

Internalismo Interpretativo en la Época de la tecnociencia

Interpretive Internalism In The Time Of Technoscience

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Abstract: This paper argues that scientific inquiry (1) creates its own cognitive autonomy within the interplay of research practices and possibilities for doing research, and (2) discloses, meaningfully articulates, and procedurally objectifies reality in a unique manner. Taken together, both claims characterize the position of hermeneutic realism which lays foundations for the radically anti-foundationalist hermeneutic philosophy of science. Claim (1) opens a subject of meta-epistemological studies aiming at a complementarity between a hermeneutic theory of the facticity of scientific inquiry as a mode of being and an epistemological theory that works out in its own terms the conditions for having science's cognitive specificity, whereas claim (2) is a necessary presupposition for studying how reality becomes meaningfully articulated within scientific practices. The position of hermeneutic realism is on a par with the thesis of interpretive internalism stating that the cognitive autonomy of scientific inquiry is achieved through the openness of inquiry to its milieu. This openness consists in a selective assimilation of external themes, goals, tasks, and other items. The paper also deals with some socio-political consequences from the thesis of interpretive internalism. It is argued that only scientific inquiry freed from social monitoring and political control is able to serve societal needs, preventing at the same time a politically initiated scientification of societies, i.e. a scientification guided by dubious economic and political interests, and accomplished through sciences that are not able to preserve their cognitive autonomy, thereby becoming exposed to manipulation and misuse.

Keywords: hermeneutic philosophy of science, interpretive internalism, characteristic hermeneutic situation, contextures-of-equipment, contexts of inquiry

Human existence has a being only in practices that constantly and continuously constitute meaning. Putting practices first is a common concern of all philosophers who try to defend a form of realism without committing to the God's Eye point of view. The epistemic relationship is situated and takes shape in the medium laid down by practices. The hermeneutic philosophers of science advocate the primacy of scientific practices as a medium in which the epistemic positions (cum their norms and criteria) are generated, but strongly deny any account of this primacy in terms of causal interactions. For them, causal interactions also become meaningfully articulated within practices of inquiry. By implication, scientific practices are interrelated not by causal interactions but by relations of mutual interpretation. The interrelatedness of such practices brings into being the interpretative articulation of meaning as a prerequisite for delineating meaningful causal interactions. In raising this claim, the hermeneutic philosophy of science turns out to be a program irreducible to an interpretive theory of scientific communication. This philosophy is not about the cultural production of scientific texts mediating and propagating the outcomes of inquiry. It neither addresses the formation of audiences reading these texts, nor does it deal with the effective-historical dynamics of receiving and aging of scientific results. The constitution of science's cognitive specificity within the practices of inquiry, and the disclosure of domains of meaningful reality are the two subjects which invite unitary interpretation. The quest for such an interpretation is what the hermeneutic philosophy of science is all about. It is these two subjects that resist recasting in terms of a cultural hermeneutics concerned with the production and reception of texts.

The first subject – the constitution of science's cognitive specificity – is of meta-epistemological nature. Its treatment requires a kind of complementarity between a hermeneutic theory of the facticity of scientific inquiry as a mode of being and an epistemological theory that works out in its own terms the conditions for having the specificity mentioned. (In a tentative formulation, the epistemological theory I am speaking about is not of post-empiricist type. It does not look for a constitution of empirical facts within theoretical frameworks. From the standpoint of the hermeneutic philosophy of science, the formation of all theoretical frameworks is "always already" situated within the articulation of meaning. By putting the theoretical frameworks first, post-empiricist epistemology proves to be unable to study how the formation of these frameworks is constantly fore-structured by the articulation of meaning within [scientific] practices. Several versions of the post-empiricist philosophy of science lay claim to be interpretive enterprises. Yet their hermeneutic dimension is solely restricted to the interpretive correlations between theoretical terms and empirical data in process of theory construction. By contrast, the hermeneutic philosophy of science focuses on the interpretive-practical fore-structuring of this process.)

The second subject – the disclosure and the meaningful articulation of reality’s domain through scientific inquiry – is of ontological nature. Its treatment demands a hermeneutic ontology of how reality becomes meaningfully articulated within scientific practices. In addressing this subject, the hermeneutic philosophy of science counters any view that defends (or at least presupposes) the “diremption of reality”, i.e. the dichotomous division of the latter into a reality of “lived experience” an objectified reality that becomes alienated from the meaningfulness of this experience. The hermeneutic philosophy of science debunks the myth of a crucial divergence between what is meaningfully articulated and what becomes idealized and procedurally objectified. Taken together, the approaches to the meta-epistemological and the ontological subjects outline a unitary hermeneutic-ontological strategy of overcoming the “diremption of reality”. In this strategy, scientific inquiry is the only mode of being through which domains of reality become disclosed and meaningfully articulated while being subjected to procedural objectification. The hermeneutic philosophy of science needs neither the assumption that science is grounded in pre-scientific (lifeworld) experience and practices nor the assumption that within scientific inquiry there is a separation between the phronesis of practical constitution of contextual meanings and the procedural production of (allegedly) de-contextualized factuality. Against the first assumption this philosophy of science argues that all meanings instrumental in scientific inquiry are intrinsically produced, whereas the argument against the second assumption stresses that the same configurations of scientific practices which contextualize the articulation of meaning in the process of inquiry are also liable for the objectification of de-contextualized factuality. Overcoming the “diremption of reality” goes hand in hand with the formulation and defense of a thesis that I will call *interpretive internalism*.

A domain of scientific inquiry is originally disclosed as a thematically delimited region that contains a potentially infinite number of research objects. These are objects that might be constituted in the process of inquiry. Thus disclosed, the domain is indispensably prepared-to-be-articulated within a certain tendency to fore-having, fore-seeing, and fore-grasping the potentially existing research objects. Following this tendency, the process of inquiry reveals and conceals – in actualizing the appropriated research possibilities – what has been disclosed in a specific manner. The tendentious revealment and concealment of a scientific domain resulting from the tendentious choosing and appropriation of possibilities for doing research in the process of inquiry is the *characteristic hermeneutic situation* in which the domain exists. Being within such a situation, the process of inquiry selectively appropriates possibilities for doing research at the expense of ignoring and sedimenting possibilities that would reveal (and conceal) the domain in an alternative fashion. The appropriation and actualization of a possibility for doing research changes the very horizon of possibilities – new possibilities emerge and possibilities that have been previously available are fading

out. At the same time, actualizing a certain possibility makes the configuration of scientific practices in which it is appropriated into a particular context of meaningful articulation. The appropriation of a possibility for doing research indispensably contextualizes both the process of inquiry and the articulation of a domain.

In the thesis of interpretive internalism, science (as a mode of being in the world) articulates reality in a characteristic way due to the interplay of scientific practices and possibilities for doing research. In a corollary to this claim, the interrelated scientific practices, which disclose a domain of reality in a characteristic hermeneutic situation, enter into interplay with the possibilities upon which they project their interrelatedness whereby the domain disclosed becomes subjected – within this interplay – to an ongoing meaningful articulation. There are no meanings (and meaningful entities) in scientific inquiry constituted beyond the interplay of scientific practices and possibilities for doing research. Insisting on the tenability of interpretive internalism does not entail the claim that the process of inquiry is immune to the infusion of external themes, values, or goals. Scientific inquiry, especially under the conditions of technoscience, constantly reacts to its milieus by incorporating issues, problems, and task originating in a wide range of social-pragmatic contexts. It is precisely this incorporation that preserves the cognitive autonomy of scientific inquiry. The point is that the infusion of external task, themes, goals, etc. does not change the fact that all meanings operating in scientific inquiry are constituted within the interplay of scientific practices and possibilities for doing research. The cognitive autonomy of scientific inquiry is not enabled by a normative encapsulation of the process of inquiry. In interpretive internalism, this autonomy is rather achieved by an openness to the milieus that consists in a selective assimilation of external items.

Joseph Rouse makes the case that the totality of scientific practices can only be separated from the rest of the cultural world of practices for conventional or pragmatic reasons. It is impossible (and unreasonable) to present this totality as a self-sufficient realm and as “a separable component of the world whose interface with other components is readily localizable.” (Rouse 2002, 165) This is why the cultural studies of science he aims at “take as their object of investigation the traffic between scientific inquiry and those cultural practices and formations that philosophers of science have often regarded as ‘external’ to knowledge.” (Rouse 1996, 239) Any attempt at ascribing a significant autonomy to the realm of scientific practices faces the challenge of the traffic of technological, instrumental, experimental, and conceptual practices across the alleged boundaries. One can invoke in this regard also Rorty’s view that natural science is not a “natural kind”: There is no philosophically significant difference between the methodically organized practices of inquiry and the rest of human practices that – in an essentialist manner – divides culture into science and non-science. The hermeneutic realist does not deny the constant traffic (in Rouse’s sense) or the growing

diversification of (what Peter Galison calls) “trading zones” of practices that progressively efface the borderlines between scientific domains and their ambiances. Yet the hermeneutic realist denies that this effacement provides a rationale for abolishing the creation of cognitive autonomy within the hermeneutic circularity in which a domain of inquiry is disclosed, articulated, and objectified.

In adopting the Heideggerian distinction between factuality and facticity, one can state that the thesis of interpretive internalism presupposes *the production of procedurally objectified factuality within the facticity of inquiry*. The ongoing meaningful articulation of a domain taking place in the interplay of practices and possibilities is the facticity of scientific inquiry. The objectified factuality consists of discrete structures that result from embedding data models in theoretical models. More specifically, the procedural production of objectified factuality is distinguished by five steps. They are related to (1) the acquisition of data, (2) the discovery of patterns and the construction of data models, (3) the experimental construction of phenomena that are to be describes and measured by data models, (4) the embedding of data models (as “empirical algebras”) in theoretical models, and (5) the saving of experimentally constructed phenomena whereby theoretical objects become contextually envisioned. (Ginev 2016, 209-240) The facticity of scientific inquiry, in turn, is characterized by (a) the configurations of interrelated scientific practices, (b) the contextuality of inquiry, (c) the potentiality-for-being of what is disclosed in a characteristic hermeneutic situation, (d) the ever changing (and “inexhaustible”) horizon of possibilities for doing research, and (e) the entanglement of each particular context of inquiry with domain’s ongoing articulation.

The hermeneutic philosophy of science does not claim that there is one-to-one correspondence between the five steps of the procedural production of objectified factuality and the five traits characterizing the facticity of inquiry. It only argues that the *continuous* interplay of inquiry’s practices and possibilities constantly fore-structures – in the tendentious manner of a characteristic hermeneutic situation – the production of objectified factuality as it is expressed in *discrete* structures. The factuality is always already situated in this interplay which – in every particular context anew – transcends what becomes objectified. The figure of *situated transcendence* – i.e. the figure of ever moving horizon that at once contextualizes what is situated in it and transcends each and every context – is a hallmark of the way in which scientific inquiry constitutes its specificity and articulates/objectifies reality uniquely. The processual aspect of situated transcendence takes the form of hermeneutic circularity. There are several hermeneutic circles of different sorts that epitomize various dimensions of the production of factuality within the facticity of inquiry. Let me mention some of them: the circle of selecting data within whole of admissible measurements; the circle of constructing data models within the whole of the relevant theoretical interpretations of a phenomenon; the circle of designing pertinent experiments within the whole of theoretical predictions; the circle of

selecting patterns of data within the whole of (possible) theoretical models that can save a predicted phenomenon; the circle of constructing theoretical models within the whole of scenarios allowed by a basic mathematical formalism; the circle of performing particular measurements within the whole of possible formal operations with the measuring outcomes, etc. In all of these cases, there are unavoidable part-whole relations that consist in the mutuality and reciprocity between a transcending whole of possibilities and the situated choice of a possibility that has to be actualized. It is the totality of the hermeneutic circles of producing factuality-within-facticity that enables interpretive internalism of scientific inquiry, thereby enforcing science's cognitive specificity and autonomy by keeping hermeneutically open the process of inquiry.

Unfolding the thesis of interpretive internalism also defines the political agenda of the hermeneutic philosophy of science. In advocating interpretive internalism, this philosophy makes the case that there is nothing dangerous in having scientific inquiry that resists external "democratic control" and determines its own values and goals. Dangerous is rather the political insistence on such a control. Only scientific inquiry freed from social monitoring is able to serve societal needs, preventing at the same time a politically initiated scientification of societies, i.e. a scientification guided by dubious economic and political interests. What can be treated as a really menacing situation is the unduly proposed scientification of all spheres of socio-cultural life through sciences that are not able to preserve their cognitive autonomy, thereby becoming exposed to political control, manipulation, and misuse.

Evelyn Fox Keller formulated in the 1980s a dilemma that has subsequently played a pivotal role in science wars: Scientific knowledge is either the only kind of objective and truthful knowledge, or science is divorced from nature and married instead to culture, which implies that scientific knowledge is characterized by cultural relativism. Grasping the first horn of this dilemma would lead to the acknowledgement that only scientists are privy to objective truth and the authority of science is unassailable. (Fox Keller 1987, 45) Choosing the other alternative would compel us to make cultural relativism and the "polytheism of values" our religion. The champions of the hermeneutic philosophy of science believe that Fox Keller's formulation expresses in several respects a wrong dilemma. First, it incorrectly assumes an ontic dichotomy between nature and culture. Second, the formulation introduces the opposition between objective knowledge and relative knowledge within a Cartesian framework. But the most significant deficiency consists in ignoring the ways in which the objectivity of scientific knowledge is contextualized without becoming relativized. *Contextual objectivity without relativism* is a formula advocated by the hermeneutic philosophy of science. Following this formula as a counterpart of interpretive internalism has tremendous socio-political consequences for fighting scientism without undermining the authority of science.

The more adequate are the reactions of the research process to its milieu, the higher is the process of inquiry's plasticity and the leeway in choosing possible roads of inquiry. Without such a plasticity the external pressure would be destructive. On interpretative internalism, however, what becomes incorporated is not left unchanged. To reiterate, all themes, values, and goals infused in the process of inquiry become re-described in accordance with the possibilities that can be appropriated within the domain's articulation. The incorporation of external tasks in the autonomous research is an assimilation of these tasks within the proper horizon of interpretation. In other words, the meaning of what becomes incorporated is recast in accordance with the interplay of scientific practices and possibilities for doing research. As already indicated, the view of interpretative internalism states that all meaning and meaningful entities in scientific inquiry is constituted in the process of inquiry. Scientific inquiry does not permit the import of external meaning that cannot be made "congruent" with the possibilities generated by the practices of inquiry, i.e. the possibilities whose appropriation – by the same practices which generate them – meaningfully articulates the domain of inquiry. Only external units that can be integrated into the research process through the appropriation of possibilities generated by the very process are admissible. The interplay of practices and possibilities in scientific inquiry filtrates what can be adopted as a research task from the non-scientific social worlds. Thus considered, scientific inquiry not only articulates its domain, but constitutes its relevant social-political milieu. (If the process of inquiry proves to be unable to do this, it would become amenable to political pressure and manipulation.) Making external subjects, issues, problems, etc. to fit the intrinsic possibilities of doing research within the domain – and thereby incorporating the external demands into inquiry's interplay of practices and possibilities – turns to be the intrinsic device of preserving the facticity of scientific inquiry.

Curiously enough, well-elaborated case studies carried out by upholders of the so-called "finalization of science" – a controversial meta-scientific platform for investigating the incorporation of external aims into domains with "closed theories" whereby the formerly autonomous domains are transformed into socio-politically guided, task-oriented, research areas – have eloquently demonstrated that scientific inquiry manages to avoid the destiny of becoming a politically controlled and socially planned process thanks to its potential to project the being of entities implanted in contexts of inquiry upon its own horizons of possible research. By implication, the alleged finalization turns out to be rather a thematic proliferation of existing scientific domains. (Bonss, Hohlfeld, Kollek 1995) Thus, the selection of what should be counted as man-made factors of carcinogenesis is undoubtedly heavily dependent on political, commercial, and corporative interests. Identified as "entities" laden with such interests, these factors have been implanted – via the clinical discipline of oncology – in various research contexts of biochemistry, cell biology, genetics, histology, and developmental biology. During the post-war

development of the domains concerned the man-made carcinogenic factors have been abode by possibilities for studying anomalies in chromosomes, kinds of mutations, the transmission mechanism of genetic information, special metabolic chains within the cell, the ways in which antimetabolites operate as metabolism blockers, the interaction between viruses and cells at the genetic level, and trajectories of morphogenesis. (Hohlfeld 1983)

With regard to the way in which scientific inquiry discloses the reality, the hermeneutic philosophy of science put forward a kind of realism about what is ready to hand within changing configurations of readable technologies and spaces of representation in the research process. This claim is in need of a specification. Scientific research collects pertinent data by manipulating entities that are ready-to-hand within specifically constructed and/or conventionally delineated environments. The acquisition and processing of data take place in such environments. This is why the collected data are idiosyncratic to the instrumentally arranged environment in which they are produced. However, the process of inquiry manages – through the configurations of its practices – to distance itself from what is directly registered and read through the use of instruments, and to constitute research objects by modelling and saving phenomena.

It is the procedural distancing from the immediate manipulation of what is instrumentally ready-to-hand that enables and warrants the autonomy of the process of inquiry as this autonomy is epitomized by the thesis of interpretive internalism. Having a (reflexively controllable) theoretical distance from what is directly ready-to-hand in inquiry allows one not only to make theoretical predictions when saving phenomena, but also to devise and construct new instruments for verifying the predictions, thereby setting up new environments of immediate manipulation. But the way of distancing is prepared by the immediate manipulation and occurs within the environments of direct instrumentation. It is this instrumentation that produces distance from what is ready-to-hand in scientific inquiry. Therefore, arranging instrumental environments of data collection and (statistical) processing of data, on one the hand, and distancing from these environments for the sake of creating more sophisticated configurations of scientific practices, on the other, are events involved in relations of a mutual reinforcement. The (constructivist) attempts at coming to grips with these relations by employing models of strongly successive activities – from immediate manipulation of what is ready-to-hand to theoretical conceptualization – are doomed to failure. In stating this, I should like to raise the claim that the thesis of interpretive internalism is incompatible with any kind of constructivism. The discussion of this claim requires broadening the picture of scientific inquiry depicted so far.

The approaches to inquiry developed in science studies (SSK and STS) that prioritize practices over knowledge exclusively work with the concept of (scientific) practice as rule-following and goal-oriented actions. Accordingly, these approaches are firmly tied to the objectivist paradigm of conceptualizing practices

as discrete (factual) units. On this paradigm, any particular practice form a contexture-of-equipment in which all entities enacted by instruments become ready-to-hand. Designated by various expressions, the notion of a contexture-of-equipment plays a crucial role especially in the conceptions of New Experimentalism. It serves an important function in the hermeneutic philosophy of science as well. Nonetheless, this is only a subsidiary function. The picture of scientific inquiry as a diversity of discrete and self-enclosed contextures-of-equipment is not in harmony with the interpretive-phenomenological approach to scientific inquiry where the accent is placed on the continuity and the openness of the research process. Obviously, a laboratory's environment as structured around the research instruments provides the most typical case in point for a contexture-of-equipment in the process of inquiry. This is the environment in which science "brings objects 'home' and manipulate them on their own terms." (Knorr Cetina 1999, 27) The entities within this environment are ready-to-hand and subjected to the conditions of the local social order of a laboratory.

Yet the notion of contexture is also extendable to the empirical (objectifying) sciences which are working with controlled observations rather than with repeatable experiments. Most of the observatories might be considered as environmentally circumscribed contextures-of-equipment. The ground-based astronomical observatory equipped with a permanently mounted Newtonian reflector for lunar and planetary observations is the classical example. However, in many types of observatories the condition of environmental localization of data collection and data-processing via instruments is either not fulfilled or strongly modified. These are observatories with rather virtual contextures-of-equipment. The most interesting case in point in this regard is provided by the so-called Ocean Observatories Initiative – a research driven network organized by National Science Foundation. The confluence of a number of emerging new technological capabilities (satellites, fiber-optic submarine cables, telecommunication cables, new sensors enabling in situ measurements, data archival systems that can retrieve volumes of data from arrays of sensors, and computer networks that bring real-time data) allows researchers to collect data on various scales by measuring physical, chemical, geological, and biological variables. It is this confluence that creates a virtual contexture-of-equipment. Put differently, the contexture of data collection is the very network of costal, regional, and global observatories (plus the facilities required for calibration of instrumentation). Yet the registration of unknown phenomena as measured by data-models occurs, as a rule, not in this contexture, but in specifically configured practices of inquiry or in (what I call) contexts of inquiry. Thus, for instance, the prediction of change in the marine environment requires practices of theoretical conceptualization, construction of mathematically sophisticated models, and unfoldment of suitable interdisciplinary methods.

Though existing in a virtual environment, the contexture-of-environment of Ocean Observatory Initiative is clearly delineated. The next case shows that this

delineation is not always possible. I have in mind the case in which the environment of a research-driven data collection coincides with the environment of what is under investigation. The equalization of both environments, however, follows the way in which the respective domain of inquiry becomes disclosed in interrelated scientific practices. This equalization cannot take place before the incipience of the domain's meaningful articulation. This is why the proper environment of what is investigated takes the form of an environmental contexture-of-equipment. Thus, for instance, the presuppositions of how to gather relevant data inform the way of delineating a suitable contexture-of-equipment in the domain of studying ecological succession. At stake is the controlled observation of succession as a process undergone by ecosystems (such as forests), provided that these ecosystems achieve – in the phase of maturity – an equilibrium between the community of (populations of) living organisms and its physical environment. (The equilibrium indicates a steady-state of the ecological community.)

When ecologists are studying the successional modes of behavior, they are looking for patterns of successive stages. Establishing the physical environment in which such patterns of achieving ecosystems' equilibrium is a way of constituting a contexture-of-equipment. The entities in this environment are, in a sense, indirectly manipulable through the practices of controlled observation in ecosystem ecology. Identifying the patterns in question involves, for instance, (a) research activities of measuring the increasing organic content and the increasing differentiation of levels of the mature soil of the ecological community which achieves an equilibrium with its physical environment, (b) research activities of registering changes in community's structure resulting from the utilization of environmental resources, and (c) research activities of measuring the rate of replacement of populations of shorter-lived species by populations of longer-lived ones. All these activities – as involved in practices of controlled observation – indicate the way in which the physical environment becomes a contexture-of-equipment of dealing with entities that are, in a sense, ready-to-hand. Moreover, the successional dynamics through which an ecosystem achieves its maturity is measurable within this contexture.

Against the background of the examples cited, one is to state that the interlinked activities – each of them following its rules and algorithms – and the material resources they utilize form a contexture-of-equipment that includes basic instruments by means of which entities that are ready-to-hand become manipulated. On this account, ready-to-hand is what has the character of being manipulable. To reiterate, the contexture-of-equipment of a scientific practice is most typically exemplified by the classical research laboratory. Peter Galison (1987, 75-80) traces the genesis of what one might call “non-classical laboratory environment” back to Ernest Rutherford's electric counting devices and Charles T.R. Wilson's cloud chambers. The new laboratory environment was spatially designed to allow the execution of many experiments coordinated by groups of experimenters. The main distinctive feature of this environment as compared with the classical laboratory

consists in the need for answering the questions of when and how experiments end in an essentially new way. The end is to be sought in the manifold of theoretical beliefs and instrumental practices nourished by the growing complexity of the laboratory environment. Despite the growing complexity, the tendency toward enclosing (spatially, operatively, socially, and instrumentally) the contexture-of-equipment has not vanished. The changing “topology” of the laboratory spatiality offers new mechanisms of enclosing the experimental work in contextures-of-equipment.

To be sure, the contexture of any particular practice of experimentation is devised to be congruent with contextures organized by other scientific practices: There are entities ready-to-hand within it that can be transferred to other contextures. Yet each scientific practice keeps maximally enclosed its contexture-of-equipment. The practitioners manage to do this by retaining the entities manipulable within the contexture’s environment. The transfer (and the import) of manipulable entities to (from) other contextures create some regular links between contextures. Yet transferring and importing such entities is not sufficient to create and maintain a whole network of contextures. Moreover, the inquirers try to keep the particular contextures enclosed. Enclosing the contexture allows them to represent the outcome of practice’s multifarious performance through homogeneous semiotic means. The autonomy of the contexture-of-equipment and the homogeneity of the semiotic representation of experimental practice’s outcome go hand in hand.

Presumably, the laboratory contextures-of-equipment of research practices that collect pertinent data respond to natural orders by emulating them. It is a popular opinion that a laboratory has to reproduce a natural order. However, this opinion contradicts the thesis of interpretive internalism. In fact, the activities and actions taking place in a contexture-of-equipment respond only to what is meaningfully constituted within scientific inquiry. Elaborating on this formulation brings into play another important facet of interpretive internalism: Practices of experimentation, controlled observation, and data processing do not artificially reproduce or imitate a reality that is somewhere beyond the process of inquiry. Phrased differently, the readable technologies of these practices do not render objective factuality that is beyond – and not constituted within – the facticity of inquiry. Social constructivists seem to hold that it is the other way around. They consider the laboratory milieus as technological and semiotic embodiments of natural orders. Thus, according to Karin Knorr Cetina (1999, 26-32), the “natural order” becomes reconfigured as an order of signs in a laboratory contexture-of-equipment (that by itself is characterized by a local social order). From the reconstruction of natural events and processes through instruments of experimentation – so her argument goes – physicists creates variables (as second-order signs referring to data as first-order signs) that are designed to be employed in the formal models of theoretical physics. The reconstruction of natural orders and

the production of signs are construed in terms of practices of representation (in a sense more or less related to representational epistemology). In summary, the semiotic orders created within the socially organized environment of experimentation somehow reproduces something that is “out there”, and thus, what is studied becomes technological and semiotic artifacts constructed under laboratory conditions.

On this account, the semiotic reproduction and representation of natural orders is universally valid for all kinds of scientific inquiry. Knorr Cetina provides the example of astronomy as a discipline that has been transformed (after the use of photographic plate) from a kind of research that surveys natural phenomena (or, observational field research) into a research enterprise that processes images of these phenomena. The insistence on such a transformation, however, still implies a strong opposition between manipulable entities and natural phenomena. The effects and images produced through laboratory manipulations should (somehow) represent the natural phenomena. This is the point of the “enculturation of natural objects” conception. The hermeneutic philosophy of science denounces this opposition because it is at odds with thesis of interpretive internalism. All phenomena studied in the environments of scientific practices are meaningfully constituted within these environments. They are neither outcomes of transformations nor do they represent something that by itself is deprived of meaning. They are phenomena of the reality disclosed and meaningfully articulated by scientific practices. Knorr Cetina wrongly admits, in my view, that there is an initial process of imaging the natural phenomena that precedes the articulation of meaning within the laboratory contexture-of-equipment. There is no room for an absolute (non-contextualized) distinction between natural and “cultural” in scientific research since the very distinction is always already “encultured” and properly carried out in the contexts of inquiry and not beyond them.

All phenomena supposedly entitled to be saved in the research process are meaningfully produced within this process. (This claim is nicely defended by Paul Teller [2001] who – in contrast to Bas van Fraassen - argues that the phenomena to be saved are not to be directly described by empirical substructures of theoretical models. What data-models describe and measure are idealized and laboriously constructed phenomena that have little to do with the descriptions of phenomena predating data-models. Yet even these – more intuitive than methodically ruled – descriptions in the process of inquiry are always already contextualized by scientific practices. In admitting that scientific instruments create new phenomena, van Fraassen [2001] seems to accept Teller’s argument.¹) From a constructivist

¹ Some constructivists of the so-called Erlangen-Konstanz school radicalize this role of the instruments for experimentation, and go on to defend the view that the commonplace that technology is applied natural science has to be reversed – natural science is applied technology. According to them, only when the scope of the natural-scientific experience is strongly determined by the technological infrastructure of measuring, experimenting, and constructing phenomena, scientific inquiry begins to

viewpoint, scientific inquiry turns out to be enclosed in a large cycle that involves observable and unobservable phenomena, data-models that measure phenomena, theoretical models that save phenomena, theoretical entities that supposedly receive empirical interpretations through saved phenomena, and predictions about the existence of new phenomena that can be saved if they are constructible by instruments.

In contrast to constructive empiricists, social constructivists promise a way out of this cycle. Andrew Pickering and many others argue that behind every phenomenon lies a set of practices. This is an attractive formulation that implies multiple ways of arranging data, phenomena, models, and theoretical models, depending on the social contexts of inquiry. But it is burdened with an unpleasant problem consisting in the unclear status of “behind”. If practices are behind phenomena, then the former are causing the latter. Since practices supposedly “pertain” to culture, and phenomena are manifestations of nature, then the conclusion become unavoidable that culture is causing nature. The hermeneutic philosophy of science categorically rejects such an absurdity implied by the mysterious way in which practices are put behind phenomena. The champions of this philosophy insist that all phenomena are contextually revealed within contextualizing practices. Revealing-phenomena-within-practices is neither culture nor nature, and – what is much more important – it is not a causal (or whatever) relation of determination. It is rather a kind of hermeneutic circularity of meaningful articulation within the facticity of inquiry.

I agree, all phenomena are, in a sense, constructed – by selecting and proceeding patterned data – within contextures-of-equipment through employing instruments of experimentation. These phenomena – as measured by data-models – become saved by theoretical models constructed within theories that have predicted the phenomena’ existence. However, the whole constellation – the selection of data, the discovery of patterns in the data outputs, the construction of data-models, the measurements of phenomena, the conceptual work of making theoretical predictions, the construction of explanatory models by specifying theory’s mathematical formalism, the search for a morphism between data-models describing phenomena and explanatory models, and eventually the theoretical way of saving these phenomena – takes place “always already” within a context of scientific practices in which the phenomena are revealed and projected upon possibilities. By implication, all constructive procedures – regardless of whether they will be treated as purely cognitive procedures, or as manifestations of social processes of negotiations – are rendered possible within the contexts of phenomena’ revealing.

deploy the techniques of “idealizing stylization”. On this account, technology is not a particular sphere of social life, or a particular “symbolic form” (in Cassirer’s sense). Technology is the teleological essence of human existence and culture. (Janich 2015)

The distinction between a contexture-of-equipment (of a single practice) and a context of inquiry (formed by a configuration of practices) I introduced in the foregoing considerations looms large. It is a distinction that resonates the ontological difference between the objectified factuality and the facticity of inquiry. A single scientific practice is defined by (a) its functioning as a “readable technology” (Patrick Heelan), (b) its space of semiotic representation of what is read, and (c) its contexture-of-equipment where all entities being submitted to reading and representing are constantly ready-to-hand. Reading and representing are intertwined when producing meaningful results (expressible by signs of various kinds). A context of inquiry comes into being as a result of the appropriation of possibilities for doing research within a configuration of scientific practices. Thus, a context of inquiry contains the spaces of semiotic representation generated in the contextures-of-equipment of the practices involved in a configuration. Yet these spaces are not statically juxtaposed to one another. They constantly circulate and interpenetrate one another, thereby forming the semiotic expressivity of a context of inquiry.

The manipulation of entities within a particular contexture-of-equipment and its environment produces signs that from the very moment of their initiation are – in contrast to the manipulable entities – beyond the contexture. Stating that the manipulable entities are tied to the particular contextures-of-equipment whereas the signs produced by the manipulation of these entities are constantly beyond the environmental arrangement of any particular practice of inquiry is a statement that ought to be construed in connection with the claim that each contexture is always already within the interplay of practices and possibilities of inquiry. The production of signs by reading manipulable entities proceeds within this interplay. Accordingly, the production of new signs is impossible without translation of signs already produced. This is why one ought to hold the view that the semiosis in scientific inquiry is stretched out over the whole facticity of inquiry. The readable technology and the space of representation which distinguish a particular contexture transmit signs from one to another practice of inquiry, thereby enabling the circulation of signs within the interplay of practices and possibilities.

Since this translatability is not secondary to the semiosis but rather affords it, the circulation generates signs and symbols by translating semiotic systems across spaces of representation. In the sociology of scientific knowledge there is a tradition of specifying a class of scientific practices as representational practices. Though this tradition has produced several interesting views, the champions of the hermeneutic philosophy of science are not inclined to accept the separation of a special class of representational practices of inquiry. They rather try to show that each and every scientific practice is distinguished by a characteristic space of representation. This generalization of the representational dimension of scientific research might be vindicated by tackling the issue of how symbolically embodied representations-as mediate between the facticity of inquiry and the objectified factuality – a task that I

cannot undertake in this paper. It is the ongoing semiosis in scientific inquiry that tears the research process away of the particular environments and contextures-of-equipment.

From the viewpoint of hermeneutic phenomenology, interpretation of something-as-something is the primary engagement with the world that “circumspectively” (contextually) articulates the world. The articulated meaning is constantly represented-as-something. To represent something-as-something in the ongoing articulation of meaning is what Heidegger calls the hermeneutic-as of “circumspective concern”. Notoriously, Heidegger coins the expression “circumspective concern” for the pre-objectifying being-in-the-world and the corresponding meaningful articulation of the world. It is this interpretive mode of being that is entirely guided by the hermeneutic-as (as opposed to the apophantic-as of predication). The non-representational engagement with the world might be approached in naturalist terms by means of empirical studies that avoid Cartesian dualism. This should be a kind of naturalism without essentialism and objectivism, and without hypostatizing a concept of causality. Otherwise, the naturalist account of circumspective concern would run against the tenets of that ontology (and anthropology) which claim the primacy of the non-causal (and non-representationalist) engagement with the world. (An interpretive theory of behavioral coping with the environment – as such theories are at stake in AI and cognitive science – could be an appropriate candidate for providing the intended naturalist account. It is another question that presently there is no full-fledged theory of this type.)

In advocating the claim of interpretive internalism, the hermeneutic philosophy of science does not admit that the operative range of circumspective concern must be restricted to pre-scientific experience and practices. All practices and contexts of scientific inquiry are guided by circumspective concern as well. Yet the latter operates in science as intertwining of reading and representing that dissolve the stability of any referential representation in the sense of representational epistemology. All kinds of interpreting something-as-something in scientific inquiry take place in the contextual circulation of the research practices’ spaces of semiotic representation. The thesis of interpretive internalism implies that the hermeneutic-as operates not only in the circumspective constitution of pre-scientific meaning, but also in the meaningful articulation of reality’s domains within scientific inquiry.

REFERENCES

- Bonss, W., Hohlfeld, R. & Kollek, R. (1995). Die Risikoforschung als Problem der kulturhistorischen Dynamik der Wissenschaft, *Annuaire de L’Universite de Sofia. Centre de Culturologie* (Edited by D. Ginev) 84, 79-118.

- Fox Keller, E. (1987). The Gender/Science System: or, Is Sex to Gender As Nature Is To Science?, *Hypatia* 2(3): 37-49.
- Galison, P. (1987). *How Experiments End*. Chicago: The University of Chicago Press.
- Ginev, D. (2016). *Hermeneutic Realism. Reality within Scientific Inquiry*. Dordrecht: Springer.
- Hohlfeld, R. (1983). Cancer Research. A Study of Praxis-Related Theoretical Development in Chemistry, the Biosciences and Medicine. In: Schäfer, W. (Ed.) *Finalization in Science (The Social Orientation of Scientific Progress)* (pp. 123-178). Dordrecht, Boston: D. Reidel Publishing Company.
- Janich, P. (2015). *Handwerk und Mundwerk (Über das Herstellen von Wissen)*. München: C. H. Beck.
- Knorr Cetina, K. (1999). *Epistemic Cultures (How the Sciences Make Knowledge)*. Cambridge, Mass. And London: Harvard University Press.
- Rouse, J. (1996). *Engaging Science. How to Understand Its Practices Philosophically*. Ithaca and London: Cornell University Press.
- Rouse, J. (2002). *How Scientific Practices Matter (Reclaiming Philosophical Naturalism)*. Chicago and London: The University of Chicago Press.
- Teller, P. (2001). Whither Constructive Empiricism? *Philosophical Studies* 106: 123-150.
- van Fraassen, B. (2001). Constructive Empiricism Now. *Philosophical Studies* 106: 151-170.

