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Nathanaël Wallenhorst, Christoph Wulf

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Section II

Epistemology, Sciences and Humanities

Nathanaël Wallenhorst and Christoph Wulf

The concept ‘Anthropocene’ marks the emergence of a new epoch, with new conceptions of nature, the world and humanity. In this process an important role is played by an expanding spectrum of different scientific disciplines. What are the basic suppositions of these sciences and how do they acquire their knowledge? What is it that creates certainties and convictions? How do existing insights gain new connections and new interpretations? How does existing knowledge lead to new kinds of knowledge and how that knowledge is used? Radical changes are on the horizon. In this process, sciences and philosophy play a role in the creation of new self-conceptions of humanity.

In the 18th and 19th centuries, newly emerging sciences began to advance the development of society. This process accelerated in the 20th and 21st centuries and contributed to the continued evolution of the Anthropocene, where humans have a considerable influence on the fate of the planet. Now it is the natural sciences and technology that have taken the lead. The sciences have become central forces that determine the relationship of humans to the world. In this process, new forms of knowledge have arisen, leading to the new term ‘knowledge society’. As important as the sciences have become for our conceptions of the world and ourselves, their insights must not be allowed to obscure other characteristics of the globalized world, as created, for example, by neo-liberal capitalism.

The expansion of the sciences plays a central role in the Anthropocene. It has radically changed the living conditions of many people. At the same time these changes affect the type and quality of our knowledge. In all regions of the world,

N. Wallenhorst (✉)
Catholic University of the West, Angers, France
e-mail: nathanael.wallenhorst@uco.fr

C. Wulf
Freie Universität Berlin, Berlin, Germany
e-mail: christoph.wulf@fu-berlin.de

sciences play a role in both positive and negative developments in society (Wallenhorst, 2021; Wulf, 2022; Wallenhorst & Wulf, 2022). In research into these, the various paradigms, questions, methods, and techniques are of considerable importance. This is particularly true of the sciences that have led to the emergence of global technologies, industries and companies.

Can binding criteria be specified that can be used to determine what is considered scientific? Or does the historical and cultural nature of scientific research make us question the validity of scientific criteria? In view of the two tendencies, on the one hand the dynamics of globalization which tend to homogenize the world in the Anthropocene and on the other, the tendency to emphasize its diversity, the question of what can be considered scientific is of central importance, even if it cannot always be answered clearly. Even where the sciences produce coherent, justifiable knowledge that is open to critical argument, the general criteria for scientific knowledge are often culturally different (Michaels & Wulf, 2020).

Natural Sciences – Social Sciences – Humanities

What do we understand by ‘sciences’ in view of this situation? There is no simple answer. In the English language, within scientific research a distinction is made between Natural Sciences and Humanities (cf. Snow, 1963). This distinction also plays an important role in epistemological discussion in Germany. There is however a major difference, in that in Germany both the humanities and the natural sciences are traditionally regarded as sciences. Although they have different roles and differ in terms of content and method, both are recognized in society as sciences.

The social sciences have a place in between the natural sciences and the humanities. According to a common differentiation, the natural sciences have the task of describing and explaining the world. It is demanded that science should be ‘naturalistic’, that is, that it should only deal with what is evident and measurable. That this understanding of science is too narrow and therefore often harmful is clear. This has led to the numerous unwanted negative effects of positivist knowledge. In the natural and technical sciences that predominate today there is a distinction between Dilthey’s ‘spiritual sciences’ (*Geisteswissenschaften*) and humanities in that they attempt to understand the meaning of life. The focus is on hermeneutics, which dates back to Friedrich Schleiermacher and his efforts to understand and interpret meaning (Schleiermacher, 1977). Dilthey sees hermeneutics as an “empirical science of mental phenomena” or as a “science of the spiritual world” (Dilthey, 1988, 2008; Gadamer, 2002; Ricoeur, 1973).

Ensuing from extensive epistemological debates there is agreement that it is not possible to uphold the idea of there being a clear distinction between natural sciences, social sciences and spiritual sciences or humanities. Instead of emphasising the difference between natural and spiritual sciences it is more fruitful to attempt to relate the different paradigms to each other so that they complement each other. There is a consensus that both forms of research are important. But sometimes the

representatives of the quantitative paradigm insist that only they provide “true scientific” results. This is certainly true, although recently a comprehensive study on the reproducibility of 200 research findings in psychology published in *Science* demonstrated that the reproducibility of the findings could only be proved in one third of the studies (Ioannidis, 2005; Staddon, 2017). Since the representatives of the quantitative research paradigm insist that reproducibility guarantees the scientific character of the research findings, they now have a problem. According to the study, the reproducibility of the research results is limited. There must at least be an acknowledgement of historical and cultural differences. The rigid representatives of the quantitative paradigm in the social sciences only accept that qualitative research contributes to the development of hypotheses, which can then only be verified or shown to be scientifically false by using quantitative methods. According to Popper’s Critical Rationalism, research produces scientific results if it uses one specific and normative research method (Popper, 2002). The application of this research method to different subjects assures the scientific character of the research findings.

Science and Methodology

If we understand methods as being paths to knowledge (from the Greek *methodos*), then scientific knowledge in the Anthropocene is acquired via many different paths. Windelband’s differentiation between ‘nomothetic’ natural sciences and ‘ideographic’ humanities is still relevant today (Windelband, 1924). In contrast to this, in the English-speaking world the Vienna Circle’s idea of ‘Unified Science’ dominates. According to this, scientific knowledge should comply with certain features that concern the intersubjective validity of scientific knowledge and that are binding for all scientific methods. In his “Logic of Scientific Discovery”, Karl Popper disputes such a dogmatic view, using his Falsification Principle to demonstrate that there is no scientific method that has succeeded in achieving knowledge that is valid once and for all (Popper, 2002). As a rule, methods and the knowledge acquired by means of them are only valid as long as they cannot be proved false. Therefore, in Popper’s Critical Rationalism, ‘medium-scope theories’ are valid only if they cannot be falsified. Paul Feyerabend was critical of this, seeing methodological pluralism as “anything goes” (Lakatos, 1977).

The positivism dispute (Adorno et al., 1976) highlighted the complexity of methodological questions and the contradictory nature of the different positions in scientific theory. The Frankfurt School emphasized that it is not enough to limit scientific methods to ‘medium-scope methods. The claim that following a universally accepted method ensures that the research and its results will be ‘scientific’ is not acceptable. Science also involves far-reaching theories which must be examined based on whether they are plausible and appropriate. Because of the complexity of the conditions, empirical falsification is often not possible. Wittgenstein too, in his later work, distances himself from the monism of Critical Rationalism with its demand for falsifiability. He demands diversity of methods and points out the

limitations of scientific insights that are expressed in words. In view of this situation, there is still a certain tension in the humanities and social sciences today between methods that are becoming increasingly formalized and methods that are more flexible or open. It is therefore useful to see the natural sciences, social sciences, and the humanities as a *unitas multiplex* within which there are differences and similarities.

Paradigms of Research

Research in the individual scientific disciplines continues to play a central role in research on the Anthropocene. In addition, the scientific landscape has been enriched by the emergence of new developments. These involve new questions and goals as well as new methods and structures. The great challenges facing science today include questions of inter-, multi-, and trans-disciplinarity and issues of multiculturalism connected with the developments on the planet. These issues are of particular importance in the context of network research (Latour, 1999, 2018), in which there is collaboration between numerous projects and different scientific paradigms (Kuhn, 1972; Wulf, 2003). Here, an attempt is made to overcome the limitations of research in a single discipline through interdisciplinary and international collaboration, thereby creating new forms of complex knowledge.

The humanities make a major contribution to integrating scientific knowledge into people's life contexts. In addition, we see how important the knowledge generated by the humanities is, so that people can live together despite their differences and the difficulties resulting from these. Knowledge of the humanities is required, for example, to deal constructively with violence, alterity, and sustainability. To meet the demands of the Anthropocene, there is a need for both extensive knowledge in the natural sciences and social sciences as well as the development of appropriate action and behaviour. Knowledge from the fields of the humanities and social sciences contributes significantly to the acquisition of the necessary knowledge and skills. What is important is their contribution to the transmission and evolution of culture and cultural identity and to coping with alterity.

The growth of scientific knowledge has required it to be structured in clear, transparent forms. This increases the importance of the individual scientific disciplines. Working methods are being developed which will cause lasting changes in individual disciplines. Interdisciplinary and transdisciplinary research transcends boundaries. The consideration of the "difference" of the other disciplines is a constitutive element of transdisciplinary research. This enables new themes, concepts, and methods to be developed that change and call into question established knowledge and research in the individual scientific fields. This results in increased diversity and greater complexity: the more radical the selection of subjects and methodological processes, the less predictable the results of the research.

Networking with researchers from other countries and cultures can create new forms of sustainable knowledge in the natural and social sciences and in the humanities. By focusing on scientific knowledge and relating this knowledge to existing historical, ethnographic, and aesthetic knowledge, the humanities, for example, contribute to a better understanding of the meaning of the results of scientific research. The high regard for the sciences and the interpretation of their meaning through the humanities often leads to the devaluation of other forms of cultural and social knowledge, which are of central importance for living together in society. These forms of knowledge include, for example, practical knowledge, body knowledge and aesthetic knowledge, knowledge of wisdom and other forms of tacit knowledge (Wulf & Baitello, 2018; Kraus et al., 2021; Kraus & Wulf, 2022).

Many of the issues are so complex that they cannot be explored in sufficient depth using the approaches of one single discipline. Inter- and transdisciplinary research helps to enhance the multi-dimensionality of the subjects of study, the methodological approach, and the investigation itself. In many cases, the different skills of various scientific fields can be combined to achieve the desired increase in complexity. The plurality of the scientific paradigms under consideration results in complex research that extends beyond the scope of single disciplines. Democratic societies need the humanities and their forms of knowledge to sustain people, to help them orient themselves in an increasingly complex world.

Diversity: Inter- and Transculturality

If the specialist disciplines and scientific paradigms are supplemented by viewpoints from other cultures, and if the research thereby becomes inter-, or transcultural in nature, everything becomes increasingly complex (Gil & Wulf, 2015). In view of humanity's shared responsibility for the future of the planet there is a need for research that develops diverging cultural perspectives on global processes. In this research, an important role is played by differences and how they are dealt with. It is not possible to have intercultural and transcultural research projects if cultural differences are not processed. 'Difference' acquires particular importance in the UNESCO convention for the protection of cultural diversity, which envisages cultural difference as a universal human right (UNESCO, 2005).

The global change we are experiencing today is a multidimensional process with economic, political, social, and cultural consequences. Something that is very important is our encounter with what is foreign to us and our recognition of how experiences of what is foreign are determined by our own cultural situation. Today there is a danger that people increasingly only encounter themselves on the planet.

In this process, it is above all these aspects of western culture that adversely affect our experience of what is foreign and of alterity: (1) a pronounced subjectivism, and (2) extreme rationalism, and (3) an excessive ethnocentrism (Wulf, 2016).

In our encounter with nature, with other people and their cultures and in much anthropological research, foreignness and alterity have played an important role. Mimetic and hermeneutic approaches help us to understand these concepts. They are particularly difficult in cases of hybrid cultural phenomena. The concept of hybridity is used to determine cultural contacts, not only in a dualistic and essentialist way but also to show that through these contacts, new transcultural identities can emerge with the help of a “*third space*” (Bhabha, 2004). This third space is liminal; it is a space of in-between-ness. In this liminal space, spaces are bypassed and restructured, and hierarchies and power relations are changed. It is crucial to know to what extent these processes and their results are determined by performative practices and in what way new transcultural hybrid forms are born in them. These forms are mixed forms in which elements from different systems and contexts change their character in a mimetic process and give rise to new, partly transcultural identities.

Amazement, radical questioning, philosophical criticism, and self-criticism play a key role when researching these increasingly important processes. These forms of philosophical reasoning cannot be adequately described as methods. They cannot be formalized, and their significance can only be gauged when they are used to examine phenomena, events, actions, and problems. Depending on their context, these types of philosophical reflection result in differing views and insights as well as an increase in the complexity of research. They help to ensure that we continue to regard the fundamental questions concerning the human condition as unanswered and to realize that there can be no definitive concept of human beings and the Anthropocene (Kammer & Wulf, 1989, 1994).

Sustainability as a Challenge

In research on the Anthropocene, sustainability, and the Sustainable Development Goals in particular play an important role. The issue of sustainability leads to the introduction of new subjects for research, new research areas and methods. In addition, there are also new ways of structuring transdisciplinary and transcultural research, and also there is a re-evaluation of the outcomes of existing research. For this to happen, there is a need for an investment of financial and personal resources. The focus on sustainability, that influences many areas of human knowledge and that is closely linked with peace and the reduction of violence, must not be allowed to place restrictions on scientific freedom. This is ensured by the fact that the initiation of large parts of this research came from science itself, as did its normative focus and subject matter.

Although these research projects and institutions can be inspired and promoted from outside the sciences, they must be independent of these outside interests and must follow scientific criteria and standards. It is only through this that the creativity and productivity of scientific research can be guaranteed, although the insights that may emerge and the impact of the work cannot always be envisaged beforehand.

It is also important to examine what is meant by sustainability. This is particularly important in those contexts where the goal is a reduction in violence towards nature and other people. What does the term sustainability encompass? Currently there is much to be said for a broad use of the term. Then the aim could be to re-interpret familiar issues in light of the contribution they make to furthering sustainability.

Regardless of their foundations, intentions, form or content, research projects contain a comparative element. Implicit or explicit comparison plays a particularly important role in interdisciplinary or intercultural studies (Dreher & Stegmaier, 2007). If you want to find out something about a subject you contact someone else and establish what is identical, different or similar and where there are deviations. To compare something, you have to see the similarities. In science, this process must undergo methodological control, to ensure that criteria of objectivity, reliability and validity are met. The key objective in the comparison is to find a *tertium quid* that is equidistant from the two positions compared and permits a ‘fusion of horizons’ (Gadamer). This can only be achieved by mimetic assimilation (Detienne, 2009). Here, historical, and comparative cultural aspects are important (Wulf, 2013; Wulf et al., 2011). These studies throw up many new epistemological questions to be addressed in the Anthropocene.

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Nathanaël Wallenhorst is Professor at the Catholic University of the West (UCO). He is Doctor of Educational Sciences and Doktor der Philosophie (first international co-supervision PhD), and Doctor of Environmental Sciences and Doctor in Political Science (second international co-supervision PhD). He is the author of twenty books on politics, education, and anthropology in the Anthropocene. Books (selection): *The Anthropocene decoded for humans* (Le Pommier, 2019, in French). *Education in the Anthropocene* (ed. with Pierron, Le Bord de l'eau 2019, in French). *The Truth about the Anthropocene* (Le Pommier, 2020, in French). *Mutation. The human adventure is just beginning* (Le Pommier, 2021, in French). *Who will save the planet?* (Actes Sud, 2022, in French). *Vortex. Facing the Anthropocene* (with Testot, Payot, 2023, in French). *Political education in the Anthropocene* (ed. with Hétier, Pierron and Wulf, Springer, 2023, in English). *A critical theory for the Anthropocene* (Springer, 2023, in English).

Christoph Wulf is Professor of Anthropology and Education and a member of the Interdisciplinary Centre for Historical Anthropology, the Collaborative Research Centre (SFB, 1999–2012) “Cultures of Performance,” the Cluster of Excellence (2007–2012) “Languages of Emotion,” and the Graduate School “InterArts” (2006–2015) at the Freie Universität Berlin. His books have been translated into 20 languages. For his research in anthropology and anthropology of education, he received the title “*professor honoris causa*” from the University of Bucharest. He is Vice-President of the German Commission for UNESCO. *Major research areas*: historical and cultural anthropology, educational anthropology, imagination, intercultural communication, mimesis, aesthetics, epistemology, Anthropocene. Research stays and invited professorships have included the following locations, among others: Stanford, Tokyo, Kyoto, Beijing, Shanghai, Mysore, Delhi, Paris, Lille, Modena, Amsterdam, Stockholm, Copenhagen, London, Vienna, Rome, Lisbon, Basel, Saint Petersburg, Moscow, Kazan, Sao Paulo.

Part V
The Anthropocene as an Interpretative
Framework