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Introduction: Science and Literature

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1. Primeval scenes

The purpose of this volume is to investigate a number of selected examples of contact zones between the sciences and literature. We will be dealing with prominent cases of how science and literature encounter and interact with each other and profit by this recourse to their corresponding other, yielding aspects of self-reflection and self-representation. The volume will not attempt to address the question whether the so-called "two cultures" can be brought closer together or superseded by a third (Lepenies 1988, passim). We will be dealing neither with science and literature in an autobiographical or "life-world" sense, nor with popular scientific texts with quasi-literary claims, such as Stephen Hawking's theory of time, nor, in the parallel universe of popular fiction, with science fiction.

When Mary Shelley published her novel *Frankenstein, or the Modern Prometheus* in 1818, she tapped the pulse not only of her own age by giving expression to the hopes and fears connected with the new sciences studying man. The scenarios of the gothic novel were not new, nor was the broader treatment of the subject of science. Here, what was astounding and ahead of its time was rather the insight that the future fate of humanity would depend upon its relationship to science and that this science, beyond the discovery and technological exploitation of the laws of nature, would place at its center humanity's *model of itself*. In the introduction to her novel Mary Shelley noted the moment when she came upon the basic idea for Frankenstein, and she describes this moment in the guise of a scientific discovery. During a nocturnal discussion she meditated upon new theories in the natural sciences of her age – upon "Dr. [Erasmus] Darwin and some of the physiological writers of Germany" (Shelley [1818] [1831] 1979, xviii)[1] – and, at the same time, upon the possibilities of poetic

[1] Mary Shelley is most likely thinking of Johann Wilhelm Ritter here; she was also familiar with Luigi Galvani and his influence on German romantic scientists and writers such as Ritter, Ernst F. F. Chladni etc. (cf. Wetzels 1990, 199–212). – Most commentaries assume "Dr. Darwin" to be Erasmus Darwin (1731–1802), Charles Darwin's famous grandfather. He wrote, among other things, *The Zoonomia* and *The Temple of Nature*; and he also conducted experiments on the theory of color (contained in the *Zoonomia*). These experiments were documented in the *Philosophical Transactions of the Royal Society of London*, 1786. One should note, however, that in these *Transactions* the name of the experimenting scientist is identified as "Robert Waring Darwin." The complete title reads: "New Experiments on the Ocular Spectra of Light and Colours, by Robert Waring Darwin, M. D.; *communicated by* Erasmus Darwin, M. D. F.R.S. – Read March 23, 1786," in *Philosophical*

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fantasy. The eureka of the future novelist reads like this: "I have found it! What terrified me will terrify others" (ibid., xv). In this horrifying discovery there lies a dynamic the author cannot extricate herself from and must follow. Mary Shelley acts much as the researchers she studied who were led by their discoveries to take the next step beyond the established model of humanity of their age. It was the new sciences that forced their way into language with Mary Shelley, giving language and literature a new, scientifically shaped character. Literature no longer merely describes the progress of the sciences; it actually contributes to the knowledge of science, particularly where the question of the essence of humanity is raised. Goethe drew similar conclusions in Faust II ([1832] 1975). In the famous laboratory scene we read: "A man is being made" (114), namely the homunculus in the bottle. But only when he acquires "a voice, a language" (115), and his speech can in turn be discussed – only then do the threads of reflection lead back to the human being designing himself. As these two examples can only indicate, literature has found one of its many roles by serving as an echo chamber and a room for reflections upon the sciences. Whether we turn to Goethe, Mary Shelley, E.T.A. Hoffmann, Robert Musil, Bertolt Brecht, Friedrich Dürrenmatt, Don DeLillo, John Banville, or Aris Fioretos – to name just a few –, they all show that the imagistic language and the imaginary space of literature are in no way afraid of the confrontation with the sciences. Not only the acts and primeval scenes of scientific research find representation here, but also the cultural and social contexts and the consequences of science, and particularly the questions, problems and the fate of the subject that is itself bound up with the process of knowledge. Literature can make many things understandable, among them the anthropological, psychological, and fantastical preconditions and consequences of the scientific process of knowledge. From these moments a cardinal question arises, a question fictional literature has henceforth been concerned with, namely, the question of the driving forces of the human "will to knowledge" – as in Foucault's reformulation of Nietzsche's theory of the "will to power" – and of the consequences arising from it (cf. Daston 2002, 147–175).

Literature is capable of incorporating a level of self-reflection into the representation of scientific processes without itself being involved in a particular science and without claiming to contradict science on its terrain of immanent processes, tasks, and terminologies. The process of modern scientific research – which is not concerned with questions of curiosity, but with the verification or refutation of results and the development of new questions, methods, formulations, and terminologies – obviously can only rarely create for itself such room for reflections, although in pre-modern scientific models it possessed its own value. In this sense literature carries out research *on* modern science in a specific medium: its own artistically skillful form of representation. Literature can show – and this has been confirmed again and again by historians of science – that the process of research is not an obstinate history of positive findings, but

Transactions 1986, 313. There remains, therefore, still some obscurity with respect to the "Dr. Darwin" M. Shelley is actually referring to. (I am indebted to Alexandre Métraux for this note.)

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rather it is permeated with fantastical and creative moments (cf. for one of many possible examples, Hans Blumenberg [1973] 1988).[2] In this relationship literature assumes a *hybrid* position. Firstly, the cognitive form of literature maintains its relationships to pre-modern forms of science and research practices. And secondly, literature always remains "only" literature, no matter how much it represents the sciences and no matter how intensive the dialogue it develops with the sciences. The subjects of literature are reflected in the mode of fiction; their signifiers have symbolic contexts; their language is that of metaphor, metonymy, and symbol; literature is subject to its own particular linguistic and medial conditions; one of its foremost goals is to entertain and stimulate the fantasy of the reader, and not to accumulate or to critique knowledge; its forms of representation and expression are indirect, requiring hermeneutical approaches while illustrating at the same time their limitations; its readability always contains simultaneously the problem of the unreadability of the unreal.

Whenever natural scientists refer to productive (research-relevant) literary experience, these references most often appear in the context of autobiography, and thus again in a *literarily* structured genre. Often they are scenes that treat the creative moment itself, offering at times even aesthetically loaded scenes of involuntary cognition. Just think of the chemist Kekulé dreaming of his serpentine benzene molecule, an image from the year 1890 that has a number of parallels to the way Mary Shelley came upon her Frankenstein figure in a waking dream:

> During my sojourn in Ghent in Belgium I lived in an elegant bachelor apartment in the Hauptstrasse. My study lay next to a narrow side street, though, and it had no light during the day. For a chemist who spends the daylight hours in his laboratory this was no real disadvantage. I sat there and wrote my textbook, but the work was moving on quite slowly, my mind being full of other things. I turned my stool to face the fireplace and fell into a half-sleep. Again, the atoms appeared to flutter about before my eyes. But this time the smaller groups remained humbly in the background. My inner eye, sharpened by the manifold appearances of a similar kind, now distinguished larger structures of various shapes. Long rows pressed closely together; everything in movement, winding and turning like a snake. And low and behold, what was this? One of snakes took hold of its own tail, and the image whirled disdainfully before my eyes. I awoke as if struck by a bolt of lightning, and once again I spent the rest of the night working out the consequences of the hypothesis. (Anschütz 1929, II, 942)

This passage captures the subjective biographical event as reflected by the scientist; in the scene a theory of scientific creativity is developed, but not a science. Kekulé's dream stages the scientist as a dreamy subject of genius. One cannot extrapolate from this self-representation whether the scene is fictional or not, but the established fictional narrative model is quite recognizable, and the manner in which the scientist

[2] The relatively new, culturally informed field of science studies is devoting its interest to such questions of the cultural formation of knowledge in the sciences.

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stages himself here follows it. Kekulé's memoir bears witness to the possibilities of a biographical representation of scientific processes in the medium of a literary language, and it testifies to the formative power of the biographical genre. Kekulé's memoir does not speak in the formalized presentational medium of science with all the specialized terminology, formulas, and categories belonging to it. Rather, both literature and science partake of the subjective perspective of the autobiographical genre. This implies simultaneously that the relationship between literature and "science" depends, first and foremost, upon a whole spectrum of literary and metaphorical possibilities of representation. The relationship between literature and science is perhaps a great love story in the literature of modernity – but it is most often an asymmetrical relationship in which science is represented *in* literature in certain forms. Only in the degree to which the languages of science and literature clarify the status of their categories, metaphors, and styles, and thus the forms that in the broadest sense belong to the organization of the symbolical levels of representation, can the reciprocal perception or relationship occur.

The relationships were quite different at the beginning of the modern period. During the fourteenth and fifteenth centuries, as the sources of antique knowledge were being rediscovered, the arts were also considered to be forms of knowledge and science. Painting, sculpture, architecture – with all the manual skills belonging to them, which were no less technically, mathematically, and medically (physiologically or anatomically) orientated – were collected together in a system of "humaniora" that was organized around the leading science of rhetoric.[3] "Following the exile, all good sciences were, thanks to the grace of God, re-established in their native home," noted Rabelais in 1532 with reference to medicine (quoted in Panofsky [1960] 1984, 30). Panofsky speaks of a "successive expansion of the humanistic universe from literature to painting, from painting to the other arts, from the arts to the natural sciences" (ibid.). During the Renaissance, literature, in close conjunction with rhetoric, developed the model par excellence of the *artes liberales*, and thus also of the sciences in general. But the more rhetoric lost its leading function and the sciences laid claim to other forms of representation than those organized rhetorically, the more the "literary" aspect of the sciences lost terrain. In this respect it should not be forgotten that pictorial forms were also among the most effective manners of representation ever since the modern age; even today they still exercise an increasing influence upon the development and success of scientific theories (see Lefèvre et al., 2003). With the dawn of the eighteenth century at the latest, when the modern natural sciences became more specialized and were differentiated into new individual disciplines, literature itself changed, becoming a subjectively and perspectivally directed organ of self-perception and self-reflection. By comparison to this, the sciences increasingly addressed positive tasks that at first appeared incompatible with the perspectivism of the subject. In his countless theories

[3] For the eminent role of anatomical studies in the sciences and arts of the sixteenth and seventeenth centuries, cf. Rafael Mandressi: "Morale, mondanité, esthétique et métaphore" (Mandressi 2003, chap. 5, 217–268).

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of color and in his writings on botany, geology, and physiology, Goethe attempted to bind together aesthetical and scientific phenomena in one graphic level of language. But Goethe's works, in attempts to synthesize, mark a turning point: the point around 1800 where science and aesthetic representation diverge.

2. Metaphorology

With the role of language, or, more properly, with the critique of categories and metaphors, a new aspect has appeared since the nineteenth century that could be described as a reciprocal space of reflection for literature and science – a space that has stimulated fundamental contemporary studies of the history of science. In this connection it is hard to overestimate the influence of Nietzsche's reflections on the critique of categories and his related theories of metaphor – particularly in their further development by Michel Foucault. Today, these reflections still act as an inspiration and a point of departure for the critique and the history of science. According to Nietzsche's argument in his famous essay "On Truth and Lies in an Extra-Moral Sense" from 1873, fading memory, the "forgetting" of the original physiological impulse, are what allow the re-evaluation of linguistic images and signs in (rational) categories in the first place. Categories, according to Nietzsche's theory, were originally stimulations of nerves, forgotten and translated into images and language. The Cartesian cogito and the established categories of reason and truth disregard this origin entirely. Man "subjugates his actions as a rational being to the rule of abstractions: he no longer allows himself to be carried away by sudden impressions, by notions; he generalizes all these impressions into colourless and cooler categories in order to harness the vehicle of his life and actions to them" (Nietzsche 1986, vol. 1, 881). "Consciousness is the last and latest development of the organic," Nietzsche writes, expounding upon this thought in *The Gay Science*, and since that is so, there exists a "new task that has just begun to dawn upon the human eye: to ingest knowledge and make it instinctive" (ibid., vol. 3, 382).

The arts in particular deal with this sphere of sensual perception, with *aisthesis* in the literal sense, and for this reason Nietzsche hoped to renew science and philosophy with the aid of art. This was Nietzsche's point of departure in the works surrounding his *The Birth of Tragedy*, a treatise in which he insisted upon seeing "science through the optic of an artist" (ibid., vol. 1, 13). Nietzsche's provocation – his habit of investigating categories and discipline-internal, specialized terminology in light of theories of metaphor and genealogy – at least had the effect of modernizing for the sciences the role of rhetoric that had hitherto bound together the disciplines. Here, from the perspective of rhetoric, the classical opposition between the category, on the one hand, with its connotations of reference, unambiguousness, and a fixed position within a larger system, and the metaphor, on the other hand, with its own connotations of vividness, association, and relativity, can no longer be upheld. Using the example

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of molecular research during the nineteenth century, Hans Blumenberg illustrated the historical dynamic of metaphorical processes by showing that the construction of scientific analogies (for the molecular scientists, those between microcosm and macrocosm) could actually be understood as metaphorical activities. Linguistic images not only possess a range of expressivity depending upon their context, but are also subject to historical processes of decline due to their contextual dependence. Metaphors can thus be original images of imagination, but also later forms of a category. One phase in which the image is considered positivistic and realistic can be displaced by another phase in which a model of thought exercises continuing influence purely as an image. (One might think here of the lasting linguistic effect of the geocentric world view long after its scientific revision: for us, the sun still rises and sets.) Metaphors as models of clarity and of the movement of thought are able to unleash their own operational dynamic and thus to actually influence the development of scientific models and theories (see, for example, the article by Christina Brandt in this volume).

Categories, formulae, and metaphors have, despite all their systematic and disciplinary differences, one common characteristic: they are symbolizations, and as such they are indifferent "to the presence of that which they purport to indicate" (Blumenberg 2001, 205). They govern, according to Blumenberg, a cognitive-critical deficit, namely the deficit Kant defined as the cognition of the thing itself (*das Ding an sich*), and they compensate for this deficit circuitously with the anthropological "ability to combine the heterogeneous." This is the rhetorically, linguistically, and imagistically basic aspect of symbolization. The symbolization, however, the *metaphorein*, the transformation, and translation, is one of the requirements of clear and categorical creativity, of cognition (Blumenberg 2001, 205).[4]

Rhetoric reappears in a new function in the discourse of the sciences. It no longer possesses the function of a leading science as it did during the renaissance. And rhetoric is not considered merely instrumental as a strategy to push through arguments. Rather, rhetoric is far more visible as a link between science and literature insofar as it reflects the generation and order of symbolic methods. From this perspective the metaphor proves to be the *agens* of an unlimited process of transformation and translation, and no longer just a deficient special case within language, an undetermined contradiction to the definition of a category. Metaphors have a dynamic that affects all symbolizations and forms of representation, whether they are of fictional or scientific provenance. They indicate the symbolized, circuitous form in which knowledge is manifested. The origin of linguistic form does not lie in the thing being treated, but in the movement of the link. For that reason, metaphors in science are *not* what they

[4] Blumenberg's metaphorology offers anthropological answers to philosophical and metaphysical questions; however, anthropology can not rid itself of the "figural genealogy" (Haverkamp, in Blumenberg 2001, 441), of its own theoretical models. Thus Blumenberg's answer still entails an allusion to the irreplaceable role of rhetoric wherever symbolizations are concerned (cf. Anselm Haverkamp's critique of Blumenberg's metaphorology in Blumenberg 2001, 440 ff.).

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appear to be *pragmatically*. From a pragmatic perspective they are usually considered to be descriptions.[5] Hans Blumenberg's *Metaphorology* shows, much as Ernst Cassirer's reflections on the symbolics of the sciences, that metaphors are not only referential thought models with regional ontologies. A metaphor is not only a pictorial and direct expression of scientific facts that exist independently of their representation. The metaphor marks a process of translation that the movement of thought itself represents, and it thus affects the scientific orientation within which it appears. The movements between analogous images and metaphors and their influence upon scientific operations were studied in detail already in the 1960s by Mary Hesse in her book *Models and Analogies in Science* (Hesse 1966, passim). According to her argumentation, analogies that were created in a specific science can lead to new descriptions of all the aspects addressed in those analogies. These metaphorical references can conceivably initiate technical, theoretical, and ontological changes in further research. An example: when the mind is defined as a computer, both elements of the analogy, the mind as well as the computer, are subject to a new metaphorical formulation, and the original field of the analogy, in this case neurological science, will – through this very operation – be referred back to a new field of research, in this case computer science.

Such insights into the translational movements of metaphors also have consequences for the reciprocal perception of literature and science. For the field where literature and science encounter each other is none other than that which was opened by the process of translation. It is the aesthetical and rhetorical field that finds a common terrain, a *logos* and a context, through reciprocal translation. The encounter with literature – if it is sought or tolerated at all by scientific authors – can force the sciences to think about the mediality of its representation. This often leads to the perception of something in language, not only in the linguistic images (metaphors), but also in the diagrams and statistics, that at first goes beyond the fine-tuned instrumental meaning. What literature makes clear in its self-reflective moments is the following: language does not represent some content independent of itself. The modes of representation are rather a part of the knowledge. The mediality is itself part of the expression; a trivial fact, perhaps, but one that the sciences and literature are always called upon to reflect.

3. Representation, style

Nietzsche noted the fatal consequences of a category of truth that purports to be independent of its genealogy, its imagery, and its sensual manifestation. He thus demanded stylistic sensibility from the language of the sciences. Precisely because "good style" for Nietzsche is not simply a question of the construction of sentences

[5] "Always just descriptions, and they function just as descriptions always do. . . . New phenomena, new data, . . . new theories call for new words, whether coined or borrowed" (Machamer 2000, 52).

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and rhythms, since it transports *aisthetic*, quasi-corporeal and gesticulatory traces, style appears to have the same affect as the arts themselves. The stylistically well-formed manner of writing follows the traces of a non-ideal, a corporeal origin of thought. It prefers to avoid using abstractions at the cost of sublimation, it recognizes the share of "poetry" or fictionalization in its foundations. "Good style" communicates an "inner condition" and expresses it "through gestures," since "all laws of the periodic sentence are the art of gesture" (Nietzsche 1986, vol. 6, 304). One is called upon not to put one's "ears in the drawer" when reading (Nietzsche 1986, vol. 5, 190). Even if the emphasis with which authors like Goethe, Nietzsche, Ernst Cassirer, Georg Simmel, and Robert Musil, but also natural scientists like Georges Buffon, Horace Benedict de Saussure, Luke Howard, Jean-Henri Fabre, and Ernst Mach – to name just a few examples – encouraged scientific prose to be stylistically good did have some resonance, the end of the "beautiful" in the representation of the sciences can scarcely be overlooked. Since the nineteenth century the needs of representation in most sciences have been moving in another direction. On the one hand, this has to do with the specialization and differentiation of methods of formalizations in the individual disciplines; on the other hand, in many sciences other systems of notation than those of linear writing have come into use. The human body and its sensory apparatus are no longer the primary recipients of the representation of scientific results. Instead, the notational systems of machines that are read by machines have been developed. The body, conceived of as a unity, is no longer the referent; and the subject is no longer the primary instance of experience. Our perceiving, life-world mediated subjectivity is no longer the organizational center of self-representation for the sciences. One can see the changes in the conventions of representation in the fact that older "scientific" texts are often considered today to be good (belletristic) literature. It is no coincidence that – in the classical sense – beautiful, autobiographically organized, clear prose such as that of Jean-Henri Fabre, a prose that expressly treats the investigating and experiential subject of the researcher, is still considered by contemporary readers to belong to "world literature" (Fabre 1992, 11).

Although modern systems of representation may lack imagistic clarity of language when seen from a classical perspective, this lack itself is not a subject of reproach, since other medial forms such as digitalization and pictorial processes have assumed a central role in scientific systems of representation. The rational dismissal of stylistic ideals such as those of clarity, of rhythmic and catchy language, a rich and varied vocabulary, and vivid representation belongs to the dynamic of modern scientific prose (cf. Métraux 2005; see also Heintz and Benz 2001).

But a common level of reflection for literature and science could still be found when they both begin themselves to reflect upon their own form of representation and upon the common unity of cognition, style, and representation; these common levels of reflection do not automatically lose their significance when the forms of representation in the sciences appear to close themselves off from generally approachable prose. The sciences, too, often find themselves forced to critique the relation of hypotheses,

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research results, and their representation; and only in rare cases is a separation of these levels possible.

4. Differences

This is the reason why the widely accepted notion that there is a gap, if not an abyss between scientific and literary or poetic renderings, descriptions, depictions, representations, has perhaps to be regarded as all too generalizing. The notion is that scientific findings have to be insensitive to and independent of their linguistic, rhetorical, and pictorial presentation, their truth lying "in the matter" itself, whereas, in literature, there is no such thing as a content independent of linguistic and rhetorical aspects. Literature *is* its language, *is* its rhetoric, its representation, and it does not exist beyond them. In this sense, literature is at the same time its performance and its meta-theory; in other words, what literature is and wants to say cannot be perceived in any other form than literary. As was pointed out, the gap opens up with respect to the role of language and mediality – and, not surprisingly, it can also be overcome with respect to the very same role of language and mediality as soon as the critical and self-reflexive aspect of the role of "Darstellung," of representation, is at stake.

There can be no doubt that the confrontation with the sciences may be followed through the literature of most epochs, albeit with various accentuations and perspectives. Recently Durs Grünbein has offered us a text that in many respects is interesting in the present context. In Grünbein's poem *Vom Schnee* (*On Snow*) (Grünbein 2003) one can trace in an exemplary fashion how a poet of the twenty-first century can treat questions of the history of science, of rationalism, and of methodologically oriented thought without yielding to the terminological restrictions of the languages of science. Grünbein's text is at the same time an example of a philosophically schooled poetic that reveals contemporary allusions and questions in historical and scientific constellations: in this case in rationalism.

It pleased the poets that René Descartes dated the birth of rational philosophy with the aid of a quasi-poetical situation, namely the so-called "inaugural dream." Descartes reports that in the night from the 10th to the 11th of November, 1619, the question of the possible completeness of knowledge in connection with the question of the right path, the method of thought, appeared to him in a scene he dreamt.[6] In his story *Vom Schnee*, narrated in Alexandrine verses, Durs Grünbein takes up this constellation and

[6] Descartes reports on his stay in a little village near the German town of Ulm in the winter of 1619–20, and there he mentions having experienced a somnambulistic state several times (cf. Descartes 1972, 87). For detailed information on Descartes' dreams and their argumentative function in Descartes' writings, see Adrien Baillet's biographical work *La vie de Monsieur Descartes* [1691] 1972, and also the edition of Descartes' early writings by Fernand Hallyn: *Les olympiques de Descartes* (cf. Descartes 1995).

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lets the philosopher in the year 1619 appear in an extreme situation, far away from the centers of science and politics, in a snowy "Town close to Ulm" (Grünbein 2003, 19) where he is forced to spend a winter. He is accompanied only by his faithful servant Gillot, a man with hard-nosed materialistic opinions who even saved the philosopher's life in the aforementioned night of the dream, protecting the slumbering thinker from the flames of a fire.

The poem presents us with an important episode in the history of rationalism. While belonging to the lyric genre, it acquires a position eccentric to the traditions of scientific prose. It also behaves eccentrically with regard to lyric genres by developing Descartes' cognitive episode in a narrative, and not, for example, in the tradition of a pedagogical poem or a lyrical conceit. In his commentary to his poems Grünbein pointed out the permeable border between lyric and philosophy; he didn't mention Nietzsche explicitly, but he writes from a cognitive and critical perspective that appears to have been schooled by Nietzsche's insights into the overlapping claims of art and science: "For every logic there appears to me to be a poem-logic, for every sentence from a doctrine of cognition a poem-sentence. Only the unprovability catapults the poem out of the rational and critical associations" (Grünbein et al., 1995).

Grünbein shows us a Descartes physically suffering and isolated, bent over his papers:

> The feather scratches. At once the hairs at the back of the neck stand on end,
> And the goose pimples run over the arm, over the back.
> Drops fall from the forehead. The purest sweaty towel, the page,
> Lies in waves, and turns into a dreary mirror, wildly tousled,
> Your hair [appears] in it and a face that terrifies you
> With its scars and eczema, crow's feet,
> The first wrinkles around the eyes resemble writing.
> The ink flows – as if out of hidden glands of the body.

Descartes asks:

> Is there a syllogism that affects my existence? (Grünbein 2003, 19)

The scene binds philosophical, scientific writing into a charming experience. It opens an aesthetic dimension, discussing the analogy of physiognomy and handwriting and alluding, beyond the methodologically intended *clarté*, to the "dreary mirror" of the page of paper. The philosopher's last question concerning the implied syllogism of concrete strategies of writing indicates that the successes of the rational method, faced with the complexity of sensual perception, remain doubtful. Indeed, Descartes' own corporeal experience had long since been affected. It was Nietzsche's opinion that Descartes' "cogito" masks the questions of the corporeal, concrete life-world dimensions of the act of thought, and Nietzsche based his critique of Descartes upon it, as Rousseau had done before him.

The poem opens a twofold perspective upon a language that both represents and is at the same time the thing represented. It shows how this doubling affects the

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rationalistic question of the thinking ego – and thus the possibilities of scientific writing. Grünbein allows his reader to observe the process leading to the creation of the scientific method from a twofold perspective: he recapitulates the thoughts underlying the Cartesian meditations and he narrates Descartes' own story in images that expose the intermediary experience of the body.

And yet the book's title is not *Literature and Science* but *On Snow*. The snow covering the entire countryside appears to Descartes as a *tabula rasa*, as an invitation to fill out the emptiness with logical, structured order:

> Snow abstracts. Assume that it has made the bed
> For reason. It has laid the paths to rest
> Upon which the course of thought would otherwise have gotten lost. (Ibid., 14)

The snowy countryside acts upon the thinker as a shimmering and blinding force confounding the dimensions of space and time. The philosopher Descartes reads both the smooth white emptiness and the uncontrolled plenitude of the falling snow as a call to rationalistic (geometrical, mathematical, physiological) order, as a call to find the path, the "method" – a call to methodologically secured thought. The difficulties of orientation facing the thinking ego in the placeless – and unscaled – white expanse also alludes to a possible erring: a problem that the skeptic Descartes animated to posit the possibility of doubt and to find doubt in everything.

> It was no dream. I opened the book and read the verse:
> "In which direction does it lead me, the path of my life?"
> Then a man came, I heard him say: "est et non." (Ibid., 24)

Using the figure of Descartes, Grünbein follows the change from the corporeal, life-world perception into an aesthetic one, and vice-versa, as the path in the development of rationalistic thought. Throughout the poem, at least, Cartesian rationality is described as an open process. In the "I think" moments of corporeality, confusion and disorientation obtain their own validity even against the intentions. Thereby a form of thinking is revealed whose center is uncertain to thought itself and thus is ultimately not definable. Grünbein uses linguistic images for this non-rational moment: metaphors that cast aesthetic experience back upon the origin of rationalistic thought. And thus Grünbein reminds us, as Nietzsche did, of a fault that rationalism cannot think.

At the end of the poem the world distances itself from Descartes, abandoning him to his melancholy, lonely condition:

> . . . He cries.
> Tired to death he withdraws into his bed and reads a book.
> Does he need anything, he is asked. Descartes negates. (Ibid., 135)

If literature keeps the memory of this fault alive it could enrich the dialogue with the sciences. The sciences influence literature insofar as they offer the rational outlines of

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man's future self-model and his life-worlds. In literature we can negotiate how worthy of living these new life-worlds might be.

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