

18 Theses on Art and Science

Text: [Peter Tepe](#) | Section: [On 'Art and Science'](#)

Abstract: Peter Tepe uses the brochure RESISTANCE COGNITION [WIDERSTAND ERKENNTNIS] to express theoretical thoughts on the topic of Art and Science. Both the arts and the sciences reach creative achievements which involve overcoming different kinds of resistance. The empirical sciences (the focus of the text) primarily solve cognitive problems: Aspects of reality are described and, by means of theoretical constructions, explained. The arts, on the other hand, primarily deal with problems of artistic creation within the context of art programmes based on specific values.

To mark its 15th anniversary, the Schering Foundation has published the brochure titled [RESISTANCE COGNITION. Discussions with personalities from science and art](#) [WIDERSTAND ERKENNTNIS. Gespräche mit Persönlichkeiten aus Wissenschaft und Kunst]. Several texts emphasise that in science as well as in art, the realisation of something new involves overcoming resistance. This is certainly true. My intervention will first of all propose further differentiation when thinking about creativity in the sciences, the arts and other areas of life; more theses will be added later. Other aspects mentioned in the brochure worth reading are left out here.

Introductory quotes

The biophysicist Ilme Schlichting writes:

“[One] challenge within the scientific field is to pursue one’s own research interests without being misled by others [...]. Too many thoughts about the future or one’s retirement can have a paralysing effect. In any case, one only realises in hindsight whether a decision was right or wrong. I encounter an extremely delightful form of resistance in my research topics, to which I develop a personal relationship.” (8)

Nobel Laureate Christiane Nüsslein-Volhard expresses a similar opinion:

“In my experience, it is indispensable in both science and art to believe in one’s own concept and to enforce it against any resistance. This may be risky, but worth it if you have a new, original and forward-looking idea. Creativity, a combination of productivity and originality, is not very common in science; many researchers tend to rely on the mainstream, which is safer. [...] Most of them base their projects on career considerations, meaning they do what is expected of them and choose the path of least resistance. This is an attitude that seldom results in anything truly new.” (14)

Neuroscientist Ivana Nikić-Spiegel answers the question

“What do you think constitutes an outstanding scientist?”: “Thirst for knowledge, a sceptical mind and infinite patience, which one has to show for the sometimes extremely tenacious processes in the laboratory. What outsiders don’t suspect: Scientists require a lot of

perseverance and diligence, as experiments are often frustrating and gruelling at first.” (18)

A central category in the writings of the science-historian Hans-Jörg Rheinberger is “the resistance of the material – something which both artists and researchers struggle with alike” (28). Artistic and scientific practice

“are both experimental fields that require breaking new ground and initiating things that have never been done before. In the studio as well as in the laboratory, you work your way through the material, ideally encountering connections and phenomena that you would never have dreamed of. Presuppositions are shattered, and one experiences something fundamentally new.” (28)

The artist Hiwa K writes:

“The work becomes interesting to me at the point where the material causes me difficulties and offers resistance; when something is stuck inside that has to be lured out. Then I must do everything it requires of me and, like an obstetrician, bring to light what was not visible before.” (16)

Proposals for differentiation

My first suggestions relate to the sciences. The scientists quoted are active in disciplines which commit to principles of empirical-rational thought — the empirical sciences. They are dealing with aspects of reality of any kind; I exclude logic and mathematics in this context.

Thesis 1: Principles of empirical-rational thought can be applied in all disciplines that deal with aspects of reality, e.g. also in the humanities. However, not all scientific disciplines follow these principles. Furthermore, only some of these disciplines — not all — operate in a laboratory.

Thesis 2: The basic form for great innovation of an empirical science begins with the development of a new theory on a specific aspect of reality. This new theory, according to cognitive criteria, is superior to the pre-existing theories with which it competes. Such a theory has, for example, a higher degree of explanatory power than the other theories, as well as better consistency with the established facts.

Thesis 3: In order to build an innovative theory of this kind, the psychological belief “in one’s own concept” and the will to “enforce it against any resistance” is necessary. One must “pursue one’s own research interests without being misled by others”. Renewers of this kind are “not very common in science; many researchers tend to rely on the mainstream” i.e. on the work based on already established theories. Anyone who strives to implement a truly innovative approach undoubtedly has more resistance to overcome than someone who aims for smaller advances in knowledge within the framework of an established theory, which of course is also important. To “break new ground and initiate things that have never been done before” requires a certain attitude that is relatively rare. In the case of success “presuppositions are shattered, and one experiences something fundamentally new”.

On the other hand, it must also be considered that not everyone who believes in their own concept and has the will to enforce it against any resistance pursues a theoretical programme whose realisation actually leads to empirical-rational advances in knowledge. It can also be a research dead-end, or an approach that is inferior to the present one. Not all thoughts pursued with great commitment are original and forward-looking.

“Thirst for knowledge, a sceptical mind and infinite patience” are often also prevalent among those who work within the framework of already established theories. A certain “resistance of the material” with which the researcher struggles can be found in all of these forms. Now I turn to art.

Thesis 4: The basic form for innovation in art is not the development of a new theory about a specific aspect of reality that is superior, in terms of cognitive criteria, to the pre-existing theories with which it competes. In art, the basic form for great innovation is rather the development of a new art programme,

opening up many possibilities for implementation and deviating significantly from pre-existing programmes. By an art programme I mean general art goals of a certain kind, which enable a variety of realisations in individual works or projects; these goals do not have to be formulated explicitly; they can also be implicitly effective. The concept of progress is not applicable here, or only in special cases requiring particular analysis.

Thesis 5: In order to establish an innovative art programme, the psychological belief “in one’s own concept” and the will to “enforce it against any resistance” is also necessary. One must pursue their own artistic interests “without allowing oneself to be led astray by others”. Renewers of this kind are not to be found on every corner of the art world either, but they probably appear somewhat more frequently here than in the academic world. Most artists likewise “tend to rely on the mainstream”, i.e. on work within the framework of already established art programmes, which can lead to important innovations on a smaller scale. To “break new ground and initiate things that have never been done before” requires a certain attitude in art that is relatively rare.

On the other hand, however, also here one must take into account that not everyone who believes in their own artistic concept and has the will to pursue it against resistance follows an art programme that is actually innovative. Not every art project pursued with great commitment is original and forward-looking. Such a commitment can also be found among those who carry out their work within the framework of already established art programmes. A certain “resistance of the material” which artists struggle with must be overcome in all these forms. For many (but not all) artists, the following applies: “The work only becomes interesting to me then, when the material causes me difficulties and offers resistance”.

Cognitive and value-based innovations

In the next step, I put the discussion about creativity and innovation into a larger context:

Thesis 6: Creative individuals who promote new ideas and try to enforce them against great resistance do not only appear in the sciences and arts but, ultimately, in all areas of life: Craft, industry, ideology, politics, gender relations, sport, etc. The following applies to all: in a particular area, a particular regulation is established to solve particular problems; this has proven worthwhile — at least for some time — and its application has become implicit for many who are active in that area. Now, if an attempt is made to replace the old regulation with a new one, it is to be expected that its implementation will only succeed if we are prepared to engage with overcoming many obstacles. With some modifications, the formulated theses can, therefore, be transferred to other areas of life which I will not go into at this point. Creativity is not exclusive to the arts and sciences.

Thesis 7: A distinction must be made between innovations in solving cognitive — and their sometimes related technical — problems, and innovations whose primary aim is to enforce certain values. The development of a new political programme is driven by a related set of values which determine what is most important in this dimension — contrary to what was previously thought. Accordingly, the development of a new art programme is driven by a certain set of values which determine what is most important in art practice — contrary to what was previously thought. This difference must be observed on a theoretical level: Whilst the various creative processes do reveal some common elements and structures, there are also important differences specific to each area.

About art and science

In the next step, I focus on the relationship between art and science and consider how general statements about this relationship can be made. In art generally, and in the visual arts in particular, various different art programmes have been and are still being pursued; cf. thesis 4. Artists working expressionistically, for example, pursue a different art programme to those working with a naturalistic approach.

Thesis 8: When making statements about art, it is a mistake to orient oneself to one specific art programme in an open or covert way, neglecting other art options. This mistake can be avoided by utilising a formal concept of art when defining the relationship between art and science in general terms. This means that art is always the realisation of a certain art programme that can be pursued at different degrees of awareness; the content of the different art programmes, i.e., the general art goals, vary.

The approach described in Thesis 8 can be applied to the sciences: although for the sake of simplicity I shall continue to restrict myself to the empirical sciences.

Thesis 9: Different science programmes have been and continue to be pursued in those disciplines with a claim to scientific knowledge of aspects of reality. By a science programme I mean general epistemological goals of a certain kind, which enable a variety of realisations in individual scientific projects; these goals do not have to be formulated explicitly; they can also be implicitly effective.

In the next step, I will make a differentiation in order to arrive at the most concise statements possible about the relationship between art and science.

Thesis 10: A distinction has to be made between two types of past and present scientific disciplines relating to aspects of reality. Whilst the first type is based on principles of empirical-rational thought, the second type is not, or only to a very limited extent: here, principles are used that are more or less in great conflict with those of empirical-rational thought.

According to Theses 8 and 9, it makes sense to first of all interpret the question surrounding the relationship between art and science in this way: What is the relationship between art (understood as the realisation of this or that art programme) and science (understood as the realisation of this or that science programme)? One can go down this path, but I do not consider it particularly productive, as the difference between the two types of scientific disciplines relating to aspects of reality, which are in

conflict with one another, is neglected. Therefore, the following path looks more promising.

Thesis 11: It is proposed to split the initial question on the relationship between art and science relating to aspects of reality into two questions. Question 1: How does art relate to those scientific disciplines that are based on principles of empirical-rational thought? Question 2: How does art relate to those scientific disciplines that are not or only to a limited extent based on principles of empirical-rational thought?

In this text, I will limit myself to the first question. Thesis 4 already includes a first response to this question, referring to the aspect of great innovation. Both art and empirical science reach creative achievements: while new art programmes are developed on the one hand, new theories on aspects of reality, representing empirical-rational advances in knowledge, are developed on the other.

On the relationship between art and empirical science

Thesis 12: The empirical sciences solve cognitive problems, epistemological problems of a certain kind: The examined aspects of reality are described as precisely as possible according to certain criteria (which are not further discussed here), and the findings are explained with help of theoretical constructions. An innovative empirical theory can better explain its respective aspect of reality according to certain criteria than the pre-existing theories with which it competes.

Thesis 13: The arts also reach cognitive achievements — to varying degrees — which cannot be determined in detail at this point. Here, however, we are primarily dealing with solving problems of artistic creation that are related to various art programmes which, themselves, are based on art-related values; cf. Thesis 7. Declaring a found object (*objet trouvé*) an art phenomenon can be seen as a borderline case in solving a problem of artistic creation.

Thesis 14: Thus, the basic difference between art and empirical science is that both areas primarily set out to solve different problems: where one focuses on problems of artistic creation, the other deals with cognitive problems of a descriptive-determinative, but above all theoretic-explanatory nature. However, this does not exclude the possibility that an arts practice can also encounter cognitive problems and an empirical scientific practice can also encounter problems of artistic creation; these interrelations require a separate analysis.

On the relationship between science-related art and empirical science

Finally, I will briefly address the relationship between science-related artists (i.e., artists who base their work on theories/methods/results of any scientific field) and the empirical sciences. Sentences from the conversation with Rheinberger, which refer to the exhibition *Eavesdropping Fish* [Fischen lauschen], serve as a starting point:

“The Swiss media artist Hannes Rickli had latched onto the primary data stream of biologists exploring marine life near Spitzbergen. In this way he was able to take scientific video and audio recordings out of their context and transform them into an artistic research object. With the help of this moment of alienation, he succeeded in eliciting impressive aesthetic effects and new insights from the material.” (28)

Thesis 15: Rickli draws on video and audio recordings made in a scientific context: he then uses this scientific material to solve certain problems of artistic creation within the framework of his art programme. He thus represents one variant of the science-related artist.

In principle, I am open to concepts of artistic research. When reading relevant texts, however, it has become apparent that the term is used in various contexts that are often not distinguished from one

another. Therefore, if no clarification is made, the question “What exactly do you understand by artistic research?” becomes relevant. Thesis 15 now makes it possible to grasp one of these meanings more precisely.

Thesis 16: The transfer of scientific video and audio recordings into a project of artistic research can be understood as the use of these recordings for a project of artistic creation supported by a particular art programme. Rickli thus succeeded in “eliciting impressive aesthetic effects from the material”.

But does Rickli also arrive at new knowledge? The answer depends on what exactly is meant by knowledge — also here, there is a need for conceptual clarification and a reference to the fact that many different things are referred to as knowledge.

Thesis 17: If one interprets the concept of cognition to be scientific thought of an empirical-rational

nature and its pre-forms in everyday life, then the following applies: The claim that a science-related project of artistic creation reaches new insights in the empirical-rational sense — insights which are directly relevant to the sciences dealing with such aspects of reality — requires examination in each individual case. Such a gaining of insights may be conceivable, but in many cases seems rather unlikely. The following constellation, however, is probably more likely: a science-related project of artistic creation dealing with certain phenomena can help a scientist who is also concerned with these phenomena to come to new ideas, the further pursuit of which then leads to an improved or even completely new theory. It would be worthwhile to examine more closely whether there are cases of this kind and, if so, what the individual effect of art is in encouraging the gain of new scientific knowledge. Furthermore, Rheinberger addresses another way in which science-related art benefits science: “It is important for science to create such points of contact. This opens up the gates to a universe that otherwise remains rather alien to laypersons.” (28)

Thesis 18: In some cases, science-related art provides the layperson, who may not be able to find direct access to a certain science, with a first access to a universe that seems strange to them.

This is one reasonable option amongst many others.

Picture above the text: Cover picture of the magazine: Resistance Cognition [Widerstand Erkenntnis].

Translated by Rebecca Grundmann.

Tags

1. Artistic Research
2. cooperation between artists and scientists
3. Empirical Science
4. Peter Tepe
5. science-related artist