

## Concept, Prerequisites and Goals

The DFG Centre for Advanced Studies “Imaginarium of Force” deals with a fundamental concept of both the theory of art and the description of nature. In doing so, it brings research from art history and various fields of literary studies that has hitherto been conducted separately into dialogue with philosophical and (natural) scientific concepts of force. The aim of gathering these fields together is to grapple with a topos of art theory that has been familiar since Plato, to examine it within a systematic comparison of the arts, and to interrogate its epistemic preconditions. The Centre for Advanced Studies thus promises to contribute basic research on a central model of reflection in the arts which has maintained an astonishing currency since antiquity. The added value of interdisciplinary research on concepts of force also lies in the way that artistic and cultural references to the forces of nature allow us to observe the historical processes of transfer and transformation between the natural sciences and the humanities in an exemplary fashion. The collaboration between representatives of the humanities and the natural sciences – as represented already by the group of applicants in the first funding phase – was not just concerned with what the natural sciences ‘knew’ about forces, but also with the procedures and models by which they generated, tested, and presented that knowledge. At issue here was what Rheinberger has called “the factual space of indeterminacy” that is situated even “at the heart of measuring science” (Rheinberger 2007, 23).

The category of ‘imaginaries’ accounts for the fluidity and mobility of the concept of ‘force’, which traverses and connects the most diverse cultural and epistemic fields. Situated between *imago* and the imagination, image and fantasy, the deliberately open-ended conceptual discourse of imaginaries aims at investigating the worlds of images and imagination in which concepts and theories of force take shape. In this sense, the project’s epistemological interest lies in modes of imagination and representation that range from efforts towards formalization and mathematization, graphic recording systems, models and simulations, all the way to images, metaphors and narratives. This analytical focus on the necessary mediality of forces, which only ever appear in their effects and only become comprehensible in their representations, characterizes the entire research context and motivates its twofold line of questioning. We aim to investigate not only how scientific descriptions of forces articulate models for reflections on culture and the arts, but also to scrutinize the visual and linguistic models upon which scientific concepts of force themselves are based.

Our inquiry is guided not so much by the concept of energy (more common today but also more closely related to physics) but rather primarily by the concept of actively operative *force*, which discussions in physics have largely left behind since the second half of the 19th century. The focus on ‘force’ hardly excludes adjacent terms like power, energy, intensity, and strength, since the semantics of forces can only be adequately understood through the historical dynamics of related conceptual structures. Yet without losing sight of the concept’s complex transformation into the concept of energy, the decision in favor of force is warranted above all by its disproportionately larger historical and disciplinary scope. As a translation of Greek *dynamis* and Latin *vis*, force has been both a guiding concept of the new natural sciences (oriented towards empiricism and mathematization) and of the reception of ancient poetics and rhetoric since the early modern period. The historical semantics of force open up a field in which discourses prove especially permeable and where the interferences between nature and

culture can be observed in an exemplary fashion. The movements of exchange between the cultural domains may also be so animated because forces, regardless of their disciplinary framing, are notoriously difficult phenomena to pin down. Forces traditionally mark an intermediate stage between inert material and 'ensoulment'; they possess a 'dark' striving capability of their own and do not merely identify a state of matter, as energy does. This character accounts for forces' affinity to the realm of art: on the side of production, they represent the dynamic *ingenium* of creative design; on the side of reception, they comprise the works' power of fascination. Unlike the concept of energy, which has largely been freed of its old metaphysical burdens, force is a borderline concept between physics and metaphysics.

### Problems and Results 2019–2023

The first funding phase was focused on developing the historical semantics and aesthetics of force. Here we not only had to work through an extraordinarily complex philosophical and scientific conceptual tradition, but also its manifold reception and reflection in the arts. The work was structured by the annual themes 'Nature', 'The Arts', 'Human Forces' and 'Culture' as fundamental domains of the modeling of forces. In the discussions of the first three years, which were always conducted in a dialogue of the disciplines and thus with a dual view to the history of science and the history of the arts, we could confirm and further differentiate some hypotheses, and also identify new questions.

Focusing on the (meta-)physics of force as well as on biological conceptualizations, the discussions in the first year addressed the booms and crises of the force concept in natural philosophy and the study of nature from antiquity to the 19th century. As was shown in the first semester (summer 2019) in collaboration with the fellows from philosophy and history of science, the philosophical and scientific approach to the causes and effects of forces in nature since ancient natural philosophy has been continually confronted with problems. To be sure, the question posed in the Aristotelian theory of impulsion of how to think of 'violent', 'unnatural' movements (*antiperistasis*) did receive a provisional answer in the late medieval theory of impetus, before finding its 'solution' in classical mechanics (*inertia*). However, Newton's mechanics itself generated a new uncertainty, particularly in confrontation with Descartes' physics, when contemporary critics took gravitational force (*vis attractiva*) to be a *vis occulta*. In the 19th century this led many to become skeptical whether it would ever be possible to discover the origin of force and thus solve the riddle of 'force' and 'matter'. The version of force formulated within the framework of classical mechanics thus only drew an even sharper boundary between mathematical and physical forces: force remained a threshold concept between physics and metaphysics that was meant to make a multitude of phenomena explicit or at least mathematically calculable, yet which itself remains inexplicable. Thus, when the arts turn to natural science for information about the workings of forces, they do not always encounter answers, but often unsolved problems. As was shown in the projects from literary studies, art, and art history, it is precisely this intangibility that makes ideas about forces attractive to the arts. We discussed this thesis in the lecture series "Dark Forces. Reflections of a Diffuse Variable in Literature and Art" (Fehrenbach/Müller/Renner/Zumbusch), to which a number of fellows contributed.

In the second semester (Winter 2019/20), biology proved particularly productive for making aesthetic connections. After all, the study of the living is concerned with those forces that bring forth bodily forms in a wide range of variation (understood as disparity or

polymorphism). Biology deals with stabilizing forces like those manifested in the formation and preservation of taxonomic diversity; yet it also deals with destabilizations like those represented in pre-modern natural philosophy by the formation of monsters and hybrid beings, in modern biology by mutations and 'runaway' evolutions. In this way, biology has traditionally thematized precisely those form-giving (or balancing) forces as well as those deforming forces (working against stable orders) that are of equal importance to artistic reflections. From antiquity through the early modern period up to the modern age, the powers and capabilities of animals and plants have served as a countermodel for artistic and technical accomplishments, and were often viewed with envy. Especially during the formulation of the aesthetics of autonomy, 18<sup>th</sup>- and 19<sup>th</sup>-century aesthetics drew heavily upon contemporary notions of a 'life force,' a 'formative force,' and also of a 'procreative force' (the latter being the theme of a workshop in December 2019). Conversely, an idea of nature characterized by the balance of forces has been associated since antiquity with beauty and harmony, in notions of the *cosmos* or *ordo*. From the Christian perspective, the unstable balance of the kingdoms of nature stemmed from the effect of divine creative power and the providential arrangement of the whole of nature. This theocratic equilibrium was reformulated in the 18th century into the conceptions of an 'economy of nature' or *balance naturelle*, the validity of which was confirmed by reference to aesthetic models of order. Even Alexander von Humboldt picked up this thread when he described the "interaction of the forces in a natural whole" in the *cosmos* (Humboldt 1845, xiii) as a harmoniously ordered whole. The considerations derived from this insight informed into the conception of the exhibition "The Whole of Nature. Forces, Orders, Limits" (Fehrenbach/Glaubrecht/Hünniger), which opened at the Hamburg Zoological Museum in November 2022.

One of the findings of the first year is that it does not work to assign reflections on aesthetic form to theorizations of the living, and aesthetic mechanisms of effect to kinetic-physical phenomena, respectively. However obvious it may seem to explain motor and emotional activation in terms of the mechanics of movement, or to relate the emergence of forms and design problems to biological considerations, the concrete case studies of the fellows made it clear that life and movement are in close alliance with one another. Processes of formation and transformation, for instance, affect not only organic but also inorganic natures. Moreover, gravity itself has a shaping and deforming effect. As the conference "Forces of Form and Motion" showed in January 2020, thinking about forces of form and motion in the arts demands less an 'either/or' model than an 'and'. This in turn led to a more differentiated line of questioning for the thematic focus of the second year, 'The Arts'. Here the goal was to assess how artistic practices, and the conceptual dynamics internal to disciplines like rhetoric, poetics, art theory, and aesthetics, have confronted contemporary natural-philosophical and scientific conceptions of force.

As became apparent in the second year, reflection on artistic practices doesn't merely open up a rich field of metaphors in natural philosophy and natural science, but also generates its own conceptual traditions. Following the core team's preparations in a study course in Fall 2019, conceptual variants like *energeia/enargeia*, enthusiasm, inspiration, genius, *movere*, *violenza*, the sublime, overpowering, intensity, elasticity and malleability, attraction and fascination were discussed with the fellows of the summer semester 2020 and winter semester 2020/21 (who unfortunately could only participate digitally). The enormous diversification of force-related aspects that emerged from these discussions led again and again to the central issue of finding a conceptual common denominator. We determined that aesthetic models of force are

distinguished by their peculiar oscillation that makes it possible for exceptions or contingencies, rule-like processes, decentering dynamics as well as stable orders, laws as well as their transgression, all to be conceived under the sign of force. Since Greek antiquity, aesthetic thought has grappled with the idea that art comes into being through the transmission of supersensible powers over which humans have only limited control. The distinction between what is given by God or nature and what can be done or learned was sharpened when Plato's distinction between a divine power (*dynamis*) and mere *techne* was transmitted to the Renaissance and early modern period as the contrast between *ingenium* and *ars*. In their reflection upon their force(s), the arts are by no means concerned only with what exceeds the technical side of artistic production. When the arts use the language of force to address the grounds for their own coming into being, their nature-analogous creative forces, or their effects, that reflection also includes the material conditions of aesthetic production as well as the perceptual-psychological preconditions of aesthetic reception. Among other things, this finding raised the question of the psychological and physiological preconditions of these forces of art, to which we turned in the third year.

The third year was dedicated generally to human forces. In the summer of 2021, we compared competing conceptualizations of the imagination as a force of the human being. Discussions with guests from art history, literary studies, media theory, philosophy, and the history of science unfolded an astonishing range of conceptions of the power of the imagination: as a somatic disposition or a pathological deviation, as an ordinary cognitive process or as an effect of numinous influences, as a reproduction of what is perceived or as a creative potential. Building on this insight, we used the second annual conference in June 2022 (Fehrenbach/Isengard/Micheluzzi/Zumbusch) to pose the broader question of the “forces of perception”, in which fundamental coordinates of the research group meet: How do conceptualizations of perception in terms of sensory forces relate to force's own problematic perceptibility? At issue here were adaptations of artistic procedures of representation to the knowledge of human perception. Conversely, we also discussed the possible influence of pictorial and linguistic modes of representation on perceptual conventions as well as their disruption. Terms focusing on perceptual attitudes and qualities of sensation, such as emotion, impulse, stimulus, irritation, shock, atmosphere, attention or attentiveness, provided an occasion for thinking about the reflexive moment of an aesthetics anchored in the power of perception.

The second focus of our consideration of human forces was the examination of bodily forces, which can be tracked by the (self-)representations of powerful bodies from ancient sculpture, via the classicisms of the 16<sup>th</sup>–18<sup>th</sup> centuries, up to contemporary popular cultures. Here we asked how the strengths and weaknesses of bodies – that is, their specific characteristics, behaviors, physiognomies, and materialities – are staged or visualized, what force lies in their ‘recognizability,’ and what these demonstrations of force suggest about conceptualizations of force in general. We found that strength constitutes an aesthetic ideal – as in the athletic or particularly muscular body – but that it can equally pose a particular challenge to aesthetic representation. ‘Too much’ strength, as exhibited by the hypertrophically muscular body, seems detrimental to beauty. The historical cycles and cultural attributions which affect the variable relationship between strength and beauty (including corresponding stereotypes: gender, age, etc.) – are striking also in their politically explosive nature. But we also addressed the more general question of the relationship between corporeality and materiality, leading not least to the arts' positioning of themselves between natural forces and the possibilities of



their targeted control: between intensification and utilization. This was the subject of the workshop “Matters of Force. Materiality of Forces and Material Economies in Arts and Literature of (Aesthetic) Modernity” (Renner/Hengst). When one’s own body is harnessed by motors and machines, or in fantasies of superpowers, ‘natural’ bodily forces tend to become visible as augmented, heightened, and imaginatively exaggerated forces. These cultural practices and techniques are the starting point for the questions of the second funding phase. Here we take up the more precise understanding we have attained of the connection between experiences of one’s own bodily forces and the formation of a scientific concept of force. For contrary to what one might at first assume, the forces characterized as ‘dark’ in the natural sciences are in fact rooted in the corporeal experience of forces. “The word force,” according to Gehler’s *Dictionary of Physics* of 1798, “expresses in the proper sense what we feel in ourselves when we want to move bodies at rest or stop bodies in motion” (Gehler 1798, 797). From this experience of feeling, forces then become ‘recognized’ in nature: “The feeling of exertion we experience when lifting a load, or overcoming some other resistance, is said to have led to the concept of force by way of projecting subjectively experienced muscular effort onto inanimate nature and thinking of it as a principle inherent to physical objects” (Jammer 1976, 1177). It is precisely this origin of force from an empathic transference or bodily projection that makes it suspect for the formation of concepts in the natural sciences around 1850 and, at the same time, a paradigm of empathy aesthetics in the second half of the century: “Force in that sense is nothing but a hidden outgrowth of our own irresistible tendency toward personification. [...] It is still the same need, merely refined, which once drove men to populate bush and spring, rock, air, and sea with creatures of their imagination.” (Du Bois-Reymond 1848, 14). If the discourse of strength is the product of a rhetorical operation that transfers the experience of the muscular strength of one’s own body onto external nature as anthropomorphism, then the origin of strength is to be sought decidedly not in physics, but in conceptualizations that could be called natural-magical, mythological, or in a broader sense, religious. This will be the point of departure for the second funding phase, precisely because the arts and their discourses have been dealing with such ‘parascientific’ conceptualizations of causal relationships continually up to the present.

In the first funding phase, we have thus dealt with the history of force in philosophy, science, and aesthetics in order to reconstruct the genesis of force and related concepts in their different disciplinary iterations. In the process, we could confirm our working hypothesis that reflections on the forces of the arts develop in extremely close dialogue with philosophical and scientific conceptualizations of natural forces, which in turn threw new light on the spectrum of mostly affective potentials passed down by rhetoric. Over the first funding phase, we productively realized the working assumption that, in addition to physics and mechanics, it was above all the sciences of the living that inspired aesthetic reflections on forces. At the same time, the case studies on the artistic and literary modeling of forces led us again and again to the points where the possibilities inherent to the arts are linked to the workings of divine, demonic, or irrational, unconscious forces. It is this persistent proximity of the forces of nature to the occult and numinous that we would like to address in the second funding phase. As seen in the first funding phase, the abandonment in the 19th century of a substantial concept of force (i.e., one which refers to a separate striving faculty) in favor of a functional approach is precisely what allows us to model cultural as well as psychic causal relationships by analogy to natural energetic transformations. We will focus more precisely on this transition from force to energy in the second funding phase and use it to analyze current

constellations of problems as well as recent natural-philosophical debates over force and energy.

### **Goals for the second funding phase (2023–2027)**

In the second funding phase we would like to use the conceptualizations we have already developed to deepen the ongoing description of historical and contemporary conceptions of artistic, natural, and socio-political forces in their visual and discursive formations. Further, we intend to diversify the spectrum of these conceptualizations both in disciplinary terms and, by way of the fellow invitations, also geographically, while also guiding the inquiry more specifically towards present-day concerns. Rather than attempting to systematically and definitively index such a fluid category, we will instead continue to lay out the parameters of a new epistemological field, to map it in terms of theoretical conceptions and research practices, and thus to open up new directions for art history and literary studies that will provide them with stimuli and, as it were, ‘forceful’ impulses. It is therefore a matter of collectively probing, delimiting, and developing thought-images and binding categories – and thus also the methodological and theoretical instruments of a future scientific practice.

Firstly, we want to place the force of the arts within the broader context of researching, representing, and practically dealing with non-mathematizable forces. One of our aims here is to work out more precisely how aesthetic forces are related to the numinous – a theme which emerged repeatedly in the first funding phase but was not systematically examined. Thus in addition to the concepts and historical semantics already elaborated, we will examine new (and historically equally impactful) aspects of force, especially in their significance and their limits for the immanent possibilities of modeling the arts and literature. In the European context, the discursive history of forces presents us with a fascinating oscillation between their bracketing off from other domains, and their almost irrepressible return: not only in new hypotheses and scientific frontiers, but also in the alliance between religious and aesthetic projects. Already before the well-known mockeries of causal forces and faculty physiologies in the 17th century (Hobbes, Molière), the ontology of forces relied on the ontological status of logical or linguistic operations that thematized causal effects and the causes of motion. The distinction that Peter King (2021) has elucidated for the High Middle Ages as a debate between a *merely* ‘modal approach’ (e.g. Abelard, Grosseteste) and an ‘agential approach’ (e.g. Anselm of Canterbury, Henry of Ghent) draws its sharpness from the belief in, or skepticism towards, the recognizability of effective causes, and thus of motion in general. But this problem takes a different form in religion and art than it does in science. In the long history of emanationist philosophies between Neoplatonism and the hermetic or ‘esoteric’ currents that continue up to the present, the rhetoric of forces forms an inexhaustible reservoir for those artists who lay claim to alternative artistic modes of taking part in the world, not least to ‘scientificity’ itself.

Secondly, building on our intensive examination of fundamental texts of European philosophy and the modern sciences, we would like to include new expertise from ethnology and anthropology in order to realize the expansion beyond the European-Western domain already envisaged in the application for the second funding phase. In so doing, we are guided by the hypothesis that notions of force in non-Western reflections on arts and nature can open up additional aspects of the topic. The European/Western history of the artistic examination of forces can hardly be understood without reference to non-European cultures and the ‘extra-scientific’ conceptions of forces that have been assumed to exist there since the 17th century;

this is even more the case for modernity and the present. This is not to say that the work of the two applicants and the majority of the fellows, which is primarily historical and related to European art, should be merely supplemented or relativized by contrasting semantics. Rather, the aim is to develop a better understanding of the complexity of the category, which especially given the inter- and transcultural projections and exchanges between concepts of force, would remain incomplete were one to begin from a geographically closed discursive framework that primarily analyzes the dialogue between natural science and art. The discourse of the force (energy, influence, vibration, oscillation, radiation, etc.) of art also seems to promise an almost global comprehensibility, quite as if force – like ‘time’ – were a universally understood, ‘clear’ concept, if not a ‘lucid’ one (to paraphrase Gottfried Gabriel). From this point of view, Western art’s constant thematic and practical references to numinous actors, the agency of materials, or animistic or shamanistic ideas, are quite consistent. A protest against the dominance of reductionist forms of knowledge is also manifested in these reprises, which can be observed above all in Romanticism and Neo-Romanticism, but also in the cross-reception between European and non-European thinking about force. Since antiquity, that protest has accompanied the disciplinary domestication of knowledge generation like a shadow, also in Europe. Here one must begin by discussing the founding writings of ethnology, according to which ‘primitive’ thinking is supposed to be characterized by a special “belief in forces” (Lévy-Bruhl 1921, 23). It is also symptomatic that texts of New Materialism tend to employ the terms ‘power’ and ‘energy’ wherever they argue against a rationalistically constricted concept of inanimate matter (Barad 2007; Bennett 2010).

Thirdly, we would like to continue reflecting on our research’s potential for analyzing current social problems. Thus we will ask to what extent dealing with ‘energy’ as a modern heir of the concept of force is subject to similar epistemic and aesthetic problems as thinking about forces. While mechanisms for generating and transmitting energy (power plants, high-voltage lines) are visible, and while outputs and effects, emissions and residues are all sensible, energy itself is not accessible to sensory perception. From the perspective of cultural anthropology, it is evident that research on cultural patterns of perception play a central role in the course of sociopolitical energy turns, insofar as what is at stake here is a ‘change of perception’: “our beliefs about energy shape how we use it; our uses of energy simultaneously shape our cultural concepts of and beliefs about energy” (Rupp et al. 2013, 10). The Centre’s internally-founded “Forum: Designing the Energy Turn” investigates the perception and design of technical facilities for producing or transporting energy from a multidisciplinary perspective. The examination of design options for current technical transformations of space as ‘energy landscapes’ will be continued and extended to literary explorations of old and new energy landscapes, as can be observed for instance in New Nature Writing. The undoubtedly most urgent research questions today include the design of energy plants, and a closer examination of the technical possibilities and socioeconomic consequences of altered means of regional and global energy generation and storage, transport and trade, consumption and renewability. This is true not only within the horizon of sociopolitical acceptance research, but also in connection with ongoing transformations of human and animal labor.