

7. A sociedade está a mudar de uma forma muito célere e estão a aumentar as incertezas e os desafios que acompanham os períodos de mudança.

Também as universidades estão a mudar. Saíram das torres de marfim, num processo de aprendizagem não isento de dúvidas, de hesitações e de riscos, e acrescentaram às suas missões tradicionais – o ensino e a investigação – uma terceira missão – a abertura à sociedade. E têm-no feito num quadro de convulsão interna mais ou menos acentuado, onde coexistem posições conservadoras, reativas à mudança, e posições mais favoráveis às dinâmicas de progresso.

A massificação do ensino superior é uma consequência dessas mudanças. Com o aumento do número de candidatos à formação pré-graduada, aumentou também o número de estudantes que procuram aceder a níveis mais avançados de educação superior na sociedade do conhecimento.

E se a massificação do ensino superior tem vindo a pressionar fortemente a qualidade das formações pós-graduadas oferecidas pelas universidades, é também cada vez mais claro que na sociedade global em que vivemos a competição irá acentuar-se. E que, no futuro, dificilmente haverá lugar para instituições sem qualidade. Por isso, seja a oferta pós-graduada orientada para a ciência ou para o ensino, para a academia ou para o mundo de trabalho, os estudantes que estão a ser chamados a pagar a sua formação vão querer escolher, cada vez mais, instituições de formação onde a excelência esteja no centro das preocupações das IES, seja na investigação científica, seja na formação pós-graduada.

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<https://doi.org/10.5628/rpcd.21.S1.37>

## Scientific ethics. Some fundamental remarks about necessities and possibilities

### INTRODUCTION

Whenever one tries to connect Science and Ethics, it is necessary to look into the past to get a better understanding of the current situation. That is why I would like to start this article by talking about important, pre-modern roots.

The next part will deal with the necessity of a modern scientific ethics. The goal of this article, which also makes up the main part of these considerations, will be about giving an outline as well as illustrating basic problems of the new area of scientific ethics as a scientific sub-field. At last, I will suggest a very contemporary challenge.

### BACK TO THE ROOTS

You can start the explanation of this topic by studying those ancient sources which are linked to the Greek philosophical “heroes”, Plato and Aristotle. I will, however, concentrate on Aristotle. “Why is this?”, you may ask. His pioneer works had a stronger influence on modern philosophy, science and ethics than those of his teacher Plato, whom he criticised several times. Aristotle’s *Metaphysics* is a masterpiece of science. Already the opening sentence is of fundamental relevance: „Mankind asks for knowledge by nature“ (translation by E.M.) is an undeniable, anthropological fact. A special kind of knowledge, in fact its highest and purest form, is the scientific one. Aristotle’s *Metaphysics* has founded the

science of philosophy. The object of metaphysics is not a specific aspect of being, instead it focusses on „the being of being“. This means that metaphysics is not a science that is concerned with just analysing mere aspects of a whole, but is instead a comprehensive philosophy that focuses on the essence of being. It is a theoretical science, a “Prima Philosophia”, in which truth is imbedded by default.

Since Aristotle’s scientific knowledge must be based on truth, and therefore it is a necessity for all scientific findings. That means: Scientists have to adhere to truthfulness which is a moral attitude in itself.

If you try to generalize Aristotle’s argumentation you could say that one basic principle of scientific investigations is morality. This impression is strengthened by his work “Organon”, in which he developed something resembling a logical-empirical proof-teaching, which is why you have to obey rules.

Aristotle, a personality with enormous philosophical and scientific interests, who was additionally blessed with extreme far-sightedness, realized that there was a connection between science and moral, although he did not construct the discipline of Scientific Ethics, because he had no reason to do so.

Independent from his theoretical philosophy, the genius Greek also reflected on the philosophy of practice, which is subdivided into ethics, politics and economy in regards to human activities and moral behaviour. It is therefore no surprise that he was the first to justify a systematic and scientific ethics. He thoroughly reflected on; and finally understood, the leading question: Which aspects characterise a good life (gr. eu zen)? Aristotle gave the answer himself, using the term “eudaimonia”(happiness). In his globally renowned “Nicomachean Ethics” – which include 10 books (chapters) - you can follow his unique ideas. He was convinced that all people see the knowledge of eudaimonia as the highest ranked goal to obtain in life, albeit they disagree on what constitutes said best life. For Aristotle, Eudaimonia is the most important aspect, while virtue (gr. arete) is the second basic term of Aristotle’s ethics. The virtues are so important that they form the heart of Aristotle’s definition of ethics.

Aristotle interprets virtue as an activity of the human soul, which leads to us developing the best set of skills and capabilities possible. The soul strives for a status of excellence. Virtues are no innate human characteristics, instead they must be acquired by education and habit. The Greek differs between virtues of rationality, affecting the rational part of the soul, as well as virtues of irrationality, which in turn belong to the irrational part. This thesis of a division of the soul into separate parts cannot deny the influence of his teacher Plato (Plato, Politeia), although Aristotle developed an understanding of virtue in a more comprehensive manner than his teacher. With respect to the so-called ethical virtues and virtues of character, which depend on emotions, passion (gr. pathé) and ethical virtues, which are all attitudes (gr. hexis) towards our passion (pathé),

in turn stabilize character traits. It is an integral part of Aristotle’s ethics that virtue is defined as “maintaining the balance between two extremes”. For example, courage is a cardinal virtue and forms the middle ground between cowardice and rashness, which would be enabled by prudence (gr. phronesis).

Aristotle was not only the founder of philosophy as a theoretical science, but also established systematic, scientific ethics as a practical philosophy, which deals with human doings. His “virtue ethics” celebrated its comeback to international acclaim in the 1980’s (Nussbaum, Lopez, Frias). You can find some sense of scientific ethics (Metaphysics). If you take a look at his ethical main work “Nicomachean ethics”, one may also find that it includes said virtues, which are fundamental for any kind of scientific work, although Aristotle had no reason to combine these virtues with scientific doing, since it was not necessary at the time. This also depends on the understanding of science in his day. He had founded the science of systematic ethics, but he did not come up with a specific sub-area of this science. This happened later on. When and why?

#### **THE NECESSITY OF AN ETHICS OF MODERN SCIENCES**

According to the ancient definition of science, theoretical knowledge is the highest form of knowledge. The purpose of science was science in itself. There were no practical ambitions to interfere with the environment and nature, since science had no external utilizations. Scientists were solely motivated by the desire to gain knowledge about certain “principles”, which are the “First” of all scientific workings. Nature was supposed to remain unchanged. In short, the guiding principle was: “Let it (nature) be!”

Furthermore, the scientists’ leisure (lat. otium) was an inevitable prediction. Aristotle plead for the freedom of science, since it has its own internal purpose and its own will (Metaphysics, 982 b). That is why one can call the ancient sciences “scientia contemplativa”. This situation changed fundamentally in modern times. In later years the sciences developed a specific, modern understanding of themselves which followed new interests, goals, concepts, hopes, logics and designs, as well as predictions. The following paragraph(s) will enumerate some of these.

Contrary to the “scientia contemplativa”, modern science represents a new understanding. The Greek motto “Let it (nature) be!” has been replaced by the motto “Do it!” The “scientia activa” began to predominate the field of science and the status and reputation of philosophy has therefore suffered.

Philosophy had to relinquish its topmost spot in scientific hierarchy, and the natural sciences took over in its place. The one thing ancient scientists did not want to do, which was to research the utility of things instead of their very nature, became the main interest of modern (natural) science. F. Bacon embodied this new character of science (Höffe, 1995).

In contrast to the classical antiquity, modern science interferes with nature and manipulates it. New methods of scientific research have been created whose crown jewel is the experiment since it guarantees quantifiable results. The experiment enables progress, and progress is one of the keywords of modern society. But do not forget, and I'd like to specifically raise this point, that progress could turn into regress in the long run. Sometimes there is a perceivable and strange dialectics between progress and regress (Adorno/Horkheimer 1944).

The modern science intends to recognize and analyse nature with the help of experiments in order to take control over the laws of nature. These efforts are completely incompatible with former times and methods. So, the triumphal procession of the experiment and nature sciences began. One consequence is that modern sciences need tools, apparatuses and machines to reach their goals. The process of researching was born. It is a completely new scientific field that, in its definition of science, differs greatly from its classical counterpart. Research is defined as an active process, fuelled by the desire to disenchant nature and unveil its secrets.

On the other hand, modern science is eager to improve human life. That is of great importance to my train of thought. Why?

Modern (natural) science and research are synonymous terms: Not only do they seek to gain control over the laws of nature, but they also seek to humanize mankind's situation. Simplified: Scientific research attempts to make the world a better place and therefore is in dire need of moral and ethical standards. Scientists have to ask themselves: What are measures, rules and standards in scientific conduct? Can we simply do what we want to do?

What does human improvement mean in different situations? Are conflicts of interests possible etc.? From now on scientists have to direct the intention of morality. The classical antiquity, as I stated before, was able to exist without morals and morality. But in modern times morality became necessary, because since the combination of experimental technical science and the goal to humanize mankind's affairs, science and morality were tied together. Morality and ethics have been burned into modern science. Morality is a part of its DNA. Scientific activities require a specific moral consciousness. It is not only an intellectual, rational or aesthetical doing. If morality and ethics would be amiss, the scientific work would collapse.

But how can we define this specific ethics more precisely in our modern time and day? What does scientific ethics mean exactly? To answer this question, it is obligatory to talk about the possibilities of scientific ethics, which I will do in more detail

## A POSSIBLE DEFINITION OF SCIENTIFIC ETHICS

To understand the former exposition, it is necessary to accept the different interpretations of scientific ethics; for there are different layers of meanings and definitions. On the one hand it does mean that ethics is a constituent dimension of all sciences. It does not matter if the research deals with music, animals, mass-medias or other subjects. The scientists have to reflect on the moral rules and demands of their field of research in relation to their corresponding research methods.

On the other hand, scientific ethics can be seen as a young, specialised branch of general ethics, as well as an independent field within philosophy of science. This perspective deals with general ethical values and applies them in concrete areas of research. Another possible terminology of this subfield would therefore be "Applied Ethics", which would be in accordance with other applied ethics such as bio ethics, economical ethics, ethics of animals and plants etc. The overarching subject matter is the morality in situations of research.

Ethics as a term was derived from the Greek word "ethos" and can be translated as follows: Ethics is centred around the question of how humans can achieve "a good life". Morality gives answers on how to act in real situations and refers to the general, cultural consensus of different morals and values. Morality is based on standards and rules, which are related to law and the judicial system. Ethics and morality are therefore inseparable.

To reiterate: The sub-area of ethics of science is first of all a theory pertaining to an individual scientist's morality, but it also encompasses the morals of scientific institutions (for example universities). Indubitably, scientific ethics reflects on very specific area of expertise. It attempts to define the moral and ethical ramifications of scientific work by judging what is extremely good or, vice versa, bad. That is a unique judgement of morality. It considers very carefully what constitutes good and, respectively, bad behaviour.

Consequently, scientific ethics concerns itself with the question: What defines a good scientific practise? This is a crucial question in the current century. The "German Scientific Community" published a paper on general guiding principles for good scientific research (1998), which was subsequently updated last year (2019).

It has to be stated that "good" is always an expression and a category of quality. It is used here in the sense of moral value. Good scientific work is identical with morally good work, and is therefore measured by moral standards. Therefore, the branch of scientific ethics has a clear and observable subject. It is a highly specialised area which analyses, observes, compares, classifies, proceeds systematically, has traditions and preceding methods, doubts, criticises and follows rigid rules. Its specific intention is to investigate science. But what exactly is science?

## WHAT DOES SCIENCE MEAN?

A working definition and understanding of science as an essential topic in the field of scientific ethics is unquestionably meaningful. It is mandatory to be able to differentiate between these understandings:

- The first and most explicit understanding is: Science is the procedure in which a scientist gains knowledge by applying and obeying research methods. This is the highest form of knowledge.
- Science can be a theory of a bundle of proofed hypothesis.
- Furthermore, science can stand for a specific social system analogue to a system of politics, economics or that of law education, etc.
- Another understanding is to view science as a specific kind of culture, which is then again divided into subcultures.
- Besides that, science can be also be seen as a social power of production.
- Last but not least it may stand for a certain lifestyle, if scientists define themselves and their lives by devoting themselves to their respective sciences.

It is of utmost importance to state that all these understandings include very specific morality and ethics.

Where classical antiquity was rather sequestered and only open to a few select individuals as well as topics, its modern counterpart is a global phenomenon and encompasses nearly everything (scientification) and everyone. You can only understand the necessity and possibilities of scientific ethics as an applied science if you clarify the research questions of the various sciences. At the same time, it is obligatory to give an impression of its identity. Which are those substantial fields that make up said identity?

Although scientific ethics is interested in practical problems, it has the additional task to engage in the so called “Metaethics”, which is a thought- provoking area of the ethics of science.

## METAETHICAL ASPECTS

The subject of Metaethics are ethical theories, it is not characterized by any ambition to humanize the concrete moral practises and behaviours. It tries to analyse the fundamentals of ethical theories and, because of this, is one of the basic research methods of ethics. The object is morality and the Metaethics' subject is ethics. Important questions are: What is the shape and structure of ethical declarations and theories? What is the limit of Metaethics and logic (deontic logic)? What are the particular relations and correlations between ethics, logic and language? Can you define a specific moral language? What is morality? What are marks of moral doing? What is characteristic for moral thinking?

Metaethics analyses itself. It focuses on self-understanding and discusses methods and principals (Pieper). The conclusion is: Metaethics is guided by a strong theoretical impulse and is of fundamental importance for scientific ethics. Although she will be an applied science. It is known that an applied science borrows from other approaches, but metaethical aspects are absolutely necessary, for otherwise the applied science would be unable to find its identity. There is a set of dual approaches that this ethic follows, a quite popular normative as well as a descriptive approach, whereby the normative one always had, and still has, more followers. It raises questions such as: What are the principles of a good life and good practise? What are we ought to do? How will we (I) will live? A normative ethics strives to answer these difficult questions. The descriptive approach is based on an empirical touch in so far as it observes the given norms, values and rules with empirical eyes and methods. Those procedures don't idealize, abstain from evaluating their research object and formulate neither commands nor prohibitions. It is a kind of asceticism of worth.

Sometimes it is possible to discover a third approach, which may be called discursive. It is without specific demands and does by no means operate in a prescriptive direction. This approach asks in a Socratic way: How will we live as human beings? The answer is more than a purely theoretical one, it is aimed at the lifestyle in general. The preferred methods are hermeneutical, phenomenological, dialectic and empirical, if the goal is to describe certain rules. These, as well as all other methods, force the researchers to obey the moral standards the respective methods require. For if one manipulates dates or cheats, one distorts the research's truth, which is the most significant principle of scientific work. One would therefore ignore the values of good practise. Immorality is not compatible with responsible research. Morality and ethics are not all-encompassing, but serious science is nothing without them.

## SCIENTIFIC ETHICS AS A PROFESSIONAL ETHICS

Scientific ethics is of utmost relevance when it comes to developing professional ethics of scientific doing. The ethos of a scientist is a specific codex which contains a bundle of moral ways of behaviour. Every profession, not only scientific ones, requires such an ethos, which stresses the moral ethics behaviour. It signifies the irreplaceable moral dimension inherent in all professions, in which academic professions have a special position. When contemplating the overall scientific work, it is astonishing to see that an elaborate and explicit definition of its ethics came into existence mere decades ago, which marks it as scarcely older than the beginning of a general scientific ethics. In the middle of the last century the sociologist Robert Merton suggested some principals of scientific work, albeit without creating an explicit concept of scientific ethics. He emphasised the following:

“Universalism”, “Organized Scepticism”, “Disinterestedness” and “Communalism”.

## **WEBER'S CONCEPT AS A MODEL FOR A PROFESSIONAL ETHICS OF SCIENTISTS**

At any rate you shouldn't forget a certain lecture which was given by a famous German sociologist, economist and jurist, Max Weber, entitled "About the inward profession of science" (translation from E.M.). His argumentation is now even more relevant than it was 100 years ago (1919), because Weber had characterized nearly all decisive virtues and capabilities of a scientist.

In addition to that he showed that this intellectual doing is connected with emotions. For instance, passion is one of the most important emotions. "Only that is worthwhile for a person as a human being what he can do by passion" (translation E.M.). Aristotle would have enjoyed this train of thought. Although Weber didn't mention the topic Ethic of Science directly, it is more or less an implicit type of ethics.

What makes this so fascinating from our modern point of view is the fact that he did not only give a short insight in the moral dimensions of researching, but also elaborated on morality in the teaching of sciences. One of his demands on the scientist who simultaneously teaches: Do not try to persuade or influence the students, who themselves must find the best arguments. Help them that so they are able to find their own ways. Offer the approaches and argumentations, but do not force them to imitate your opinion as a teacher.

You can read Weber's concept as a model for the scientific profession of ethics. All in all, Weber has claimed the most guiding virtues of scientific working. By the way, scientific uprightness seems to be so relevant, that almost each article that deals with professional ethic used this virtue without quoting Weber (compare DFG 2019 as an example). That means his concept is often of a hidden effectiveness. Should not the mere existence of this fact be reason enough to establish the area of "Historical Aspects of Scientific Ethics"? I am sure that these and other contents would enrich the discipline of scientific ethics. Present and future are not without past.

## **HISTORICAL ASPECTS**

The discussion about Weber's construction elucidates that a retro perspective can be a systematic advance. On the other hand, you can by no means ignore that much scientific knowledge is a novelty at the time that it is stipulated. At least two reasons cause this effect: On the one hand the modern sciences are open to the whole world and tend to research nearly everything, while on the other hand they serve society and nature. This partial character of scientific fields changes our society into that of a service orientated society.

The relatively young area of scientific ethics as a scientific sub-field arose as an applied and specialized form. It is as much a witness as it is a part of the boom of applied ethics that started at the end of the last century. Typical for all these specialized ethics are the

influences of external circumstances, generated by social and natural events. Several of them are contingent influences, which means that they are not necessary but possible. The current pandemic is an excellent example for such a contingent event. Different external influences are one source for the continuous dynamics of nearly all sciences, which also include the specialized ethics.

## **INSTITUTIONAL ETHICS**

As we know ethic intends to give orientation in a dual sense. For an individual scientist but for a collective, a group or an institution as well. That is why you have to separate the individual moral from an institutional one. This difference enlarges the field and content of an ethic of sciences. The traditional and current ethics were focussed mainly on individual moral, but there has been a trend to pay attention to research institutions as a whole for some decades.

This could be another sub-area of an ethic of science.

An example would be: Universities and high schools are significant institutions and organisations in the world of science, which therefore means that they are the main address of most institutional moral-ethics. The existence of ethic commissions in said universities signalize that there are organisations that are tasked with evaluating ethic ramifications of scientific work, which in turn shows a substantial relevance of the ethical dimension of scientific doing. The specific task of those commissions is the evaluation of planned researching projects, measured on ethical standards like the highest freedom, dignity, truth and responsibility. For example, freedom is the condition that enables the acceptance of responsibility. If you cannot choose between moral alternatives you are unable to act in a responsible manner. Expressed pointedly: The main moral values and standards between an individual and institutions are equal. Neither an individual researcher, nor an organisation can neglect freedom, which is a criterion that cannot be out bidden. As freedom and all the other standards can be abused, an ethic of science has the chance to prevent this. In a certain sense it is therefore an ethic of prevention.

However, it may be that the values and standards of the ethic of science do not distinguish between an individual moral and an institutional one. In these instances, the application of said morals is what makes a difference. This field stands for at least two unalterable comparisons. One possibility is driven by the aim to compare the various approaches in scientific ethics as well as its subjects on an international level. Simplified: In consideration of the Portuguese science for example, you can ask for the current development of the applied ethics, respectively scientific ethics. Is that an explicit scientific branch of interest? Perhaps even of great relevance? Can one find investigations which deal with this subject - and of course: In which ways? Based on the assumption that there

are special obligations and debates, you can compare this with concepts used in other cultures of science etc.

Secondly you have to understand this comparison as a result between the relations within different applied ethics. Eventually you compare scientific ethics with an ethic of politics, economics, rights etc.

Currently, and for a longer time, the ethics of technology and ecology, as well as bioethics and animal ethics have been attracting attention. Let me explain it by analysing the ethics of technology. The changes in subjects and details are of an unbelievable rapidity and inevitably generate a vast amount of new knowledge, which is one reason for this development, which is indisputably within the area of an ethics of technology. By the way, Weber was guiding when he said (1919) that "only a rigid specialization of scientific work will push science forward and make scientists feel like they have achieved something that could very well be everlasting". He noted that "a real scientific and excellent achievement, is nowadays always a specialised achievement" (Weber, 311).

Independently from Weber it is necessary to state that the ethics of technological doings reflect on the conditions, purposes and consequences of the production based on the use of said technology. Due to the optimistic attitude towards technology, which arose because technological products make life easier, ethical problems had been underestimated. Technology was connected to a progressive promise. However, since the damage dealt to nature during and after the industrialization increased over time, and the prospect of its inevitable destruction became widely known, the understanding that progress at first sight could mean a regress at second sight developed.

The necessity of moral and ethical standards could not be suppressed any longer. That was the beginning of a modern ethics of technology. During the 1970's serious investigations of technological works and technicians came into being, and that concrete, crucial moral attitude as well. The construction of an ethics of responsibility was, and still is, the most popular answer to such damages and will be handled like a remedy that can heal moral deficits. The German philosopher Hans Jonas was one of the first who devised a substantial ethics of technology and science in his bestseller "Principle of Responsibility" (dt. Prinzip der Verantwortung, 1979, 20172). Henceforth Jonas inspired many efforts, not only within the field of ethics of technology, but also pertaining to all of the applied ethics. His concept is of general importance.

Meanwhile you can observe a lot of subdivided, specialized approaches in the field of technology ethics. Examples for these are ethics of information, machines and robots, as well as an ethics of digitality and an ethics of the internet. This reality of inventions influences and changes human behaviour, which generates ethical questions in turn. One consequence of this development lies in its ambivalence. The assessment of possible results for human living is a standard ethical task and claim. The overlapping origin questions is: Can scientists

and researchers simply do what is within their possibilities and what they feel like doing without regard for its ethical ramifications? Research is not a limitless area. All kinds of ethical approaches mean to draw boundaries based on ethical criteria. Will machines create their own form of morality? The Artificial Intelligence nourishes this hope and vision. To summarize: New inventions stimulate the necessities and possibilities of an ethics of technology and science. The connection between the ethics of science and ethics of technology is evident. So, I do not want to stop without mentioning one more aspect, which is that it could be a revealing procedure to compare special ethics with one another.

For example, it would be very informative to turn to the ethics of pedagogy and demonstrate that pedagogical ethics is required for an ethic of science, because scientists in this field are tasked with the double function (employed at universities and other institutes of higher education) of researching and teaching. They have to teach contents of manifold sciences. They assume the role of a teacher who must act according to specific principles, norms and rules. That means it is quite plausible and not at all unweighty to define teaching ethics as an independent field within scientific ethics where scientific education, moral education and the didactics of science are prevalent topics. Weber knew of this connection and was the first who indicated this problem. He was the one who linked his version of a scientific and professional ethics with statements about the task of teaching. About 100 years later there are voices which demand that university students should be obliged to study the scientific ethics (Kämpgen, 2019) as a special subject.

Indeed, that would be progress!

Besides, it is an important fact that scientific ethics has the chance to unify the colourful reality of different sciences and scientist by making them adhere to the same values, virtues, moral duties and demands. Therefore, scientific ethics contributes towards its identity and stabilizes the scientific work by serving as a crucial counterpart to different sorts of abuse. These may encompass manipulation, cheating, plagiarism and lying. The ethics have to protect the truth, which is inseparably connected to science, functioning as its highest good.

### **A CONTEMPORARY CHALLENGE**

Since pre-modern times, since Plato and Aristotle, science has been firmly connected to truth and truthfulness. That is an irrevocable and fundamental fact that every scientist is obliged to acknowledge and adhere to. However, in current times one may notice that there is an increase in enemies to truth and science. Careful thinkers and journalists are aware of this danger and will recognize a "new age" called "post-truth". So James Ball who entitled his very erudite book "Post-truth. How Bullshit Conquered the World" (London 2017). In his opinion bullshit is the opposite of truth. He stated that "...a Bullshitter

will say what works to get the outcome they want, and care little whether it's true or not" (6). Ball does not concede that he is influenced by the well-known Princeton philosopher H. Frankfurt, who published a book "On Bullshit" (Princeton 2005). Moreover, Ball refers to a more recent "Bullshit culture", which he compares to a pandemic.

He tries to show ways on how to stop this trend. For him, Trump is a Bullshitter par excellence. His "rethorical clusterbombs of nonsense facts" (18) and the Washington Post's "fact-checking blog" are "truly absurd". which underlines this statement. Ball's conclusion is that this typical behaviour is "Americas version of the post-truth" (42). Trump's political style "needs enemies" – and besides journalists, scientists have to suffer from his unfounded accusations.

A climate of post-truth has spread all over the world (Brexit) with thousands who deny the necessity and even existence of sciences. All the more reason for scientists to accept truth as an unalienable good, which is scientific work inborn and which in turn guarantees its success as well as progress for human life. But as we know, the use and applications of scientific knowledge can be ambiguous at best.

In the current times of a global pandemic, the importance and power of the sciences as a whole can be seen in their fight for human life and their survival against fanatic and ignorant despisers. All interested laymen can have the experience that science can create helpful knowledge. Scientific work is a permanent learning process, induced by meeting moral demands without being influenced by any form of external pressure. No politicians or other groups can examine the falsification or verification of truth in scientific research, only the organized scientific community is able to do so.

They can see that politicians appreciate scientists as advisers, but one has to keep in mind that said scientists make their knowledge available to politicians without deciding about the eventual use of their work. The politicians' task is to decide. The system of politics and the system of science need each other, because they both care for public health and try to further that cause in different ways. Special sciences invent sophisticated medication and politicians will decide by consensus (Mohr 1992) about the distribution of the medicine. The truth is: Science does not tell us how we have to act, it can only give us certain recommendations at best.

The pandemic is a very illustrative didactic play, reflecting on the relationship between scientists (the system of science) and politicians (system of politics), and therefore between scientific and political responsibility. At the same time, it is a well-founded argument for the necessity and possibility of an ethic of science. Bullshitters and deniers are unable to solve social, ecological or pandemic problems which endanger mankind and other living beings on a global scale. Strictly speaking: You can and must observe an ironic situation. The bullshitters and companions will try to vilify and defame scientific research by truthful scientists as well as their respective morality and ethics.

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