do not relate specifically to physical processes, but to fundamental statements that are necessary in order to be able to integrate the concrete physical processes into the desired unifying framework.

Different approaches to the same process must be taken into account. These can be illustrated by the parable of dancing: the researchers correspond to the critical spectator: their statements are based on what is directly accessible to them by observation. Without knowledge of the dance rules, one can only say that people move in pairs in a defined area. If you know the step sequences, you can judge whether the consensus for the specific dance chosen is being adhered to. Then you can also see that even good dancers do not always do this exactly. (Outside observer's view). Sometimes dancers also make mistakes when they are distracted because they feel they are being watched. If you want to avoid this, the outside observer can also hide behind a wall, for example. This can be important in empirical social research. This is why it is also referred to as the researcher's wall position. The available terms are sufficient for communicating the facts collected in this way.

Additional terms become necessary if you want to communicate what the two people in a dance couple experience when dancing. From their point of view, it is quite different. When getting to know each other, each of them will pay attention to whether and how well their partner masters the basic steps and concentrate on their own step sequence. But this soon becomes automatic. You can now concentrate on how the other person reacts to the individual movements, e.g. of the arms, head, etc., which are also possible if the basic steps are followed. If the reaction stimulates further individual activity, dancing starts to be fun (inside view). Unfortunately, there are other dancing couples on the floor. You must not collide with them. But this is possible if the others have also mastered the basic steps and do not take up an unreasonable amount of space for their individual additional movements. (individual outside view). Theoretically, it would be possible for a dancer in a couple to also observe these individual movements of another couple in a highly concentrated manner (extended inside view). However, this is not possible in the long term with creative dancing with one's own partner. However, this approach is important if you want to understand how consensus is formed between couples, applied to quantum physics, how higher frequency electromagnetic radiation, light, particles etc. could come about voluntarily without intelligent design.

Consideration for the other dance couples and the dimensions of the dance floor limit the possibilities for creative, self-determined movement modifications. In addition, dancing becomes less challenging and therefore less fun over time just by modifying the basic steps. Both can be countered by expanding the basic steps with additional generally recognized consensuses. Then every couple can manage with less space. The principle of increasing the challenge to creativity by making additional demands on the sequence of steps and at the same time limiting the individually allocated space can be used again and again. The outside observer will notice that the beginner couple has now become competitive dancers. Applied to physics, the increase in frequency with a decrease in amplitude or the space required inside atoms, for example, becomes clear.

Need for terminology to communicate about the evolutionary process

All these steps presuppose that someone has invented the necessary consensuses and has been able to communicate their benefits to others. We therefore need terms to be able to communicate about the evolutionary phase itself. It is therefore a question of the inventor first expanding his own ideas and thus his reality in a creative way. It was easier to invent an additional dance, as only the familiar could be modified. It was much more creative and difficult to introduce dancing in the first place and to find a partner, to make each other the point of reference for one's own creative movements. This «couple» thus became the basis for further modifications. (Basic actor)

Different observer positions

When using terms, one should take into account the position from which communication is being sought and for what purpose statements are therefore being made:

- From the position of the wall-observing researcher, who observes phenomena to the exclusion of his influence or the influence of his experimental set-up on the objects under investigation and their processes (outside observer view), if possible.

- From the point of view of the stimulating researcher who, by deciding on the choice of experimental set-up, wants to check whether he can directly or indirectly artificially induce an expected effect (e.g. in the case of entanglement, advertising, falsification).
- From the point of view of the application-oriented service provider who wants to achieve an imminent disadvantage or a desirable effect of the service user by influencing the meaning assignment of his intervention (meaning-dependent combination effects across evolutionary levels as in toxicopy or nocebo, placebo).
- From the perspective of the person affected according to their evolutionary level (inside view, individual outside view, extended inside view).

Connection between the available terms and the thought models

A distinction must also be made as to the scientific theoretical position from which statements are made. This can be based on a deductive approach. In this case, the question at hand is a special case of a problem that can be seen from a comprehensive, sufficiently understood whole. This is what Einstein strove for. Bohr's position was that one can only start from what is currently observable, as the essence of what is happening ultimately remains closed. One can therefore only proceed inductively from the empirical facts, develop mathematical formulas for them and hope that they can at least be applied to similar processes. This approach includes heuristic research. Heuristic research and inductive research in general are indispensable. Without them, there would have been no Bronze Age, no music, no culture and, of course, no Nobel Prizes in physics in 2022 and chemistry in 2023. Nevertheless, the challenge of achieving a unification of the real sciences remains more urgent than ever. This problem is discussed in more detail in Focus 2. However, Focus 1 and 2 are mutually dependent. The terms determine which statements are possible at all, the theory determines which terms must be available.

To Understand with What Content the Following Terms Were Used

Apparent determinism: see determinism

«as if» — «as if they had»: A technique used by Einstein to make simplifications, even if there is no causal justification for them. For example, the energetic effectiveness of — massless — electromagnetic radiation, which corresponds to the energetic effectiveness of the mass of particles, can be taken into account by saying «as if they had the mass h times ny» But Einstein could deduce neither the mass nor the reason for the «as if they had» from his world view. Despite SRT, he recommends continuing to use Newton's formulas in classical questions, i.e. to act «as if» passive motion and forces exist. The reason Einstein gives for this is that the gain in predictive power is negligible in practice, especially in view of the additional work required for calculations based on the SRT. He thus implicitly takes into account an important consequence of the evolutionary process. By committing to one of the large variety of possibilities in the prior state, the consensus seems to be to use only this one in the future. Therefore, in practice, the disadvantage is negligible if the transition from the previous state to the currently treated level is not taken into account. Therefore, the gain of a unification of the real sciences is not to be seen in the increase in problems that can currently be answered well, but in the fact that new questions can be formulated and previously unanswerable ones can be answered.

Aristotle: On the one hand, his model of the world is helpful for the considerations mentioned above: he assumed a central One God who enjoys his ideal dynamis, radiating happiness and resting in himself. The divine stars, sun and planets can see the ideal one god thanks to their no longer quite ideal dynamis. This motivates them to use their dynamis for ideal movement. People can recognize the ideal movement with their significantly lower quality of dynamis and understand this as motivation to act as ideally as possible or not. The quality of the dynamis of earthly objects decreases more and more. This enables Aristotle to organize the natural objects into layers that correspond to those that N. Hartmann [33], R. Riedel [50] und W. Kofler [39], for example, attribute to the evolutionary process. Aristotle therefore also assigns dynamis to inanimate objects and thus the ability to be effective not only energetically but also in terms of discrimination. Particles can therefore also freely decide to become energetically effective in one way or another within a given framework. This results in possibilities and necessities in the reality of an actor.

The second reference concerns what Aristotle presupposes as unquestionable: These are his categories: Substance, quantity, quality, relation, place, time, doing, suffering, behaving oneself (attitude), feeling oneself (situation). I. Kant, for example, modifies and supplements these. see also Th. v. Aquinas, Newton as a philosopher of religion.

Thomas Aquino and Newton as philosopher of religion: Thomas Aquinas uses Aristotle's view of the world, replacing the sun, moon and stars with the saints and retaining the motivating God as the Christian God. Therefore, man can decide to sin or not. Animals etc. have not reached the level of man. Newton, who saw himself primarily as a philosopher of religion, had to explain why, without a visible connection between the ground and the apple, it falls to the ground at a precisely predictable speed. He attributed this to the omnipotence of God. To do this, he had to turn the motivating God

into the first physical mover and determiner: parallel to the creation of natural objects, God also laid down the binding rules for the order of the world. Therefore, the laws of nature are ideal and divine specifications for an ideal world and only require discovery. God created mathematics and logic for this purpose. For Newton, this process seemed absurd. Newton leaves it to the Church to explain how this works and why people can still sin. Descartes offers an approach that extends the remit of secular research but leaves the final decision to the Church. The adoption of Darwin's evolutionary view not only proves that natural objects could not have been created in 7×24 h, but also the foundations for the order in nature and thus also the laws of nature, logic, mathematics and philosophy. This also calls into question the historical scientific and social order. The positioning could therefore lead to profound personal disadvantages. The logical consequences of the loss of the justification of causality were therefore «the elephant in the room» in the Einstein — Bohr debate at the beginning of the 20th century. In the meantime, it seems to have become the «displaced elephant in the room». Newton as a religious philosopher determines the thinking of natural scientists today as it did before Darwin's discoveries.

Basic Actors: The term is used for these Restricted Autonomous Actors (RAAs), which are recognized as being able to motivate actors to establish a consensus to use the already given realization possibilities in a very specific way in consensus with others in such a way that a fundamentally new possibility is opened up to use the individual possibilities for creative effectiveness. Therefore, electromagnetic radiation is a basic actor that goes back to the consensus of two mechanoeitons. Its formation becomes clear if one assumes the consensus to no longer use one's own energetic potential alone for the individual modification of the self-determined orientation (and in doing so to maintain the consensus already entered into earlier with everyone exactly at the speed of light the common virtual goal for a meeting for e.g. a pulsating universe), but to do this in coordination with a second actor. With the consensus on pairing, further modifications are opened up in order to form the most diverse electromagnetic radiations etc.

It is assumed that the consensus to enter into such a «basic consensus» is also voluntary. It is therefore to be expected that not all actors share this consensus on pairing. The others have not adopted the consensus on pairing, but share the consensus on the speed of light with the «paired» ones. This covers the Dark Energy. All quantum objects are derived from the pairs, which therefore share both the speed of light (locality) and the consequences of maximum approximation and frequency. It is assumed that the consensus was reached in order to increase the possibilities for self-determined creative changes of direction. This presupposes that the options of the previous state and the conservation principle are also retained. Therefore, the overall inflationary spatial effectiveness must be maintained. This corresponds to Schrödinger's prediction that nonlocality determines the nature of electromagnetic radiation and that the observable aspects of maintaining the speed of light, the predictable approach to and distance from the quantum realm and the maintenance of frequency are only the prerequisites for this. For the researcher, it is essential that his research only has to be based on the characteristics of the basic actor from which his research objects are derived and the evolutionary successors up to the specific research object concerned. Therefore, in the classical areas of real science, it makes sense not to consider the aspects of Dark Energy. The «branches» at the same evolutionary starting level can also be neglected, e.g. usually Dark Matter.

Basic actors in the field of physics: In the Extended View model, the Mechanoeiton, the electromagnetic field (in its classical form with differentiated frequency and corresponding quantum phase) and the atom fall into the field of physics and chemistry. The cell is the next younger basic actor, but no longer falls under physics.

Basic actors of the nth order: There are good reasons to make a further differentiation and, for example, to only assume particles in research or to consider prokaryotes and eukaryotes as basic actors in biology, for example. In this way, one can arrive at basic actors of the nth order. The researcher is of course free to choose the starting point of his research and thus define «his» basic actor. Einstein has shown a practicable way of dealing with the evolutionary preliminary stages and therefore does not always have to start from «Adam and Eve». He recommends continuing to use «Newton» and «Maxwell» and not SRT, as the gain in practice would be negligible, but the amount of work involved would be considerable. The use of «Newton» from the Extended View becomes pragmatically compatible with the SRT if one is aware that one is proceeding «as if» there were passive motion, all-encompassing determinacy and machine models

Basic terms: see terms

Bell's inequality In 1964, John Bell derived the mathematical formulas whose non-compliance or compliance would prove whether the assumption of quantum physics is correct, that information can also be

passed on non-locally and whether mathematical variables could be inserted to explain the indeterminacy and achieve predictability even in individual cases. We now know: Quantum theory is incompatible with hidden variables. Nonlocality has been proven.

bio-psycho-social model: Engel deduced, for example, from the lack of correlation between the severity of observable symptoms and the severity of psychiatric illnesses that the purely biological approach of medicine was insufficient and that a comprehensive approach was therefore necessary in order to achieve causality. It would have to be replaced by a bio-psychosocial theory of medicine. This should be achieved on the basis of the General System Theory, if it is reorganized according to the hierarchical evolutionary structure of the different levels of a person. However, this connection can only be achieved at the risk level, as the meaning-related differences between the same terms at the different system levels do not allow a causal link.

Bohr's world view: He distinguishes between the «microworld», which he understands to be the quantum world, and the rest, the macroworld. The objects of the macro world exist independently of an observer or his measurements, while the quantum objects, such as an electron, only exist as soon as and as long as it is observed or measured. The nature of quantum objects and their processes is therefore inaccessible to us and thus essentially different from the objects of the macro world. The possibilities and limits of researching the microworld and its connection to the macroworld result from the Copenhagen Convention. More is not possible for the researcher, however absurd this may seem from the point of view of the classical natural scientist. Therefore, theories about the quantum world are complete if they allow exact predictions. See also «Bohr and Einstein's positions in relation to the Extended View».

Causality, risk, probability: Causality explains the necessary and sufficient reason why an effect has occurred. It is therefore about the effect of a toxin, for example, why a test animal died. Since we do not know all the interactions that can increase or decrease the causal effect of e.g. this poison in the body, only 50 percent of all animals die, for example, when the lethal dose of 50 is administered. The probability that a particular animal will die is therefore 50:50. With «probability», however, the causal cause is known. If one does not know the causal relationship, one can only calculate the risk for the harmful effect, which can be determined, for example, by the coincidence of e.g. behavioral patterns (note the differences between nuns and non-nuns) and morphological parameters in the occurrence of Alzheimer's disease.

Complementary: In Bohr's sense, complementary means that we are not entitled to assume that we have sufficiently grasped the nature of light, for example, if we only start from what we have just been able to observe, but not also from what could not be observed due to the choice of measurement method. For example, we can only observe either the wave nature or the particle nature of light. Nevertheless, both points of view are needed.

Comprehensive simplicity, principle of: Everything that can be observed or thought separately must also be able to be communicated distinctly. If this is not possible for lack of a term, it MUST be introduced, characterized accordingly and tested empirically/logically for its usefulness. This operational definition is intended to prevent relevant connections from going unnoticed for semantic reasons.

Conservation principle: The starting point is the law of conservation of energy. Since the Extended View assumes a janus-headed dynamis with energy and discrimination, both of which are always fully utilized, what applies to energy must also apply to discrimination. This is expressed by the conservation principle.

Copenhagen interpretation: see Bohr

Cosmological constant: see Einstein

Copenhagen Convention: Actually the list of principles that must be taken into account when making statements or studies in quantum physics: principle of complementarity, principle of indeterminacy, correspondence principle: «Copenhagen» because Niels Bohr worked there and was in charge of the interpretation together with Heisenberg and Born

Correspondence principle: We must also use the classical terms in QT, since we must also use classical methods to investigate quantum processes.

Uncertainty principle: The principle discovered by Werner Heisenberg in 1927 that it is not possible to measure certain pairs of observable quantities — such as position and momentum, energy and time — simultaneously with a precision that exceeds a limit expressed by Planck's constant h.

Principle of complementarity: Nature is set up in such a way that the opposite of a deep truth can be another deep truth, whereas the opposite of a false statement is the correct statement. In the case of complementarity, the complementary possibility must always be taken into account.

Descartes (1596–1650): He proposed that only the human being (the man) consists of two fundamentally different substances that are therefore unrelated to each other: The res extensa — the extended thing (including viability, emotionality) — and the rex cogitans, which is capable of logical discernment and reason-

ing and thus makes it possible to sin. Obviously, the two substances are different. For logical reasons, sin could not be realized and the body could not decide to sin. Essentially different things cannot be connected. Descartes solved the problem by «recognizing» that God is present in the pineal gland (of the man) and connects the scientifically unconnectable with his omnipotence. Comparable attempts are made again and again today, without attributing the solution expressis verbis to God. See also: «Loss of philosophical justification for a chain of reasoning».

He also formulated: «The clarity and distinctness of our concepts is the characteristic of their truth».

Determinism: What happens is predetermined, regardless of the intentions of the person concerned and their inability to experience their lack of freedom.

Determinacy vs freedom of choice: EAAs are determined and act ideally insofar as the conservation principle applies to the dynamis and its two aspects of energy and discrimination, whereby both aspects are always used quantitatively to an ideal extent. They are only «quasi-determined» insofar as they have freedom of choice, but the quality of the effect of the dynamis cannot be ideal, even if idealism is striven for. This deviation can be experienced and become the reason for the decision for compensatory effects. There are alternative options from which the EAA can choose. The decision in favor of one of the possible options is based on experience with and expectations of one's own effectiveness and the current and expected environmental dynamics.

Determinator: Determinacy is attributed to the effectiveness of a cause that is inaccessible to the observer. Models based on Intelligent Design, the creation story, etc. are typical of this. They presuppose the efficacy of God. Bohr assumes that the observer thus causes such a determinator to become so effective that quantum objects pass from their micronature to macronature for a limited period of time, so that the determinator then decides whether, for example, radioactive decay is triggered by it or not and therefore Schrödinger's cat continues to live or is dead when the box is opened as a result of the observation. However, chance, as it is understood in quantum physics, does the same thing: in contrast to the assumption of chance when throwing dice, which would be eliminated by an exact prediction if all physical conditions were fully known, as the result could then be predicted, quantum physics assumes that quantum chance occurs as a causal agent. This would mean that it has dynamis with creative effectiveness and randomness. So why don't we call it «God»?

Apparent («as if») determinacy: As the complexity of an EAA increases, the outside observer gets the impression that its processes are inevitable. It then seems reasonable to attribute this to the determinacy of (God-given) natural laws. However, this philosophical position is not compelling. It is not possible to distinguish empirically whether the predictability is due to a determinator or to the fact that it is based on voluntarily entered consensus (compare chess model). After all, chess players do not follow the rules of chess by force, but because they would otherwise lose the advantage of playing chess. The chess player is therefore only «quasi-determined», but still has the free choice to refrain from playing chess at all, to lose voluntarily, to move pieces in any way, even to burn them, etc. All this can happen, but cannot be predicted. The longer the chain of consensuses, the less arbitrary it is to renounce adherence to one of the consensuses that are prerequisites for the achieved state. This is particularly important for a person's situation. For example, the person may have no possibility of influencing the arbitrariness of a decision that has to be made at a much older evolutionary level. Such decisions can then lead to an illness that one has to endure whether one wants to or not. To assess the situation, it is sufficient to assume «as if» the biological process could be explained by a machine model.

Dynamis: see Aristotle

Einstein — Bohr — debate: In 1927, the discussion between Einstein and Bohr about the principles of natural science began, which for a long time determined the scientific debate not only in physics: Is Bohr's purely empirical view and the widespread assertion that the quantum world is absurd, so that it must be researched separately, sufficient? Or is it future-oriented to continue to strive for a unification of the real sciences, since ultimately the quantum world can also be integrated into a unified understanding of reality? Bohr's position prevailed for decades, probably also because he was able to successfully fill many chairs with his students, who enforced Bohr's view as dogma.

Einstein

Einstein's technique of theories of principles. Einstein made a contribution to the theory of science that has probably earned him the highest appreciation of philosophers. He was awarded with his own volume in the «Library of the Living Philosophers» series. The central point here is that inventions are made about a state that no longer even has to be empirically accessible today (hypothetically realistic approach, comparable to Darwin's approach). From these

freely invented assumptions, predictions must become possible that can be empirically and logically verified today. He successfully applied the technique in the development of the Special Theory of Relativity. Focus 2 presents the diagram and description Einstein used to explain the technique to his friend. Reference is made to them.

cosmological constant: Einstein created the first mathematical model for the dynamics of the universe based on ART. He assumed a static space in which the cosmological processes take place. In order to achieve the stability of the volume, he introduced the cosmological constant. He deleted it without replacement after the empirical facts of a dynamically expanding universe appeared to him to be sufficiently proven.

Einstein's pulsating universe: He consistently adjusted this model to the gradually recognized phenomena of the dynamics of the cosmos and even published his own model in which the cosmic objects first expand from a minimal area and later move back in the direction of the initial situation. This is just one example of Einstein's willingness to consistently take new empirical findings into account in accordance with his world view, which, however, only permitted changes that seemed logically compelling once sufficient empirical evidence was available.

Wooden nose of a snowman: The concept of mass used in GTR (General Theory of Relativity) cannot be derived from Einstein's basic assumptions about the nature of physical objects. However, this requires Einstein's scientific understanding of a complete theory: the justification of «mass» is therefore different from the other concepts of ART, just as the nature of wood is different from that of snow. This is why Einstein ultimately classified ART (and not just the quantum theories) as a non-complete theory, which is ultimately based on inductive foundations.

«Complete» theory: Einstein: Everything that a theory is supposed to make a statement about must be covered by the quantities of the formulas used. This is not the case with ART and quantum theory.

«Elephant in the room»: This refers to a fundamental problem that is generally known, but about which there is an unspoken consensus that nobody talks about it.

«The elephant in the room» in the Einstein — Bohr debate concerned the fundamental problem of natural research. How does one justify the right to make a prediction for a natural process at all? As long as one was allowed to assume that these processes inevitably proceed according to the divine order, one could do so with reference to the fact that natural laws and the usefulness of mathematics and logic inevitably exist. With the abolition of the acceptance of the seven-day creation, this justification based on Newton as a philosopher of religion no longer applied. Emil du Bois-Reymond believed that he could close the gap that had arisen by assuming that fundamental laws existed, but that we would never be able to solve seven riddles of the world because of the nature of the brain and the limits of what we can think. Haeckel disagreed and believed he could provide all the answers via the theory of evolution. Einstein chose a path that was compatible with Spinoza's philosophy of religion. He assumed that creatures could possibly cause many things themselves thanks to the abilities they were given and that it was therefore possible to investigate their inherent efficacy. However, it was unclear to what extent they were capable of doing this or whether God would have to intervene directly. Whether one has to fall back on God must therefore be empirically tested in a concrete question. This actually means making the indispensability of God's direct intervention in concrete questions the subject of falsifiability and, in doing so, arriving step by step at a more complete and ultimately a complete starting theory for all theories. Bohr ultimately agreed with du Bois Reymond's position and created a model of the world that is complete when the instructions for action are defined with which the observable can be made comprehensible: This, he said, was the Copenhagen interpretation, which makes the accordingly «complete» quantum theory possible. Since the principles of the Copenhagen interpretation are heuristically derived propositions, it is not possible to deduce their statements.

«The elephant driving the elephant out of the room»: after the Second World War at the latest, the risk of personal disadvantages due to a position for or against the theory of evolution was no longer relevant. Nevertheless, the question of the justification of the reasoning was not taken up, the «elephant driven out of the room», so to speak, as if Newton had not also been refuted as a philosopher of religion. This can be explained by the fact that the discussion about the appropriateness of the position determined in Copenhagen would not have been conducive to a personal career. How relevant this was can be seen, for example, in

the statements of the Nobel Prize winners Clauser and Goll-Man, which are documented in Focus 2.

Empathy: The ability of a person to think and feel «with the head of another», but also to empathize with physical and biological processes in a comparable way. This ability seems indispensable in order to make heuristic connections that can become the starting point for empirical studies. It is undisputed that people (and other living beings) have empathy. What remains unclear is how this phenomenon comes about. Its use turns medical science into an applied art.

Entanglement: Photons of a light beam are produced in such a way that they are closely linked together. As a result, the (artificially induced) change in one of the entangled photons, for example in its direction of spin, leads to a mirror-image change in the other, regardless of the distance at which they are located. As the speed of light is not taken into account in quantum physics, it was concluded that quantum processes must occur independently of the speed of light, which Einstein, unlike Schrödinger, ruled out as a «spooky action at a distance». Schrödinger therefore (1935) assumed entanglement and the resulting non-locality. In the meantime, entanglement and non-locality have been empirically proven, which was recognized with the 2022 Nobel Prize in Physics.

Epistemology: This discipline of philosophy is concerned with understanding and the limits of what can be scientifically recognized. Different approaches can be taken, e.g. positivism, empiricism, idealism, skepticism, etc. Questions of epistemology are dealt with more formally and application-oriented in the philosophy of science. (see also logic)

experience — grasp — effect: These are also global concepts. Contexts must be understood so that they can be explained. But understanding alone does not mean being able to explain the relationships. Who can explain the Pythagorean theorem to others even though they have grasped it, can write down the formula correctly and apply it logically? The prerequisite for understanding is to experience the meaning in question through observation or reflection. Then, thanks to energy or discrimination, you can correctly implement what you have grasped. Konrad Lorenz has described the steps involved well. «What has been heard is not yet understood, understood is not yet agreed, agreed is not yet ready for action. What has been secured is not permanently secured.

Extended View: This refers to the effort to achieve a unification of the proven theories of real science with a focus on sustainability and comprehensive health. This is based on the assumption of a janus-headed dynamis of the actors, which is inevitably permanent in full application and has two aspects of effectiveness: Energy and Discrimination. The actor decides for what purpose he uses his dynamis. This can be explained scientifically without assuming any influence from «outside». Furthermore, the irreplaceable scientific evidence for health and sustainability must not be lost. These can be based on different paradigms. Nevertheless, compatibility can be achieved if only a framework is offered into which the paradigms of the sectoral disciplines can be integrated like subsets into a basic set. The aim is therefore not to create a new theory to replace the existing ones. A common framework also requires commonalities. The sectoral theories are based on different initial assumptions about the cause-and-effect chain and therefore on different basic actors. They also accept different requirements for the proof of sufficient justification for scientifically justified action (from natural law causality to the golden path based on cluster relationships). However, they all accept the evolutionary nature of their research objects and the researchability of processes. This opens up the possibility of achieving connectivity by using the subject-specific methods and starting assumptions as usual, but being aware that these are pragmatically sensible simplifications. In other words, one proceeds «as if» there were, for example, machine models and «as if» the particularities of the evolutionary process were negligible because the specific question is restricted to a single evolutionary level.

Extended View Bohr and Einstein's positions in relation to the Extended View: Bohr's quantum world differs significantly from the world of classical physics also in the way what can be observed and what cannot be observed. Therefore, the conclusion that the quantum world is absurd seems conclusive. However, the absurdity disappears if one assumes that quantum objects have potentia in the sense of Aristotle, as Heisenberg did in 1955. The remaining differences become clear if one assumes a single, non-predetermined evolutionary process in which different evolutionary levels have been reached at which the level-specific possibilities of the basic actors are further differentiated. Therefore, comparable fundamental but logically comprehensible differences occur not only between the quan-

tum world and classical physics, but also, for example, between physics and biology, but also between the world of mechanoeitons, including dark energy, and the quantum world.

However, Einstein assumed neither potentiality nor a non-predetermined evolutionary process, but rather the determinacy of an intelligent design model. Bohr represented the Copenhagen Convention as a world view that was given the necessary dynamics by the power he attributed to observation, e.g. of the researcher and measurement. According to this, observation or measurement causes the temporary transition of the nature of quantum objects into the state of reality. There can be no empirical findings about what happens between observations or measurements. Neither takes dynamism into account.

Evolution: the global term for the development of all objects in the «currently observable universe». It is assumed that this process was brought about by the initial actors, about whose origin the natural scientist cannot make any statement due to a lack of appropriate methods, without any «external» influence having to be assumed for the evolutionary development.

The process: A RAA can recognize that currently given possibilities can be implemented in a previously unused way and that this can be expected to have advantages (gain in positive experience, reduction of negative experience up to the avoidance of having to give up the achieved level / possibly dying) and can successfully implement this expectation. Then something new has been achieved, but not yet an evolutionary gain. This is only achieved when many others adopt this innovation. It is not necessary to be creative enough to invent something new. It is sufficient to recognize the personal advantage that can be achieved through the innovation invented by others as a reason for adopting the necessary subset-constitutive consensus. There is also a difference in quality between inventing something fundamentally new and using the new only to improve existing questions and possibilities. This difference is taken into account by the concept of the basic actor. It is based on the creation and successful implementation of fundamentally new gains.

This can also be illustrated with the parable of the chess game. A particularly creative person has the brilliant idea. He succeeds in realizing the prototype and optimizing the process with «pioneers». As everyone involved enjoys playing (WINWIN) and someone can also win what everyone wants to achieve (WIN), other, less creative players recognize the personal advantages and voluntarily accept the limitation to the visually recognizable game and the playing field (structural consensus) and the rules of the game that can only be derived from the processes (process consensus). This is done voluntarily. Therefore, there are players who are able to play, but choose not to do so and prefer to use games that were previously used. Then there are standard moves that are made very frequently. For example, you can move your pawn two steps forward on your first move. This is usually answered by the partner also moving his pawn two steps forward: something similar can be found with entanglement: a phenomenon is artificially created that usually has a predictable effect. Entanglement thus also proves the entanglement of the space of meaning with the geometric space and thus of relationality and relativity.

Comprehensive and biological understanding of evolution:

Internationally, the term «evolution» is also used comprehensively and ranges from the evolution of the cosmos to, for example, cultural evolution with special areas such as the evolution of language. Einstein gave his book on the development of physical knowledge the title «Evolution of Physics». Darwin also had a comprehensive understanding of evolution. He just saw no possibility of making a meaningful statement on the origin of, for example, forces or the first cell, given the facts available (see Focus 2).

In the German-speaking world in particular, «evolution» is sometimes only used for the biological area of evolution. As a result, principles that have proven themselves in the biological field have to be applied to processes that fall under other disciplines. Thus, in this approach, chemical evolution only covers the sub-area which, from this position, seems to offer hope of making the appearance of life comprehensible. The question of how the characteristics necessary for chemical processes could have developed from physical objects with their specific characteristics, which is interesting for understanding chemistry, is not asked. But these should — in a comprehensive understanding of evolution — be the prerequisite for having opened up the possibility of creating the characteristics that are decisive for life. The same applies to social, cultural, economic, etc. developments for which the biological existence of individuals is a necessary but not sufficient explanation.

The strength of a comprehensive understanding of evolution is that it is based on the actors' freedom of choice thanks to their dynamis. Accordingly, even those who do not have the creativity necessary for an evolutionary gain and were not prepared to use the new option in the initial phase can recognize that they too have the prerequisites to use a modification that has since proven itself. It must therefore be assumed, for example, that all electromagnetic radiations are aware of the option to use the consensus of the particles, but — at least currently — do not use or do not intend to use this option. However, they have — currently — also not used the option to fall back to the previous state. There needs to be a sufficient reason for both. This approach becomes particularly exciting when you consider that there are single-celled organisms that have remained practically unchanged since the dawn of life. So there seems to be a sufficient reason to take the path to a goal, to reach the goal and, despite the possibility of using what has been achieved as the starting point for a new path to a new goal, to «be modest» with what has been achieved. This lingering is in tension with the need to always be fully effective. If one is guided by the fact that there must be an individual gain for this, it could be seen in the «enjoyment of being like this». The poet would perhaps express this with «and nothing to seek, that was my meaning» or «Linger but you are so beautiful».

If one assumes this arbitrariness to be constant, the intention to develop further and the reactivation of attention to what has gone before, it becomes clear why phenomena are raised, that objects at all evolutionary levels transition into pre-states and that this can also be achieved experimentally and become the starting point for modified realization. (Dolly the sheep, plastics...). See also basic actors and basic

Experimentum Crucis: An experiment whose experimental approach allows a decision to be made as to whether the previously accepted theory can continue to be upheld or whether better compatibility with reality can be achieved by using the competing theory. A classic example of an experimentum crucis was the demonstration of the deflection of a beam of light as it passed close to the sun on its way to earth. This enabled Eddington to confirm Einstein's theory of the active motion of quantum objects in 1919, as the measurements produced exactly the predicted result, while the passive motion assumed by Newton predicted a deflection half as large. An experimentum crucis was used to prove Kofler's prediction of the usefulness of the discrimination ability and its limitations. From the Extended View, Schrödinger's prediction of entanglement and nonlocality of electromagnetic radiation corresponds to the proposal of an experimentum crucis.

Flicker fusion frequency: The limitation of the discrimination ability available to a person for their conscious activities can be demonstrated with the help of the flicker fusion frequency. If the frequency at which a flickering light is just perceived as distinct and not as a continuum is measured, it is significantly lower in a rested person than when they are tired. They are therefore more efficient at discriminating individual phenomena in the morning than when they are tired. This not only proves the existence of the associated ability and its limitations. The dependence on fatigue also proves other predictions of the Extended View: the need for the discrimination ability of biological functions, which were used in addition to their biological processes for the person's requirements during the day, can no longer be covered to the same extent, but has priority. The discrimination ability therefore decreases over the course of the day. This has practical consequences, which is why the measurement was also used to avoid the resulting consequences. At the same time, the number of errors when working on the assembly line also increased. (see also wave-particle dilemma)

Formal sciences: These include purely abstract scientific disciplines such as mathematics and logic. They are therefore opposed to the real sciences. However, real scientists are often dependent on them as auxiliary sciences.

Global terms: see terms

«Heisenberg 1955»: This designation is used in the paper to express the fact that in 1955 Heisenberg made a decisive extension to the Copenhagen interpretation, which he had founded to a large extent. From his memorable lecture series in 1955 onwards, he took the view that quantum objects should be ascribed dynamis in Aristotle's sense. This addition to the Copenhagen interpretation resolved the absurdity of the quantum world for him. The scientific community of physicists has practically ignored this extension to this day without presenting a scientific argument for it. So far, no argument against it has come to the author's attention. (see Focus 2)

Heuristics — heuristic approach: «Heureka» — «I've found it», cried Archimedes when he saw the water flowing over the edge of the bathtub because he stepped into it: he grasped the relationship between weight and volume and thus discovered the specific weight. This enabled him to answer the King of Syracuse's question as to whether the new crown was really only made of gold or an alloy, without

destroying the crown. It was not necessary to know the chemical or physical nature of water or the crown in order to expand his knowledge. But in terms of weight and volume, this inductively gained knowledge could be applied to all objects. The conclusion is therefore based on induction, but allows the conclusion to be drawn about all physical objects based on atoms.

Hidden variables An interpretation of quantum mechanics based on the conviction that the theory is incomplete and that additional information about the quantum world is needed. This additional information is in the form of hidden variables, invisible but mathematically expressible physical quantities. The identification of these hidden variables would lead to precise predictions for the results of measurements and not just probabilities for achieving certain results. Its supporters believe that this would re-establish a reality that exists independently of observation, which is disputed by the Copenhagen interpretation. An experimentum crucis was formulated to test this view (Bell) [3]). Clauser and Freedman [31] were the first to implement this and provide evidence that quantum theory is incompatible with hidden variables. The investigations were continued experimentally, in particular by Aspect and Zeilinger with their teams, for which Aspects, Clauser and Zeilinger were awarded the 2022 Nobel Prize.

Hypothetical — realistic: see Einstein

Ignorabimus: The Ignorabimus discussion dominated the scientific debate among natural scientists and doctors for over ten years at the end of the 19th century. The Berlin professor of physiology Emil du Bois-Reymond attempted to close the gap that arose from the abandonment of the seven-day creation of objects and the laws of nature. He counted the critical questions (origin of the mind, of language, of forces, of order in nature, of free will...) among the seven world riddles that would currently or never be solvable (Ignorabimus — we will never know). The proposal was adopted by many, but not, for example, by Haeckel, who believed that he had solved all the riddles with the help of the theory of evolution. Einstein also chose a different path (see Einstein).

Inflation: A phase that must be inserted into the very first phase of cosmological evolution if one assumes that the Big Bang began with quantum objects. One of the fundamental challenges (in addition to, for example, the microwave background radiation, the so-called boundary problem, etc.), which is obvious to non-cosmologists, concerns the expansion of the area used by cosmic objects in today's observable universe. Since the observable spatial effect of quantum objects can be at most the speed of light, there is a deviation from the empirical value of the area calculated on this basis, in which the objects of the cosmos move, of up to approx. 1050. This phase must in any case have been completed after a $10-20^{th}$ of a second after the Big Bang and then only expansions with a maximum speed of light have occurred, since at this point in time different particles must already be assumed in the standard model. (The exact determination of such and such unimaginable numerical values is not relevant for the considerations of the Extended View) This can be successfully solved mathematically. Empirically, it is impossible to prove, as the environmental conditions and the required energy cannot be produced artificially. We are therefore dealing with an area in which only philosophical solutions can be offered and mathematically supported for the extrapolated processes. What remains unanswered in the solution often offered is the question of how the space between the quantum objects, which are actively moving at the speed of light at the same time, can be expanded to an extent that corresponds to the expansion of the width of DNA to 100 million light years. Assuming the mechanoeitons with their energetic field, this problem and the need for the numerous models that become necessary in this «intercalated» phase in order to make the observational facts determined after this time span comprehensible are eliminated.

Information is «a difference that makes a difference» (Gregory Bateson). «Information is information and NOT energy or matter (e.g. Shannon, Wiener etc.)». These almost 100-year-old classical definitions also include differences that are generated in quantum objects and other inanimate objects inside and outside systems. There are also definitions according to which information can only be exchanged between persons, e.g. to characterize telecommunications [41].

Intelligent Design: Evolutionary models that assume that an omnipotent «engineer» has designed such an intelligent machine for the development of the universe and the world that everything has inevitably developed in the way that we can trace back today.

Logic: It should help us to think and then act in a comprehensible way. In other words, it is about the way in which abstract ideas can be used to make conclusive considerations about real facts or thought structures. It is usually assumed that there is only the two-valued so-called Aristotelian yes/no logic. In everyday life, however, we are usually faced with questions that cannot be answered directly with yes or no. In most cases, you have to choose between wishes, possibilities, disadvantages, etc. which are different in nature, by weighing up and evaluating them. This is also part of logical thinking. This is also reflected in the decision as to whether to act now or later, here or there, as strongly or less strongly, alone or with the help of others, or not to

act, or to «endure» a situation. In practice, the yes-no decision is therefore only made in the final step of the logical debate. The consequences of the decision only become observable when concrete action is taken in an observable way, i.e. when it is implemented energetically. Obviously, two-valued logic is not sufficient for real scientific argumentation in many cases. Aristotle was also aware of this. After all, his dynamis opens up the entire range of intellectual argumentation and not just two-valued logic and the ability to use energy. Two-valuedness is therefore not enough, especially not in scientific activity. Purely theoretically, there are supposedly an unlimited number of logics, e.g. trivalent, multivalent, but also fuzzy logic, for example. This assumes that there is a third area between true and false. There is therefore a fuzzy area between true and false. Fuzzy logic proves to be helpful when no mathematical description is available or possible, as is the case with purely verbal descriptions.

Light Matter: Everything that we can detect with our sensory organs, but also with our measuring devices, is part of Light Matter. It is based exclusively on objects that are derived from electromagnetic radiation. According to the currently recognized cosmological models, however, it only accounts for around 3–4% of the energy in the universe. Around 1% of the total energy is radiation, around a quarter is dark matter and the rest is dark energy.

Locality — non-locality: The question here is whether all physical effects are caused jointly with the observable arrival of an object at a location (locus lat.) and are therefore maximized at the speed of light, or whether there are effects that are independent of the observable arrival of the actor at a location. Such non-local effects would be «spooky» for Einstein, as they would be independent of the speed of light. Quantum theory has not ruled out this option, as the speed of light does not appear in its formulas.

Localization spaces — time: Researchers invent mental aids in order to be able to bring changes in the relationship between objects and thought constructs into spatial concepts. Coordinate systems with longitude, latitude and altitude are classic for representing changes in position in «geometric space». It is more unusual to imagine location systems for the modification of meanings, however undisputed it is that there is also a need for this. The Janus-headedness therefore requires a «space of meaning» in addition to the geometric space and that both localization systems must be connected. This connection succeeds in terms of processuality through the common coordinate «time». It allows, for example, the speed of a moving object to be taken into account, but also the time required for it to change its spatial, relativistic position. If the speed becomes virtually infinite, the data on spatial and temporal change coincide. On the other hand, time also makes it possible to express the duration required to assign an object or construct (e.g. to think in order to answer an examination question) a position in the space of meaning in relation to existing constructs or objects. «Time» is then — like length, width, height — a thought tool for making statements ABOUT the relations and their processes. Connections can then also be made very quickly: «Touched a thousand times and nothing happens... and a thousand and first times and it went wum», eureka!

This makes it clear that scientists are not the only ones who need localization spaces. Similar things must also be assumed for all actors in order to make changes in their internal view of others understandable.

Loss of philosophical justification for a chain of argumentation: Anyone who uses an argument from an autonomous scientific discipline as an auxiliary science, e.g. in natural science, is bound as a researcher to take into account the state of knowledge of this discipline, provided that this position does not contradict the state of knowledge of their own discipline. Here is an example: it has been the state of knowledge in philosophy for centuries that differences in essence cannot be connected to other things in the area that concerns the difference in essence. It is therefore unscientific to nevertheless assume compatibility. See: Descartes

Machine model: This refers to explanatory models that assume that the observable processes do not require any further causal explanation because it is assumed that they react in a machine-like manner. From the position of the Extended View, this should be understood as «as if» they would react like machines. This simplification appears justified if the cascade of the sequence of «stimulus — evaluation — response as stimulus for the next evaluation» etc., which is to be assumed from an evolutionary perspective, can be neglected because the «machine-like» effect is an expression of the adherence to a subset-constitutive consensus, which it is assumed that the actor concerned is not ready to abandon.

Mass: In the Extended View, mass can be understood as the expression of the energy of a particle or atomically structured object that results from the consensus of electromagnetic radiations that align around a central point around the area of maximum approximation of their mechanoeitons. With this definition, mass can be derived from the same world view as all other physical quantities.

Medicine, sustainability and physics: In the Extended View, the aim is to invent a connection between the disciplines that are irreplaceable for medicine and sustainability, which also allows questions to be

addressed as to how the transition between the evolutionary levels and the theories developed and irreplaceable for them occurs. To this end, it is unavoidable to start from the «Big Bang» or the characteristics of mechanoeitons, since the most fundamental processes must be the guidelines for all further differentiations up to the current situation with people in their environments, if one assumes a single non-predetermined evolutionary process. Only the physics-related characteristics for the mechanoeiton, the Most Basic Actor and the atom would be essential for this. However, the Nobel Prizes for Physics 2022 and Chemistry 2023 offer the opportunity to test the empirical usefulness of the assumed characteristics.

Most Basic Actor (MBA): This is the name for the RAA, from which all actors that make up our world (light matter; radiation) and dark matter, but not dark energy, are derived. Because of the validity of the conservation principle, the characteristics of the MBA must be detectable in all actors that can be traced back to it. It is therefore a basic actor like the mechanoeiton, to which the MBA can be traced back.

«most convenient» way. Light moves not exactly straight. According to Newton, it is passively bent by the forces emanating from the sun as it passes close to it. According to Einstein, light itself seeks the «most convenient» path with regard to the space modified by the sun's energy, and therefore aligns its active movement individually to the geodesic. Einstein's position was empirically confirmed in 1917 in an experimentum crucis during a solar eclipse, thanks to which the light bent by the sun could also be measured, while Newton's position was refuted. This established Einstein's world fame.

Ontology vs. ontics: Ontology is the branch of philosophy that deals with the nature and origin of that which exists. Various philosophers of religion distinguish between ontology, which also includes the work of God, and ontics without this influence. See also «epistemological-theoretical-paradigmatic problem».

Paradigm see epistemological-theoretical-paradigmatic problem

Philosophy of science, for example, is oriented towards the development of methods for arriving at new findings, particularly through the application of logic or logics. Einstein's technique of theories of principle can therefore be seen as a contribution to the philosophy of science. see also epistemology

Popper's technique: Popper (like Einstein) assumes that the currently proven state of knowledge must be applied, even if it is challenged. If there is a reproduced phenomenon that contradicts a recognized theory, this opens up two possibilities: Either to reject the theory, or to try to save the theory by inventing an additional hypothesis, thanks to which the theory extended in this way would also make the previously unsolvable phenomenon predictable. An attempt must then be made to empirically falsify the usefulness of the additional hypothesis, without success, until there is a consensus in the scientific community that the extended theory is now the state of knowledge. Accordingly, the social consensus determines the state of knowledge. Furthermore, an unlimited number of additional hypotheses are permissible. The range of statements remains at the same level, whereas Einstein's approach also allows for level extensions.

Possible, real and necessary: see Aristotle

Principles: general characteristics of objects or their processes. Einstein derives them from the world view, from Bohr's conclusions from successful observations.

Quantum: In the Extended View, the term for the phase in which all mechanoeitons of a quantum object have maximally converged.

Quantum theories: In contrast to classical theories of physics, their formulas are characterized by the fact that they contain h, i.e. Planck's quantum of action. This definition determines the point in the evolutionary process at which quantum theories can be applied: As soon as the formation of paired physical objects has occurred.

«quasi» — ideal: As long as the requirements of the environment allow all theoretical possibilities to be implemented, the outside observer gets the impression that the actors have unlimited resources and therefore have any number of modifications of their realizations at their disposal. If one assumes the symbolic intention of maximizing the self-determined modification of self-alignment, the preservation of identity by avoiding collisions and the compulsion to use 100% of energy, the only remaining possibility at the beginning of the Big Bang is the «arrow-straight» forward movement. Through the expansion, the available environment is suddenly expanded, so that a variety of quasi-ideal realizations then became possible.

Realism The philosophical worldview that assumes that there are existing and therefore real objects and their processes «out there», independent of an observer. For a realist, the moon exists even if nobody looks at it or measures it.

Restricted Autonomous Actor (RAA): This is a global term from the Extended View. It stands for all actors regardless of their evolutionary level. «Autonomous» because an RAA has its own dynamis, «restricted» because it is limited in the possibility of implementing its intentions by the limited capacity of the dynamis and also by the requirements of its environment. Due to the validity of the conservation principle, the characteristics of the EAA must be demonstrable for all actors.

Relationality theory: This is understood as the attempt to unify physical theories with a focus on the noeiton

aspect of physical objects. From a purely philosophical point of view, however, it would be necessary to limit oneself to what is philosophically comprehensible and to start ONLY from the Noeiton aspect. Then it would be the analog to Einstein's approach based ONLY on the aspects of machination. This approach reaches its limits because the Noeiton aspect does not lead to any (empirical) facts accessible to the researcher. In order to arrive at such facts, a corresponding consideration of the hypothesized options is a prerequisite. Their realization, however, takes place through the Machinaton nature. Without taking the Machinaton effects into account, the theory of relationality would be a purely epistemological-ontical, i.e. philosophical, body of thought. This would be insufficient for a hypothetically realistic statement based on real science. It must also be based on empirical facts. These must already be available, as the author is not responsible for such studies. The prerequisite for a theory of relationality is therefore corresponding physical facts. Such data are available and were recognized with the Nobel Prizes in Physics 2022 and Chemistry 2023. These data correspond to the predictions of the Extended View.

Schrödinger's cat: A thought experiment with which Schrödinger wanted to refute Bohr's view of the world, according to which observation by a researcher causes quantum processes to have an influence on processes in the macro world. Then the observation would first have to trigger radioactive decay, which would trigger a mechanism so that a lethal gas would be released and kill a cat in a locked box. The probability that the decay would occur within an hour of the box being closed was 50%. The probability that opening the box and the associated observation of the cat by the researcher would or would not lead to the cat's immediate death is therefore 50%. In the meantime, the cat is in a phase in which it must be both dead and alive, if Bohr's world view is correct.

An experimentum crucis on Schrödinger's and Bohr's world view: It should be possible to investigate this in vivo. This would require minor additions to the experimental set-up. The temperature of the cat would have to be determined before and after opening the box. The temperature in the box would have to be kept constant at a low temperature of e.g. 10°C and the phase between closing and opening the box would have to be extended to e.g. 3 days. As the radioactive half-time is 1 hour, radioactive decay would be expected with a very high probability after 3 days. Since a healthy cat can starve for three days without dying, its body temperature after opening the box should be identical to three days ago if Bohr's world view is correct and death was caused by opening the box and observation. If Schrödinger's world view is correct, the cat's body temperature should have dropped. The time of death could be determined by measuring the body temperature of the dead cat, as the body temperature would drop from the time of death. So far, this experiment has not been carried out, but Bohr's position has been accepted without verification.

Simplicity principle, radical interpretation of E.: Only one of the theoretical possibilities can be realized. This means that this possibility must inevitably occur. Einstein advocated a radical simplicity principle for a long time, but later changed his position to something along the lines of «as simple as possible, but no simpler

Spinoza Baruch du (1632–1677): This religious philosopher assumed that God is ideal and that there could therefore only be one God. As he is ideal, he is not free in his decisions: God can only create the ideal. Therefore, everything he has created must be ideal, including man. Man (although he must be ideal?) can only form an image of the world through thought and action (Descartes!). God, however, has used many more efficacies, the expression of which is nature. Therefore, people's conclusions about nature are very questionable, like the assumption about the result of an equation with many variables, only two of which have been solved. Therefore, a statement about the nature of nature is only justified if it agrees with the observation of nature with sufficient certainty. Therefore, there is no freedom of any object in the world. The processes of the quanta, like those of human beings, are governed by the laws of nature. Our own actions therefore only appear to be determined by us and any inaccuracies in nature only appear to be inaccurate because we only have thought and action at our disposal.

Einstein outed himself as a follower of Spinoza's philosophical view. In 1905, there were no empirical findings on the effectiveness of the energy field, only on electromagnetic radiation and particles. Therefore — in Einstein's opinion, despite the outstanding predictive power of GRT, which only included the energetic field — there was a lack of sufficient empirical evidence until his death. His cosmological models were therefore based on quantum objects as the oldest evolutionary forms of being. This approach contradicts the principle of hypothetical realism and the empirical evidence provided by the work honored with the 2022 Nobel Prize in Physics and the 2023 Nobel Prize in Chemistry.

Symbolic intention: The artifice of assuming this generalizable intention, which can usually be empirically ascertained, to the actors who appeared evolution-

arily before the recent persons and thus the actors who can be directly examined in this respect. Only in this way is it possible to gain causal access to individual processes. Darwin proceeded in a similar way, although he was aware that the efforts to survive and to produce offspring were only two of the widespread intentions (see Coyne & Orr [12]), but the most obvious ones that can be attributed to highly complex living beings. For the individual self-orientations of physical objects, it is sufficient to assume that they increase or at least do not reduce the individual possibilities for self-determined stimulating movement orientation.

Terms:

Words vs. terms: Words can be understood as building blocks with the help of which things or thoughts are made communicable. The user does not have to be able to specify the communicated content and explain it to another person, let alone be required to do so by the interlocutor. Nevertheless, it is usually assumed that the other person assumes the same content. Not so with terms: Words become terms by having a consensually defined meaning. Technical and scientific terms require that they have been precisely defined within a specialist field. However, «exact» is not possible in the ideal sense... (semantics)

Black-box terms: «Where terms are missing, a word arises at the right time.» — Verse 1995 f. / Mephistopheles, e.g. time,

complementary terms: Terms for which the corresponding complementary term must also be considered: As a result of RAAs' (and therefore a person's) own limitations, one can only focus one's attention on one of the Janus-shaped aspects. (You can only look at the top of a coin or its underside if the coin is lying on your hand). However, both aspects are effective independently of one's own observation: e.g. «wave-particle», «body-mind», and can also arise from the different approaches to the same: «effective space — environment (internal — external view), «indeterminacy — predictability»...

Global terms: The terms that stand for the characteristics that are attributed to the mechanoeitons. They were chosen so that they could have been the starting actors for the evolutionary process up to the persons existing today.

Basic terms (1st order): stand for the characteristics derived from the global terms for the Most Basic Actors and therefore for all actors in «our world».

nth order: Since it is up to the researcher to decide which level to start from in their own real scientific research, they are free to choose the basic actor and its basic terms for this level. The basic terms of the nth order must be able to be derived from the basic terms of the given basic actors (e.g. electromagnetic radiation, the atom, the cell...) and thus ultimately from mechanoeiton. Well-established basic concepts allow well-founded assumptions to be made for actors that are not yet known! They therefore allow hypothetical deductions. The significance of the characteristics of the basic actors and therefore their validation is decisive for the informative value.

Theory of Relativity: In this model, this is understood to mean the Special and General Theory of Relativity, both of which are based only on the consideration of the machina aspects of physical objects. Einstein pointed out their limitations, as he did not succeed in integrating mass into a terminological system. «Mass» is only attributed to particles. However, neither the «mass» of particles nor their analogous effectiveness in electromagnetic fields according to SRT «as if they had mass» can be derived from Einstein's world view and his principles.

Special Theory of Relativity: In this deductive, hypothetically realistic «theory of principles», Einstein can conceal the conclusions of the evolutionary process with the «as if they had» trick. From the point of view of cosmological evolution and the Extended View, SRT includes the mechanoeiton with the energetic field, with the «as if they had the mass h times ny» the electromagnetic radiation derived from the mechanoeitons with their electromagnetic field, including the bridge to the particles traced back to the electromagnetic fields, whose mass can be expressed quasi-ideally by Newton's formulas. Unfortunately, Einstein did not take into account the reality of the energetic field. This is interpreted as a consequence of Einstein's world view, which was determined by the religious philosophy of Spinoza. From the scientific-theoretical, hypothetically realistic technique used by Einstein, the step would have been compelling to describe the energetic field as a characteristic of an unobserved evolutionary precursor of photons. However, Einstein interpreted the energetic field only as an auxiliary mathematical construction, which, as with scaffolding, is dispensed with without replacement once the building has been completed. This failure to take it into account leads to an approach that in epidemiology would be called an «ecological error»: All vertebrates are animals, but not all animals are vertebrates. Atoms are not particles, particles are not electromagnetic radiations and radiations are not mechanoeitons, but they all originate from mechanoeitons.

Furthermore, SRT does not take dynamis into account. Therefore, SRT cannot plausibly explain how photons and particles and then atomic classical objects were formed.

General Theory of Relativity: The GRT is not a theory of principles like the SRT. This is because Einstein did not succeed in modifying his world view in such a way that he could adequately integrate the common principles for gravitation, the explanation of the shape of the universe, electromagnetic radiation and particles. (See the diagram of the model of the theory of principles in Focus 2) He subsumed the energetic aspects of atoms, particles and radiation under the energetic field. This makes it clear that Einstein heuristically assumed that the energetic field could not just be a mathematical quantity, but the most fundamental thing in physics when it comes to energy. Did Spinoza determine Einstein's «peace of mind» so far in the sense of Max Planck that he did not take this logically compelling assumption into account? His struggle for determinacy and thus for his religious world view is documented by Pauli (see Focus 2). He did not live so long to see how meaningful the heuristically found formula of ART actually is. With the energetic field, he implicitly included dark energy and dark matter. This is why his formula is so powerful, even though he assumed a universe whose energy was only around one twentieth of what is assumed today.

Without the noeiton aspect or dynamis, the principles of ART cannot explain why the formulas are so powerful and do not require any mathematical additions.

Thought experiment An idealized, imaginary experiment that serves to test the consistency or limits of a physical theory or concept.

Wave-particle duality Electrons and photons, matter and radiation, can behave either like waves or like particles, depending on the experiment.

Wave — particle — dualism: a dilemma in understanding the nature of quantum objects that is not solved by referring to «complementarity»: this seemingly logical incompatibility disappears when the Extended View is adopted. There, the initial actor in the Big Bang («mechanoeiton») is discrete as a particle with inflationary spatial effectiveness. The two actors involved in an electromagnetic radiation experience themselves as discrete in the internal relationship, but experience other, non-involved pairs as a continuum. This is justified by the maximum possible orientation of the discrimination ability towards the self-determined modifications of the orientation, so that only as few resources as possible are used for external relations. This leads to experiencing the «others» «as if» they were waves. See also flicker fusion frequency.

Wirklichkeit — «wirklich»: «wirklich» here means both that which a person — or a community — assumes to be real and therefore, in the sense of the Extended View model, endowed with dynamis, but also that which can possibly be realized or has already been realized elsewhere, without this person — or this community — having already gained access to it. Since one cannot know whether the possible can also be realized or has already been realized elsewhere, the term «wirklich» and therefore also «Wirklichkeit» also encompasses areas that do not necessarily belong to reality. Therefore, decisions about predicted effects can be derived as logically compelling and necessary, which turn out to be impossible. In English, the term «Wirklichkeit» is missing. «Wirklichkeit» can be found in dictionaries. Therefore, the term is used in the English text, but with quotation marks.

FOCUS 2: STATEMENTS OF EXPERTS AS APPROACH FOR CONSIDERATIONS

INTRODUCTION

When life and science are in contradiction,
life is always right (G. Liebig)
and science has a duty to make this clear.
Who is responsible for what and when?

Aspect, Clauser and Zeilinger received the Nobel Prize in 2022 for establishing the second quantum revolution. They built on the result of the experiment specifically set up as Experimentum Crucis, which Freedman and Clauser had successfully carried out in 1972 to decide [31].

- whether Einstein's conclusions from Theory of Relativity were correct, namely that no effect can occur between entangled photons faster than the speed of light, as non-locality would require the assumption of supernatural («spooky») influences,
- or whether entanglement and non-locality are part of the nature of quantum objects, e.g. in Schrödinger's sense.

Schrödinger's position was confirmed by this and numerous subsequent experiments. It is not surprising that reproducible results are reproducible, and that the effects that can be predicted in this way can be exploited. And the joy is legitimate that this technique, which leads to faster-than-light effects between photons, can be used indirectly for the benefit of the macroworld, even with a time delay and thus with locality.

But does this experimentum crucis not force us to make much more far-reaching decisions, e.g. about whether to opt for position a) or b)?

a) Did Freedman and Clauser prove in 1972 that there are non-scientific forces in physics after all, which — as Zeilinger's findings confirm — can be used purposefully like the «genie from the lamp»?
b) Or have they opened the door to a new challenge in the search for a natural explanation of the spooky?

For «classical» representatives of the real sciences, proof of an unbridgeable deviation from a proven theory would be a welcome opportunity to strive for an expansion of knowledge: In Popper's sense, irreplaceable but challenged initial theories, such as the Theory of Relativity, should be «rescued» — or better «extended» — with the help of additional hypothesis. This is considered the royal road to expanding the state of knowledge. Is there, for example, an additional hypothesis that can build a bridge from the now proven fact of nonlocality in the current quantum world to another area of physics that is forced to accept nonlocality? The facts of observation force cosmologists to assume an inflationary phase in the very first phase of cosmic evolution within the second 10–20 after the Big Bang. This assumes a practically instantaneous expansion of the universe to the extent equivalent to the thickness of DNA to over 100 million light years. How this is supposed to have happened is an open question, but mathematically just as certain as the non-locality of entanglement.

Physics has had instructive experience with another purposefully conducted Experimentum Crucis, which could be helpful now. Eddington had carried out this experiment in 1919 in order to decide definitively between Newton's and Einstein's views on the interaction of masses. The prediction based on the Theory of Relativity was the more powerful one. Therefore, «Newton» was also experimentally disproved. However, Einstein refused to follow Popper's demand to consider «Newton» as falsified and to only work with the Theory of Relativity in the future. On the contrary: Einstein recommended that all classical questions should continue to be dealt with using only «Newton» and not the Theory of Relativity. He justified this pragmatically: the minimal gain would not justify the considerable additional effort. In the meantime, the meaningfulness of further use in the macro world can be explained by an essential feature of the evolutionary process. According to Einstein, the strength of Theory of Relativity and every «principle theory» lies precisely in capturing the essence of the objects of research in a more fundamental way. In other words, the gain lies in being able to make statements about what lies «behind» (or evolutionarily more fundamental) the solid physical objects. In contrast, the gain at the evolutionarily younger level of atoms is practically negligible. This corresponds to the conclusion from the evolutionary model of the Extended View.

The Experimentum Crucis by Freedman and Clauser confirms the assumptions of Schrödinger, but also of Bohm and Dirac, according to which the nature of photons should be thought of in a more complex way [14]. The two assumed that photons also have effects without hquer and also without the speed of light, which actually presupposes an evolutionary precursor. Einstein, on the other hand, assumed that electromagnetic fields can only have the observable effects that correspond to the speed of light and hquer, and that they are the oldest physical objects in evolutionary history. He therefore made them the starting point of his model of the cosmological evolutionary process and thus founded scientific cosmology. However, this meant that the ultimately unexplained

inflationary phase after the Big Bang had to be inserted into the second 10–20. Einstein died in 1955, Schrödinger in 1961, Bohr in 1962 so that they could no longer take into account the physical consequences of the 2nd Experimentum Crucis, but also fundamental changes in the view of the cosmological evolutionary process.

So there are also good reasons for successors of Schrödinger and Einstein to carry on where these giants could no longer work. How would Bohr and Einstein have adjusted their world views?

However, personal experience gives little hope that the possibilities will be seen and tackled. This can be seen in the way that very well-meaning experts reacted to a text that was sent to them. This assumed that the essence of the Experimentum Crucis was that a targeted, technical measure (influencing the spin) was carried out on photon 1 entangled with photon 2, which caused a — moreover predictable — change in the entangled photon 2, at faster-than-light speed. This requires an explanation and not just a description. Since electromagnetic energy and matter can only trigger effects at the speed of light, they are no longer a legitimate explanation. From the range of current physics, only «information» remains. The classic definition by Norbert Wiener 1948 [59], which has proven itself in animate, inanimate, natural and artificial systems, is helpful here. «Information is information and not energy or matter».

This means that information can be bound to processes at the speed of light or another, even higher speed, but does not have to be bound. Therefore, faster-than-light speed in entangled photons is compatible with «information». The reason for the nature of the observable change in photon 2 remained open, as no quantum could cause the change. This effect becomes clear when one considers Bateson's experience with information. Information is therefore «the difference that makes a difference [2]. It is therefore about the consequence of experiencing information. The experience leads to the experienced is using his own possibilities in a different way. It therefore does not require an external supply of energy. In a case in which the experience was possible without electromagnetic energy and without matter, no further external stimulus is required in order to use one's own effectiveness in a different way. (However, this raises the question of the nature of the effectiveness made possible in this way, but this is deliberately excluded at present and can be clarified in a later step). If one assumes «information», then both chains of argumentation can be used to understand without contradiction why no quantum had to be transferred in the experimental arrangement of Freedman and Clauser and all other experiments based on it, but why an observable effect on the entangled photon nevertheless occurred. Therefore, the author formulated in the first draft of the summary that «information was transmitted at faster-than-light speed». This purely scientifically based statement met with radical rejection, even if without scientific explanation: «No physicist will agree with this ... as the example of teleportation shows, no information is transmitted at faster-then light speed» Or: «According to RT, information cannot be transmitted at faster-than-light speed, and neither Bell nor Zeilinger have disproved this. ... Larsson would never acknowledge that his Nobel Prize decision disproves RT!!! Nonlocal quantum mechanics and local Theory of Relativity continue to coexist side by side». [42].

«Information» is in itself a universally used «global term». However, it is permissible to specify that it may only be used in a certain way. Quantum physicists, for example, seem to stipulate that information may only be used for processes between people. It is undisputed that Zeilinger transferred the information from Alice to Bob only by teleportation at the maximum speed of light, albeit indirectly, by the non-local effects between photons occurring beforehand. But Bell was talking about the process of photons, not people [3]. And what is the advantage of shifting the physical problem to linguistics and only talking about «instantaneous» or «nonlocal» instead of «faster than the speed of light»? The statement that both photons form a common system thanks to entanglement and can only be considered as one system does not really help here either. It is true for every system that only the interaction of their units produces what we call a «system». Why should this be any different in microworld systems than in macroworld systems? The challenge therefore remains the same, whether one has to justify why there is an instantaneous, non-local effectiveness between entangled photons or a faster-than-light speed between entangled photons. Electromagnetic fields and matter are ruled out as explanations for scientific reasons. Now the theoretically remaining possibility of being able to fall back on the proven concept of «information» in science and technology no longer applies. However, this is due to a social norm as to how one should behave as a member of the community of physicists.

Physicists rightly agree with the use of these techniques, as they undoubtedly enable progress. But is it enough to simply refer to the success of the technology since an experimentum crucis has been recognized that is scientifically unambiguous?

Has Einstein's scientifically founded mockery of extra-scientific, spooky effects become a belief that quantum physicists, but also all natural scientists, will have to accept in future, according to which there is a (?) «genie in a bottle» that we do not have to explain at all, despite an experimentum crucis, and which we can get out of the bottle with the right technique? Why only in quantum physics and Theory of Relativity? Another «ignorabimus»?

What do the words «coexist side by side» stand for in the statement «nonlocal quantum mechanics and local Theory of Relativity» would «continue to coexist side by side» if they obviously provided such incompatible predictions that they seemed suitable for an Experimentum Crucis? Before Eddington's experimentum crucis, it was

still possible to support Newton's position, which had stood the test of time for centuries; after Eddington, it was no longer possible. This is the difference brought about by an Experimentum Crucis. Can we really assume, after recognizing the results of Freedman and Clauser, that this Experimentum Crucis did not exist or even that it would have proven coexistence? And can we really assume that Einstein and Bohr would have tolerated such a procedure?

Einstein had scientific reasons to exclude the coexistence of two formulas about the effects of the same photons, as he was not prepared to accept non-scientific influences. This is the same Einstein who was not satisfied with the «coexistence» of «Newton» and «Maxwell», even though their fields of application did not even overlap.

Nevertheless, according to Einstein, there must be something more fundamental «behind» these formulas simply because both allow predictions about physical objects and there must be something common to all physical objects. Otherwise, the comprehensive term «physical object» would not stand for anything scientifically comprehensible. In order to be able to deduce what is hidden, he used a hypothetically realistic approach and developed the technique of principle theories. He successfully applied it to the invention of the Special Theory of Relativity. The author does not dare to accuse Einstein of failing to recognize an inevitable coexistence of Theory of Relativity with quantum theory, the validity of which he never denied, contrary to widespread opinion. On the other hand, Bohr did not question RT. He only considered the question of the nature of the connection to be presumably unsolvable. Thus, two undisputedly powerful world views competed in their respective fields.

The author also does not share the insidiousness of small minds who accused Einstein of senility, and that even when he wrote the ERP paper in 1935. Anyone who wants to understand Einstein's position in 1935 and up to his death must take the trouble to deal with his theory of science and its interweaving with his world view shaped by Baruch Spinoza. Then it should become clear to him that Einstein could not take a different view until his death, as the empirical facts for the speculative assumptions of Bohm, Dirac and Schrödinger were lacking. He did not live to see Bell's application-oriented publication or Freedman and Clauser's Experimentum Crucis, as he died in 1955. The author is convinced that Einstein would otherwise have once again adapted his world view to the facts of observation. This could also be expected of Bohr.

So the hope remains that Larsson, with his elegant reference to Schrödinger, wanted to remind us of the scientific challenges that must not be forgotten over the well-founded joy about the new operational applications of entanglement. Of course, the limits of Theory of Relativity were highlighted by Freedman and Clauser's Experimentum Crucis. It can be assumed that the implications of this conclusion were not only clear to Larsson. With the award of the Nobel Prize, the challenge of the Einstein-Bohr debate, which remains unchanged, takes on a new quality.

It is to be expected that many of those involved before and after the turn of the millennium were not familiar with the essential scientific-theoretical considerations of the «giants». One reason for this is the language barrier. Schrödinger's key work from 1935 was probably only made available in English in 1983. Many of Einstein's important works on the theory of science were published in German. Another reason was that the considerations that formed the basis for the dynamics in Einstein's way of thinking, for example, were unknown to others because they were the content of private correspondence. Significant, for example, are the more than 100 letters between Einstein and Born, which were first published only in German in 1963 [9] and not in English until 2005. For quantum physicists, the discussion of aspects of scientific theory seems to have had no relevance, even when the discussion of better solutions gained in importance in the 1980s: among the 49 contributions that Wheeler & Zurek [58] made available as reprints in 1983, there was no contribution to the discussion on the arguments of the «giants» in terms of scientific theory, but rather on the measurement methods and results for testing. This is not surprising if one assumes that everyone started from Bohr's model. However, this is now just as questionable as the view held by Einstein until his death. Why should we engage with a world of thought if we do not see the necessity or the possibilities associated with linking empiricism and theory? Perhaps this part of the supplement can arouse interest here.

Bohr and Einstein are long dead. Perhaps it is emotionally easier today to form a personal picture of the positions and their reasoning and increases the willingness to ask questions that could not be asked in the past. If the quotes compiled below for 6 sub-areas were helpful in this respect, that would be gratifying.

The compilation of quotations is inevitably subject to a bias due to the author's opinion. To make it easier for the reader to form his or her own opinion, reference is made to two main works that are widely available and easily accessible:

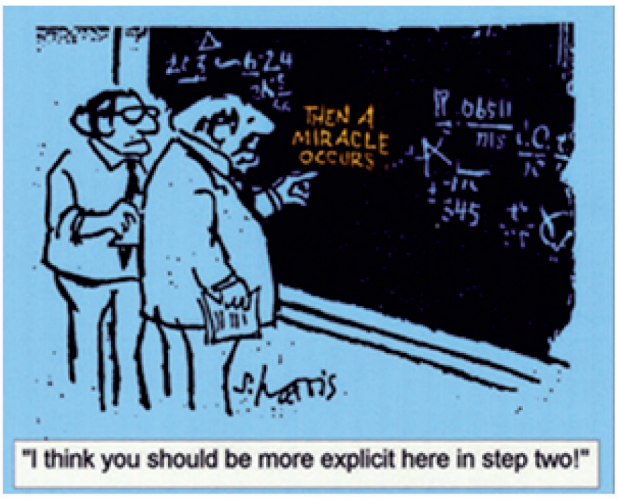
1) Schilpp P.A. Albert Einstein as philosopher and natural scientist, Vieweg 1979 [54]. Einstein is the only natural scientist to have his own volume dedicated to him in the series of the most important philosophers of the 20th century. The volumes are structured in such a way that the laureate presents his theory, then his partners and, above all, his opponents have their say and then he responds to all objections. 25 experts in physics, philosophy, mathematics, methodology, geometry, etc. from 11 nations, including 7 Nobel Prize winners, have contributed. Of particular importance are the contributions of Nils Bohr [7], Born [8], de Broglie [12], Pauli [48], Lemaetre [44], Gödl [32], Northrop [36]. Their contributions also allow a well-founded

insight into their view of the world. Einstein was therefore also a recognized expert in this field at the highest level and was acknowledged by his publications, which cannot be proven in a comparable way by the other physicists with regard to their scientific-philosophical foundation.

2) Kumar M: Einstein, Bohr and the great debate about the nature of reality, WW Norton & Comp, NJ, London 2010 [43].

The strength of this book lies in the fact that Kumar has presented a historical account of events without taking sides, as is inevitable in the many biographies. This book was nominated for the BBC's Samuel Johnson Prize for Non-Fiction 2009 and was one of the 10 science books worth reading in 2012. Kumar was probably the first to have access to virtually all the available literature, including the correspondence.

The starting point was the German publication or its translations into German. The translations into English or from German into English were made with the help of deeple.com if the original works were not available.



To methodology

Einstein's technique for developing a theory of principles (letter to M. Solovine, May 7, 1952 [26])

«I see the matter schematically as follows:»

1) The experiences are given to us

2) A are the axioms from which we draw conclusions. Psychologically, the E are based on the A. However, there is no logical path from the E to the A, but only an intuitive (psychological) connection, which is always «on revocation».

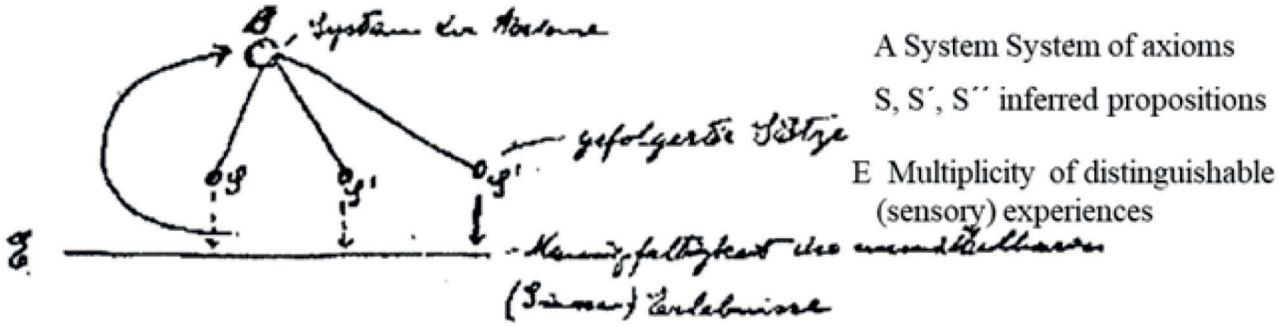
3) Individual statements S are derived logically from the A, which derivations can claim to be correct.

4) The S are related to the E (testing against experience). Strictly speaking, this procedure also belongs to the extralogical (intuitive) sphere, because the relationship(s) of the concepts occurring in the S to the experiences E are not of a logical nature. However, these relationships of the S to the E are (pragmatically) much less uncertain than the relationship of the A to the E». ... If such correspondences were not attainable with great certainty, although logically not graspable, the logical machinery would become completely worthless for the comprehension of reality

In this representation, the comprehensiveness of the existing system of axioms corresponds to the given world view. The axioms are just as much inventions as the formulas with the help of which the physicist wants to mathematically implement the conclusions of the axioms for the world of experience. How useful the inventions are can be tested by their predictability.

If phenomena occur that one would expect to be able to explain with the existing theory, but this is not possible, the invention needs to be «revoked» and adjusted. This corresponds to Popper's way of «saving» a proven theory by means of an additional hypothesis and also improving it by extending it.

However, Einstein is not concerned with these «banal cases». He wants to step «behind» the currently researchable situation, as he assumes that ultimately all laws must go back to simpler precursors. Since these preliminary stages can no longer be investigated directly today, but only that which has emerged from the past in a differentiated way, only a scientific theoretical approach can help: one must try to imagine how this preliminary state could have been, in which the «multiplicity of distinguishable sensory experiences» did not yet exist, but objects with the potential to develop into the diversity we have today. He therefore had to imagine a world without electromagnetic radiation and without particles, atoms, etc. and invent a set of formu-



las for this, thanks to which the different phases of the pre-state could be expressed mathematically. This required an almost unimaginable level of empathy, even if some of the formulas used were already available. The key factor was the invention of the energy field and its connection with frequency and Planck's quantum of action, albeit with the restriction «as if this were equivalent to mass». After Einstein changed the initial world view to the effect that the objects of the world could not have been created in 7 days, but that the entire process must have begun with an electromagnetic quantum carrier, he was able to make the predictions shown in the diagram with the drawn line: this prediction could not be predicted with the «old knowledge». He was able to present the calculations for the usefulness of the new formulas. He thus provided the only example of a complete theory to date: Special Theory of Relativity. It was and is deterministic.

Point 4) in Einstein's description raises the question of why one can expect generalizability of successfully invented correlations. They become logically comprehensible if one assumes an evolutionary model in which consensus is voluntarily adhered to because this is individually advantageous. This is illustrated by the chess model, which is described in detail in the main article.

Einstein endeavored to implement the same process flow as for the SRT for the General Theory of Relativity. However, here he (and Hilbert) only succeeded in getting back to the phase before the present world in connection with the invented world of Special Theory of Relativity in such a way that he (and Hilbert) were able to invent the formulas for GRT. However, he did not succeed in expanding the world view in such a way that the self-formation of mass would have become clear. As plausible as the geometric expression of gravity seems to us today and as impressive as the empirical confirmations are: Einstein had to be dissatisfied: The theory was not complete, as the consideration of mass differed in essence from the other quantities used «like the wooden nose of a snowman [57].

For a follower of Bohr's world view, the theory was complete. One could not demand more than excellent predictions and mathematical compatibility with the given theories, since one would have to accept that the world was absurd, but explorable and conclusive in its absurdity, due to the limitations of the human mind conclusively deduced by Emil du Bois-Reymond [6]. And Eddington proved this with his Experimentum Crucis: The formulas of the «old» world view, which we can comprehend with our logic, are not enough. The world is absurd, but it can be empirically investigated so that correct mathematical solutions can be found without contradiction. There are two worlds that are inaccessible to us.

If you want to hold on to a single reality and find a way out, you would have to look for a sufficient reason why mass is so fundamentally different from the other terms of RT and eliminate this difference. And this difference becomes obvious if one assumes that all terms are free inventions of the human mind, but physical terms must stand for something that has its equivalent in the real world [19]. In Einstein's view of the world, however, the energetical field is a purely mathematical parameter. It therefore has no equivalent in Einstein's world view of the real world. Obviously, Einstein's view of the world was not comprehensive enough in this respect. If he had consistently implemented the chosen hypothetically realistic approach, which is correct in terms of scientific theory, he would have had to claim that the energetic field is the energetic aspect of a physical agent that is located «behind» the electromagnetic radiation. However, this would have shifted the initial evolutionary phase «backwards» once again. This realization would have been enough for «classical» researchers to start a whole cascade of considerations, e.g. on the inflationary phase, the wave-particle dilemma, etc. For Einstein, it would have meant that the starting point for his considerations on the «new world view» would have changed. With what result remains open.

However, from the Extended View, it would be imperative that even with this extension, no world view would have become possible that could be described as «complete» in Einstein's sense. Such a world view must cover all aspects that are dealt with by natural scientists. To do so, this «truly comprehensive world view» would have to start from an initial state that makes it clear why all processes that can be observed and logically deduced today can have their own dynamic beginning from this initial state. It therefore presupposes a comprehensive understanding of evolution. This raises the question of determinacy in a completely different perspective. It can be regarded as a generally recognized consensus that the starting point of something evolutionarily new is only the preliminary state without the new, but that individuals have used the given opportunities to implement something new, which was then adopted by many for good reason. This is why the evolutionary new «outlives» its inventors. However, this idea is not compatible with Einstein's notion that the world would ultimately proceed inevitably in the sense of Baruch Spinoza. Bohr would have had a much easier job: Emil du Bois Reymond left open the possibility that the nature of order in nature, for example, could be answered over the course of time [5].

With the now generally recognized validity of the Experimentum Crucis by Freedman and Clauser in 1972 [31], the situation of both Bohr and Einstein would have changed fundamentally. Both would have had to review their world view and adjust it to the facts of observation. We can only speculate about how this adjustment would have turned out. However, it can be assumed with great certainty that both Einstein and Bohr would have radically rejected a «genie out of the bottle», thanks to which both theories would no longer be in competition, but would now coexist in consensus. The world may seem absurd, but for Bohr it must remain explorable and free of contradictions. The Experimentum Crucis by Freedman

and Clauser refuted the freedom of contradiction. Until his death in 1962, Bohr was aware that the available solutions were not sufficient. Silent witness to this is the blackboard in Bohr's workroom. The last drawing on the blackboard, which he had made the previous evening, showed «Einstein's light box» from 1930 [43. This thought experiment had temporarily impressed Bohr so much that he feared the end of physics if Einstein's ideas proved to be correct [43].

SELECTION OF STATEMENTS OF EXPERTS

Aristotle: «It would be foolish not to consider something a purposeful event if the moving and superior cause is invisible» [1].

Einstein: Every element of physical reality must ultimately have a counterpart in physical theory [19].

Everything should be seen as simple as possible, but not simpler.

What position does the world view of the theoretical physicist occupy among all these possible world views? ... Does the result ... deserve the proud name «world view»? I believe the proud name is well deserved, because the general laws... claim to be valid for every natural event. It should be possible to find the illustration, i.e. the theory of every natural process, including the processes of life, on them by means of pure mental deduction... ... No logical path leads to these elementary laws, but only intuition based on empathy with experience. Given this uncertainty of methodology, one might think that any number of systems of theoretical physics with equal rights would be possible; this opinion is certainly true in principle. But developments have shown that of all conceivable constructions, one single one [in each case] has proven to be absolutely superior to all others. No one who has really immersed himself in the subject will deny that the world of perceptions determines the theoretical system practically unambiguously, despite the fact that no logical path leads from the perceptions to the principles of the theory [27].

There is no inductive method that could lead to the basic concepts of physics. The failure to recognize this fact was the fundamental philosophical error of many 19th century researchers... ... Logical thinking is necessarily deductive, based on hypothetical concepts and axioms [20].

There is no term in physics whose use is a priori necessary or justified. A term only acquires its raison d'ктre through its clear and unambiguous link to results or physical experience structure [28].

The relationship between sensory impressions and concepts is not like that of soup to beef, but rather like that of a garda number to a coat [28].

Although it might be heuristically useful to remember what you have actually observed, he argued that it is wrong in principle «to base a theory solely on observable quantities». In reality, the exact opposite happens. It is the theory that decides what we can observe [n Heisenberg [35].

The reciprocal relationship of epistemology and science is of noteworthy kind. They are dependent on each other. Epistemology without contact with science becomes an empty scheme. Science without epistemology is — insofar as it is thinkable at all — primitive and muddled [22].

To the systematic epistemologist he must therefore appear as a kind of unscrupulous opportunist: He appears as a realist, inasmuch as he seeks to describe a world independent of perceptual acts; as an idealist, inasmuch as he regards concepts and theories as free inventions of the human mind (not logically deducible from what is empirically given); as a positivist, inasmuch as he regards his concepts and theories as justified only to the extent that they provide a logical account of the relations between sense-experiences. He can even appear as a Platonist or Pythagorean, insofar as he considers the standpoint of logical simplicity to be an indispensable and effective instrument of his research [21].

No matter how extensive a collection of empirical facts may be, it cannot lead to the establishment of such complex equations. A theory can be tested against experience, but there is no path from experience to the formulation of a theory [21].

(quoted by Born): Concepts, which have proved useful in the ordering of things, easily acquire such authority over us that we forget their earthly origin and accept them as unalterable givens. They are then stamped as «necessities of thought, givens a priori, etc.». The path of scientific progress is often rendered useless for a long time by these errors [10].

A theory is the more impressive the greater the simplicity of its premises is, the more different kinds of things it relates, and the more extended is its area of applicability. Scientific American (April 1950)

Russel to Einstein: Just as the sea does not cause the water to run towards it, so the sun does not cause the planets to move round it. The planets move round the sun because that is the easiest thing to do — in the technical sense of «least action». It is the easiest thing to do because of the nature of the region in which they are, not because of an influence emanating from the sun [53].

Sommerfeld A. cited Einstein Since the mathematicians have invaded the theory of relativity, I do not understand it myself anymore. Einstein zu Heisenberg: 'It is absolutely false, although it is often asserted, that the world picture of physics contains, or may contain, directly observable magnitudes only. On the contrary, directly observable

magnitudes are not found at all in the world picture. It contains symbols only [55].

Einstein, in Kanitscheider: «For a logical system to be considered a physical theory, it is not necessary to demand that all its statements can be independently interpreted and tested «operationally»; this has de facto not yet been achieved by any theory and cannot be achieved at all. For a theory to be considered a physical theory, it is only necessary that it implies empirically testable statements in the first place [39].

Feynman R: You won't understand it... And that's because I don't understand it. Nobody understands it... We physicists have had to realize that it doesn't matter whether a theory suits us or not. What matters is whether the theory allows predictions that agree with the experiments. Nature, as described by quantum electrodynamics, seems absurd to common sense. Nevertheless, theory and experiment agree. And so, I hope you can accept nature as it is — absurd [29].

Einstein in Holton G: Observation is generally a very complex process. The process that is to be observed triggers some kind of event in our measuring apparatus. As a result, further processes take place in this apparatus, which ultimately lead to detours of the sensory impression and the fixation of the result in our consciousness. On this very long path from the process to the fixation in our consciousness, we need to know how nature works, we need to know the laws of nature at least practically, if we want to claim that we have observed something [36].

Einstein: The description of matter [in the General Theory of Relativity] by a tensor is a stopgap, something temporary, like a «wooden nose on a snowman» [57].

Galilei: ... Simplicio: «The cause of this phenomenon [of moving downwards] is generally known: Everyone knows that it is gravity. Salviati: You are mistaken... You should say; everyone knows that it is called gravity. But I did not ask you about the name, but about the nature of the thing. You know not the least more about this essence than you know about the essence of the moving principle of the stars, except for the name [32].

Heisenberg tells Holton: «Einstein was certainly right. In fact, in my work on the uncertainty principle, which soon followed, I showed that the theory even decides what we CANNOT observe» [37].

Heisenberg... ... I kept asking myself the question: Can nature ever be as absurd as it appears to us in these atomic experiments [35]?

Heisenberg W: It is impossible to specify what happens to the system between the initial observation and the next measurement [35].

Northrop F.S.C.: «Perhaps the most novel and important thesis of this book s iths authorrs contention that quantum mechanics has brought the concept of potentiality back into physical science. This makes quantum theory as important for ontology as for epistemology. At this point Heisenberg's philosophy of physics has an element of common with that of Whitehead» [47].

Weizsäcker CF: (Einstein's) own contribution lay in the linking of two other ideas, the philosophical-abstract one of general relativity and the physical-concrete one of the equivalence principle. He needed Riemannian geometry to link them. The equivalence principle was one of the strokes of genius of naive-direct questioning. If two quantities — in this case inertial and gravitational mass — are empirically always the same, then there must be a theory that proves them to be identical in essence. With general relativity, however, the unresolved questions begin: Einstein had the philosophical instinct that there was something essential here and formulated what he was looking for as a heuristic principle of the general covariance of the fundamental equations. He had to learn that this requirement can always be fulfilled and reformulated his principle to the effect that the correct formulas must be particularly easy to derive in generally covariant formulations (whatever W. meant by that...). What does simplicity mean here... «I have learned something else from the theory of gravitation: no matter how extensive a collection of empirical facts may be, it cannot lead to the formulation of such complicated equations. A theory can be tested by experience, but there is no way from experience to the formulation of a theory [56].

Limits of the methodology

Bell in Kumar: Bell was convinced that Einstein wanted to establish a grand new principle equivalent to the conservation of energy. Instead, Bohm offered Einstein a «non-local» interpretation that required an immediate transfer of the so-called «quantum mechanical forces» [43].

Dirac PAM: If we succeed in finding a way to describe the indeterminacy relations and indeterminism of current quantum mechanics in such a way that a satisfactory philosophical conception emerges, then we can count ourselves lucky. If we do not find such a way, there is nothing really worrying about it. We simply have to bear in mind that we are in a transitional phase and that it is perhaps quite impossible to formulate a satisfactory picture for this stage [51].

I think one is on safe ground if one assumes that in a future physical picture e and c will be elementary and hquer derivable. If hquer is a derivable and not a fundamental quantity, then all our ideas about indeterminacy will change: hquer is the fundamental quantity in the Heisenberg indeterminacy relation, which links the amounts of uncertainty

for position and momentum. This U-relation cannot play a fundamental role in a theory in which hquer itself is not a fundamental quantity. I think it is fairly safe to assume that uncertainty relations in their present form will not survive in future physics. Of course, there will be no return to the determinism of classical physical theory. Evolution does not run backwards. There will be some new development, quite unexpected in its nature, which will take us even further away from classical ideas and completely change the discussion about the uncertainty relation [14].

Dürrenmatt: Perhaps the failure of Einstein's attempt to establish a general field theory is his most important contribution to physics [15].

Einstein: «As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality» [25].

«Does the moon only exist when you look at it?, asked Einstein Abraham Pais» [4].

Einstein; quoted by Fischer: The «subjectivity that Theory of Relativity is about is a physical subjectivity that would be equally present if there were no such thing as mind or sense perceptions in the world. Moreover, it is a precisely defined subjectivity. The theory does not say that everything is relative; on the contrary, it provides a method for distinguishing what is relative from what belongs to a physical process itself» [30].

There are many reasons for advocating [not a field theory, but] a theory without space and time. But no one knows how to construct such a theory [57].

Einstein on Gödel's position: If B and A are two sufficiently neighboring points in the world that can be connected by a timelike line, the statement has an objective physical meaning: «B is before A». Does this statement also make sense if the points that can be connected by a timeline are arbitrarily far apart? Certainly not. Then, for points of the world that are far apart in the cosmological sense, the distinction between earlier and later is abolished, and the paradoxes concerning the directed causal connection that Mr. Gödel spoke of arise [22].

Heisenberg: ... why one would run into the greatest difficulties if one tried to describe what happens between two successive observations. ... It is impossible to specify what happens to the system between the initial observation and the next measurement [35].

Newton I: [The idea] that gravitation is implanted, inherent and essential to matter, so that one body can act on another at a distance, through a vacuum, and without the agency of anything else by which the action or force is transmitted from one body to another, is to me such an absurdity that I believe no one who has the slightest competence in philosophical matters will be led to hold this view. Gravitation must be caused by an operator who acts continuously according to certain laws. But whether the operator be material or immaterial is a question which I have left to the consideration of my readers [45].

Weizsäcker: The [General Theory of Relativity] theory is like an unredeemed down payment on something still unknown; that is how Einstein himself felt about it [56].

Newton's weaknesses: Not only does it fail to determine the realities of consciousness, of affects, of values. Neither does Einstein's design. But one must accept not only Newton's laws of motion, but also mass values and laws of force as «created by God in the beginning», i.e. as incomprehensible facts [56].

The Dynamics of Einstein's World View and His Constant Endeavor to Improve It

Einstein letter to Max Born: «...I do not want to be driven to abandon strict causality until it has been resisted in a completely different way than before. The idea that an electron exposed to a beam freely chooses the moment and the direction in which it wants to jump away is intolerable to me. If anything, I would rather be a cobbler or even a casino employee than a physicist. Certainly my attempts to give the quanta a tangible form have failed again and again, but I am far from giving up hope» [9].

I still believe in the possibility of a model of reality, i.e. a theory that represents things themselves and not just the probability of their occurrence [43].

You believe in God who plays dice, and I believe in an order in a world which exists objectively and which I try to grasp in a wildly speculative way,» Einstein wrote to Born in 1944... ... I firmly believe in it, but I hope that someone will discover a more realistic way, or rather a more tangible basis, than it has been my lot to find [43].

I still believe in the possibility of a model of reality, i.e. a theory that represents the things themselves and not just the probability of their occurrence [9].

«The person of today is not the same as the person of 50 or 20 [21].

The whole 50 years of conscious brooding have not brought me any closer to the answer to the question «What are light quanta? Today, every fool thinks he knows, but he is mistaken...» [23].

«I was sitting in my chair in the patent office in Bern. Suddenly I had an idea: if a person is in free fall, they will not feel their own weight. I was amazed. This simple thought experiment made a deep impression on me. It led me to a theory of gravitation.» (Einstein told the University of Kyoto in 1922)... and had realized «that all natural phe-

nomena, with the exception of the law of gravitation, could be represented in the terms of the special Theory of Relativity. I felt a deep longing to recognize the reason for this [43].

Kumar to Einstein: Later... he was firmly convinced that «it is not possible to eliminate the statistical character of the present quantum theory by merely adding to it without changing the fundamental concepts of the whole structure.» (Letter from Einstein to Aron Kupperman, November 10, 1954.) He was convinced that something more radical was required than a return to the concepts of classical physics at the subquantum level. If quantum mechanics is incomplete, only a part of the whole truth, then there must be a complete theory waiting to be discovered [43].

Pauli to M Born: that «Einstein does not consider the concept of «determinism» to be as fundamental as it is often presented. Einstein had told him this «emphatically and often» over the years. Einstein's starting point is «realistic» and not «deterministic», explained Pauli, «that is, his philosophical prejudice is a different one». ...Pauli understood, however, that Einstein's objections went far beyond theory expressed in the language of probability. In particular, it seems to me misleading to introduce the concept of determinism into the debate with Einstein» [49].

Einstein on Quantum Theory [20]

Einstein: ...I must take a stand on the most successful physical theory of our time, the statistical quantum theory, which assumed a consistent logical form about 25 years ago (Schrödinger, Heisenberg, Dirac, Born). It is the only current theory that allows a unified understanding of the quantum character of micromechanical processes. This theory, on the one hand, and Theory of Relativity, on the other, are both considered correct in a certain sense, although their fusion has resisted all previous efforts. This is probably related to the fact that there are quite different opinions among today's theoretical physicists as to what the theoretical foundation of future physics will look like. Is it a field theory; is it an essentially statistical theory? Physics is an effort to conceptualize existence as something that is conceived independently of being perceived.

The (quantum) theory is so far the only one that unites the corpuscular and undulatory dual character of matter in a logically satisfying way, and the (testable) relations contained in it are complete according to the natural limits set by the indeterminacy relation. The formal connections given in this theory — that is, its mathematical formalism — must be contained in any future useful theory in the form of logical conclusions

If the statistical quantum theory does not purport to describe the individual system (and its temporal sequence) completely, then it seems unavoidable to look for a complete description elsewhere; it would be clear from the outset that the elements of such a description would not be contained within the conceptual scheme of the statistical quantum theory... If such efforts were successful, statistical quantum theory would occupy a somewhat analogous position in the framework of future physics as statistical mathematics does in the framework of classical mathematics.

But I consider it proven that the search for a complete description would be futile. The laws of nature are so limited that the laws can be formulated completely and accurately within the framework of our incomplete description. ...As a theoretical possibility, this is incontestable. But to me the expectation seems more natural that the adequate formulation of the general laws is bound to the use of all the conceptual elements necessary for a complete description. [Furthermore, it is not surprising that if an incomplete description is used, only statistical statements can be obtained from it in the main. If it were possible to penetrate to a complete description, the laws would probably represent relationships between the conceptual elements, relationships which in themselves have nothing to do with statistics.

Kumar on Einstein's position: Around 1954 he was firmly convinced that «it is not possible to eliminate the statistical character of the present quantum theory by merely adding to it without changing the fundamental concepts of the whole structure». (Letter from Einstein to Aron Kupperman, November 10, 1954.) He was convinced that something more radical was required than a return to the concepts of classical physics at the subquantum level. If quantum mechanics is incomplete, only a part of the whole truth, then there must be a complete theory waiting to be discovered [43].

On Non-Scientific Influences

Clauser JF: Young physicists may find it difficult to believe that thirty years ago, most of the above ideas and subject matter represented forbidden thinking for practicing physicists. Indeed, any open inquiry into the wonders and peculiarities of quantum mechanics and quantum entanglement that went outside of a rigorous «party line» was then virtually prohibited by the existence of various religious stigmas and social pressures, that taken together, amounted to an evangelical crusade against such thinking. As a result of this evangelism, much of the early important work on Bell's Theorem was

published only in an «underground» newspaper!, whose circulation was limited to members of a «quantum-subculture», and that probably cannot be found in most physics libraries [11].

Kumar M to Clauser: Clauser wanted permission to test Bell's theorem experimentally: and received the blunt reply that «no decent experimental physicist would ever bother to actually measure it». This response corresponded to the almost «universal acceptance of quantum theory and its Copenhagen interpretation as gospel», Clauser later wrote, «together with a complete reluctance to even begin to question the foundations of the theory [43].

Einstein: I am a determinist. As such, I do not believe in free will. The Jews believe in free will. They believe that man shapes his own life. I reject that doctrine philosophically. In that respect I am not a Jew [38].

I believe in Spinoza's God, Who reveals Himself in the lawful harmony of the world, not in a God Who concerns Himself with the fate and the doings of mankind [18].

What man sees before him from an early age, he does not react to in such a way — to ask himself what is behind the things that are deeply hidden. He does not wonder about the falling of bodies, about wind and rain, about the moon and the fact that it does not fall, about the difference between the animate and the inanimate [21].

The Heisenberg-Bohr philosophy of reassurance — or religion? — is so finely concocted that for the time being it provides the believer with a soft cushion of peace from which he is not so easily startled. ... But this religion seems so damn little to me that, despite everything, I say: not E AND ny, but E OR ny. And not ny but E (which ultimately has reality!) But I can't make a mathematical verse out of it [17].

In physics ... dogmatic rigidity prevailed in matters of principle: In the beginning (if there was such a thing) God created Newton's laws of motion together with the necessary masses and forces [21]. This is an interesting example of how even researchers of bold mind and fine instinct [can be inhibited by philosophical prejudices for the interpretation of facts. The prejudice — which has by no means died out since then — lies in the belief that facts alone can and should provide scientific knowledge without free conceptual construction [21].

To be an impeccable member of a flock of sheep, you have to be a sheep first and foremost. [24].

In my opinion, it is not right to bring politics into scientific matters,» he wrote to Lorentz, «nor should individuals be held responsible for the government of the country to which they happen to belong [43].

Einstein (quoted by Born, Schilpp 96): Concepts, which have proved useful in the ordering of things, easily acquire such authority over us that we forget their earthly origin and accept them as unalterable givens. They are then stamped as «necessities of thought, givens a priori, etc.». The path of scientific progress is often rendered useless for a long time by these errors [10].

Kumar: Einstein to Max Born: «You believe in a God who plays dice, and I believe in a perfect order in a world which exists objectively and which I am trying to grasp in a wildly speculative way,» Einstein wrote to Born in 1944. I firmly believe in it, but I hope that someone will discover a more realistic way, or rather a more tangible basis, than it has been my lot to find. Even the great initial success of quantum theory does not make me believe in the fundamental dice game, although I know that our younger colleagues interpret this as a consequence of senility. No doubt the day will come when we will see whose instinctive stance was the right one [43].

Einstein to Maurice Solovine: «The necessity of conceiving of nature as an objective reality is considered an obsolete prejudice, while the quantum theorists are praised», «Man is even more susceptible to suggestion than the horse, and every age is ruled by a mood, so that most men do not recognize the tyrant who rules over them» [43].

Kunar: The American Nobel laureate Murray Gell-Mann believes that this is partly due to the fact that «Niels Bohr brainwashed a whole generation of physicists into believing that the problem had been solved». (Gell-Mann (1979), «What are the Building Blocks of Matter?», in Huff and Prewett (1979) [43].

Planck M: «Man not only wants knowledge and power, he wants a world view that guarantees him the highest good on earth, inner peace of mind [50].

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