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IDEALIZATION IN SCIENCE:
A Methodological Reflection

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SUMMARY

Drawing from the example of Sigmund Koch's work, this paper examines the notion of scientific objectivity. Understanding "scientific objectivity" as a particular ideal which orients the production of scientific knowledge, I propose that scientific practitioners perform an idealization of their subject matter. This idealization is tacitly embedded within what Koch calls the "analytical pattern" of science. I speculate on the history of this embedding, sketching a route for the development of the notion of "scientific objectivity" from "pre-objective" phenomenal experience to the elaborated skillful activity of the scientific investigator. In the context of this skillful activity, idealization guides the making explicit of the tacitly experienced subject matter. It acts as a guide in the embodying of a set of values which the scientist upholds.

INTRODUCTION

This paper is guided by a particular trajectory initiated by Sigmund Koch, although it draws upon the work of both Michael Polanyi and Maurice Merleau-Ponty as well.[1] My concern is with the notion of scientific objectivity as a fundamental ideal which orients the production of scientific knowledge. I argue that the notion of objectivity performs this orienting function, in part, through suggesting to the scientific investigator a particular way of idealizing the subject matter investigated. I am using idealization in a particular sense in this article, that of a certain bodily striving to bring experience to language, a striving which, if I

read Koch, Polanyi, and Merleau-Ponty correctly, lies at the heart of scientific work. This use of idealization is intended to highlight the experiential and – as embodied in the experiential – the tradition-specific historical roots of scientific objectivity, the value-ladenness of these roots, and the questionable applicability of this notion of objectivity to psychology.

In the process, I hope to raise the following questions, and to a very modest extent, address them: What kind of idealization does a scientist employ "in doing science"? What is the history of this "idealization"? How is the idealization effective? But before I move into the discussion which raises these questions, directly or by implication, some prefatory notes are requisite.

SIGMUND KOCH: FROM REFLECTION TO ANALYSIS TO CLARIFICATION

I claimed, above, this article was guided by a particular trajectory initiated by Sigmund Koch. The trajectory, in brief, begins with reflective work that becomes a deeper analysis around the relationship of method to subject matter and culminates in a clarification of this relation. The basis for the initial reflective work emerged during Koch's supervision of the six volumes of *Psychology: A study of a science* (1959a; 1962; 1963) and coheres about the fact that "psychology was unique in the extent to which its institutionalization preceded its content and its methods preceded its problems" (Koch 1959b, p. 783). Consequently, psychology's history "is very much a history of changing views, doctrines, images about what to emulate in the natural sciences – especially physics" (Koch 1959b, p. 784). What psychologists latched onto was a (mis)conception about the methodology of the natural sciences, applied to their own discipline. The error here is compound: first, in unquestioningly fixating on natural science, as if "the method" – and the success – would "automatically" transfer to psychology. And second, in getting the method wrong. Koch (1965) calls this fixation "method fetishism"; Danziger (1990), equally irreverently and appropriately, "methodolatry". Based on these insights afforded by his initial reflective work, Koch begins work at correcting this compound error. This correctional work follows a particular trajectory, shifting from reflection to analysis.

Koch analyzes the methodology of the natural sciences more thoroughly and critically than has traditionally been done by psychologists. Instead of adopting the logical or rational reconstructive fictions advanced by traditional philosophy of science, as exemplified by logical positivism, Koch looks empirically at the practice of science. In this regard, he acknowledges Polanyi (1958) as peerless, in terms of a sustained and systematic uncovering of the personal responsibility necessary at each step of the scientific research process, precluding any possible

replacement of the responsibility by method, rule, or decision procedure. These practical-empirical reflections clear away some of the misconceptions about what scientific practice involves, and in so doing go some way toward clearing ground for understanding psychology as a science on its own terms; that is, in terms of its own, distinctively psychological, subject matter. Thus, in brief, the trajectory I follow is from an initial reflection on (some aspect of) scientific practice in terms of experience, to an analysis of what that practice involves, to a subsequent clarification of this practice by way of what the practice presupposes. The aspect of science on which I focus in this paper is the notion of scientific objectivity as an orienting ideal of scientific investigative practice, following the trajectory from reflection to analysis to clarification.

REFLECTING PERSONALLY ON SCIENTIFIC OBJECTIVITY

There is, of course, no shortage of critiques of scientific objectivity. Kuhn (1962) immediately comes to mind, from philosophy and history of science; there are numerous others within philosophy of science (e.g. Feyerabend, 1976). Many critiques are ideological, such as Marxist (e.g. Horkheimer & Adorno, 1972), feminist (e.g. Harding, 1986), social constructionist (e.g. Gergen, 1994; Shotter, 1993); to name only a few. The approach I am taking at present is somewhat different, and not merely because it is highly speculative, but primarily through its mode of access, which I shall dub "personal", following Polanyi's sense of the term as developed in *Personal Knowledge* (1958).

That is, I want to understand scientific objectivity not objectively, like some external "thing" I can prod from a safe distance, measure, assess, etc.; but rather personally, as a part of that same tradition which is formative of my person. I want to gain a perspective, through reflection, on that certain commitment called an "objective view" of the world which I live(d) prior to any reflection, in a sense to find the personal appeal of the notion "in me" prior to any appraisal of the notion; to find the way(s) my tradition lives me. This tentative phraseology aims to make clear that access to scientific objectivity, as a part of (my) tradition, is not restricted only to practicing scientists. I venture that even the child who learns that the sun's motion is apparent, as the earth is actually moving, has already become qualified to reflect, to the self-same extent, on "scientific objectivity" insofar as it has "transformed" their experience.

This objective may appear strange at first glance; but following Polanyi and the complementary work of Merleau-Ponty (1962), I am not taking either experience, as inarticulately but sensibly structured within the body, or language, naively. Both one's body and one's language are, as Merleau-Ponty wonderfully puts it, "pre-personal traditions", into which one is born. Becoming a person is a

taking on and assuming these traditions, finding oneself "there" within them. It is "there" that we feel comfortably ourselves, not because tradition is some external "thing" or body into which "our" body, language, and self, "fits" and "feels" comfortable, but because tradition is that non- or pre-external constitutive matrix that precedes, defines, and sets the very possibility of, and hence one's sense of, "externality", "fit", "feeling", "comfort", "self", and so on. One finds oneself "there" not because tradition occupies some space which one occupies, but because one's body and language as pre-personal traditions set out an intelligible locus of spatial orientation which one takes over in the self-same acts that define one as a person.

Science stands as one of the great traditions of Europe. It can be viewed as a tradition aimed at resolving a problematic relation of knowledge to authority, which resolution is best encapsulated in the notion of scientific objectivity. The ramifications of this resolution in every sphere of life continue to the present day, of course, and have either displaced or continue to contend with other traditions – religious, philosophical, etc. – in playing an essential role in the constitution of our knowledge, practices, and our selves. Therefore to put scientific objectivity in question, is to put my self, to some degree, in question. Science and the ideal of objectivity are some of the deeper-rooted constituents of my tradition, regardless of whether I wish or desire it so; in this sense they are – to some degree – constitutive of my person, not so much "against my will", but more accurately, before my will. Questioning this is the type of reflective effort Polanyi, Merleau-Ponty, and Koch are engaged in, and what is required of psychology, if it is to transform its misconception of natural science method positively.

IDEALIZATION AND APPARENT "SIMPLICITY"

Koch (1976) points out that "It took a prolonged development of ancillary knowledge, culminating in an act of genius, to disembed the laws of such simple systems as those defined by the pendulum, the inclined plane, or the motions of falling bodies" (p. 492). This is worth pondering for some moments: the pendulum or the inclined plane; seemingly very simple dynamics involved here. Yet it took centuries, indeed, millennia, to "disembed the laws of such simple systems". Perhaps nothing testifies better to the embeddedness, in a constitutional sense, of tradition within personal experience, than the incongruity between the length of time it takes a person to learn the mechanics of such systems today, and the centuries it took in history; from the Greeks to Galileo. Obviously, the simplicity of these systems is only in retrospect!

Why are they not so simple beforehand? The clue resides, I think, in Koch's notion of "disembedding". Simple systems are embedded in the complex,

ambiguous, polysemous involvements in the practically, emotionally, relationally, and epistemically jumbled opacity that mundane, ordinary experience becomes when we attempt to theorize it. To disembed distinctions, systems, and laws from this experience has been proven by history to be extraordinarily difficult. My claim is that in order to achieve this kind of disembedding, there has been a particular idealization, from experience but relying on a creative articulation of certain aspects of that experience. This creative articulation requires not only an embodied, feeling center, and a grammar (equally embodied, in a language) – both of which are intelligibly structured, as "pre-personal" traditions of body and language – but also the raising of their relation to a questionable and problematic status. To "idealize" is a bodily striving, to bring the inarticulate into language that feels appropriate as articulation of that experience.

This idealization, even before coming to be definitive of scientific objectivity, itself has a long history. To best make clear this notion of idealization, I will again cite Koch:

> What has come to be definitive of science, is a particular analytical pattern emerging first in classical modern astronomy, achieving more distinct fruition in Newtonian mechanics, and undergoing further differentiation in postclassical physics. ... [T]his pattern requires: (a) the disembedding from a domain of phenomena of a small family of "variables" which demarcate important aspects of the domain's structure, when that domain is considered as an idealized, momentary static system, and (b) that this family of variables be such, by virtue of appropriate internal relations, that it can be ordered to a mathematical or formal system capable of correctly describing changes in selected aspects of the system as a function of time and/or system changes describable as alterations of the "values" of specified variables.
> (Koch, 1976, pp. 491-2)

Rather than work through this concise and correspondingly dense description, I am concentrating only on the initial notion of "disembedding" which "this pattern requires". For my claim is that in this disembedding activity of the scientist there is already an idealization of the subject matter in a particular way, from which the remainder of Koch's description then follows. To get at this idealizing activity, I propose a speculative disentanglement of those "objective facts" usually read into "natural phenomena". In this way, the phenomenal experience prior to any ascription of objectivity is suggested, and highlights in what sense objectivity itself is an idealization from that experience. Attention to the experience highlights in what sense objectivity itself is an idealization from that experience. To do so, I first reverse Koch's sequence – from classical modern astronomy to Newtonian mechanics to postclassical physics – which brings us to pre-classical astronomy.

Reflection on astronomy outlines the "naive" phenomenal experience of "the stars", and demands imaginative co-operation in order to work one's way "under the history", and to make it "personal".

SPECULATION: ON THE TACIT, THE EXPLICIT, AND IDEALIZING

The stars, or "the heavens", are that which is the furthest away from us, in the ordinary sense of distant, in fact unreachably distant. The expanse of space in which the stars shine suggests an infinity, within which the finitude of distances situates itself. These inconceivable distances enable consistent and reliable measures over time. Landmarks erode, rivers change course, lakes dry out ... but the stars are always there, their positions gaugable on any clear night. Their positions are impervious to interference on the part of people, too; nothing we ever do could affect "the stars in their courses". Mythologies and cosmologies reflect this indifference and independence: the heavens have precedence over earthly things. Practically, this timelessness dovetails with the consistency of measures, as Greek astronomers could use Egyptian records over a thousand years old, but still approximately accurate. And further, this consistency was not only over time, but bore out an order in the stars, a non-human order revealed in the patterns of the zodiac, the cycle of the seasons, the equinox, the solstice. These various characteristics – of distance, of measure, of timelessness, of precedence (both of temporality and of significance), of independence from this-worldly matters (including human), and of order – taken together, underwrite a possible story of a cosmos utterly outside and unaffected by human affairs, which the human world of striving and doing, thinking and making, is "thrown up against". That is, these characteristics underwrite a possible story of the cosmos which within the European tradition has become definitive for "scientific objectivity". But there are numerous other characteristics derivable from the phenomenal experience of the heavens, as other traditions – Chinese, Arab, Mayan – bear out. And, these other civilizations which conceived of the stars in similar terms did not derive a notion of objectivity in the scientific sense, as Europe did. To put it differently, that these characteristics were present tacitly in the phenomenal experience of the stars, is not enough to determine their explicit characterization, and certainly not enough to explain why some of these characteristics become singled out – idealized – and not others. What else is required?

To continue this speculative reading, it would seem that also required is some sophistication in symbolic ordering in a formal sense, so as to enable communication, preservation, comparison, and so on; this in turn again presupposes some civilization to support these knowledge-related practices.

Symbolic ordering and civilization combine to make for traditions of articulation which make explicit certain features implicit in experience, and in turn build on, elaborate, and revise these articulations further (see Cassirer 1953). But again, none of these necessities are in themselves sufficient; nonwestern civilizations display these features but did not develop a comparable notion of scientific objectivity. That is, without a deeper understanding of the transformations wrought upon tacit experience (in this case, of "the heavens"), the ability of historical analysis to "explain" particular historical outcomes will prove inadequate. These transformations wrought upon experience must devolve upon some personal center, some human agent; but as I have been at pains to keep in the forefront throughout the discussion so far, this personal center is always and necessarily constituted, in its very assumption or manifestation of its agentic acts, by pre-personal traditions. The transformations wrought upon tacit experience which bring the experience to a particular articulation should be conceived as neither entire arbitrary nor creation ex nihilo. These extremes either ignore history, as manifest in tradition, or experience, as manifest in the person. To get at these transformations of experience, then, requires historical analysis but also a penetration into that which makes some particular transformation appealing in its implications, whether cognitively, morally, politically, and so on.[2] Ultimately, the appeal would have to be found in terms of orientations to what is good, or desirable, or ideal – the tack I have adopted in this paper – and these find their best expressions in terms of particular values, to which I return below.

At this point in the speculation, the notion of idealization becomes necessary. It can be defined as that which guides the transformations wrought upon experience in making the tacit explicit, or in different words, as that economy of the dynamic between tacit experience and making explicit, an economy configured in the particular language of a particular history. For the meaning of the experience – in this case, of "the heavens" – is neither reducible to some ahistorical, unproblematic direct perception of a stimulus, as traditional accounts of science would have it, nor is it entirely constructed in some arbitrary conventions of discourse, but it takes place in that mysterious and irreducible dynamic between the tacit and the explicit, between body and language. In making explicit certain characterizations implicit in the phenomenal experience of the stars, an idealization polarizes the possibilities in experience into a certain configuration. Certain possibilities are privileged in such a configuring, while others are ignored or downplayed. The idealization acts in a sense like a Gestalt principle, ordering the parts into some particular whole, which makes sense of those parts integrated in some singular, particular fashion. The ever more sophisticated idealizations employed by physics, then, are ever more inclusive reductions of the totality and complexity of phenomena implicit in our experience of the cosmos. Idealization capitalizes on the interplay between tacit possibilities and explicit realizations in

"acts of disembedding" by the scientist, skillful acts which integrate the accumulated knowledge of a tradition into the scientist's experience and then configures the subject matter under study, creatively, into a new light or meaning.

VALUES, SCIENTIFIC OBJECTIVITY, AND IMPLICATIONS

If we follow this reasoning and feel the speculation to be plausible thus far, the question that emerges at this point is: What guides this particular economy of idealization, this skilful utilization of the tradition? For the creative work here, is performed primarily tacitly; a mostly inarticulate skill of selecting and discarding, emphasizing and ignoring, that in contrast to claims from traditional views of science and to still-dominant views of science in psychology, cannot itself be replaced by a formal rule or method. If this creative work takes place both tacitly, in the body, and explicitly, in language, personal experience has to be understood nonreductively. That is, it cannot be understood by way of a reduction to a set of rules, propositions, or methods, or to social conventions of the time – though to be sure these all play some part – but by understanding the situation of personal experience both historically in relation to traditions, and personally, in relation to feeling, values, language, to name only some. The attempt to bring felt, bodily experience (which the scientist knows intimately, but inarticulately) to language needs a far richer exploration than rules of method. The notion of method substituting for this experience merely redescribes the problem, for any rule must be applied and this application presupposes an embodied involvement. Any formulation of method or rule relies, whether this is admitted or not, on some ascription of experiential application of the rule which is therefore not further reducible to a further rule. Rules and method do not ensure scientific objectivity. By the same logic, the guides of the creative work of the scientist appear as those values and beliefs, perhaps themselves as inarticulate as the skillful act of the scientist, embedded in the scientist's person and tradition. These are the values by which the scientist lives. Scientific objectivity must be understood, both historically and personally, in terms of the values which appeal to experience in tradition-specific ways.

Applying this line of reasoning with its concluding emphasis on values to the case at hand, what should be revealing here is the uncovering of the rootedness of "scientific objectivity" in the pre-scientific astronomic experience, and further the tradition-specific values which came to be implicit in the subsequent understanding of "scientific objectivity" as an ideal. Reminding ourselves of Koch's characterization of the application of this "idealized domain", that the domain "can be ordered" either formally or mathematically, and its behavior and behavioral changes over time, precisely described, and rendered predictable, what

values emerge as implicit in the transition from pre-idealized experience to an ideal of scientific objectivity? I highlight five points drawn from my above speculative description of pre-classical astronomy's "phenomenal experience of the stars".

First: the reliability of measures over time which the stars afforded, is converted into control on the part of the scientist. Rather than relying on "favorable conditions", such as a good vantage point and a clear sky, the scientist can create and manipulate the conditions. While the scientist still enters the now-idealized domain "on its terms", he or she knows, understands, describes, predicts, and controls those terms. The scientist in submitting to the terms of the domain simultaneously transforms his or her relationship to the domain into a relationship of instrumental value.

Second: the order displayed in the stars – a non-human order, timeless and independent of the human world – transformed into formal, systematic relationships of an ideal domain, come to be understood as knowledge of laws and truth independent of human making or thought, the reality underlying appearances and mere opinions; knowledge of this order lays claim to truth.

Third: the indifference and independence of the stars translates into an idealized domain that operates neutrally and impartially. Human involvement within this domain, e.g. an instrumental manipulation, disturbs the system but not its neutrality. Knowledge gained here is not only true, but applicable to all and any, and thus implies egalitarian value as the neutrality extends both ways: there is in principle no innate privilege accorded the knowers.

Fourth: as independent, the idealized system should also be accessible in principle to all and any. This accessibility argues for a bypassing of authority. As anti-authoritarian and anti-dogmatic, it has the value of supporting a freedom of access, not only for scientists in particular, but for all and any to be "enlightened" by knowledge. Objectivity argues, in political terms, for liberty.

Fifth: although independent of the human domain, that humans recognize its order, and that this recognition requires a skillful, creative activity of idealizing by a knower, combined with a demand for accessibility by all (in principle), leads not only to an intrinsically generated procedure of self-verification (i.e. replicability: description of the system, such as with a scientific finding, is repeatable) and further arrogates to itself a notion of a self-perpetuating accumulation of knowledge. It holds the promise, as an ideal, of knowledge as progressively freeing us from the ignorance, superstition, and suffering of the present, and thus has emancipatory appeal.

These values (instrumental control, truth, egalitarianism, liberty, progress, and emancipation) as transpositions of certain characteristics of the phenomenal experience of the stars (as distant, timeless, independent, orderly) are, I argue, tacit guides of the idealizing activity which is a crucial component of scientific investigation. They act as the tacit supports of what adherents of the scientific

tradition mean when they appeal to "scientific objectivity". A cursory look at these values embedded in scientific objectivity as an ideal confirms the historical specificity of the emergence of the ideal, in their being fundamental values of the Enlightenment, shaped in the confrontation with the dogmatic authority of the Church and a Church-supported Aristotelianism. As such, these values are embedded in scientific practices and continue to inform and orient notions we have today of truth, democracy, liberty, progress, etc. But, and here I remind the reader of those other ideological critiques of science which are also prevalent today, it is obvious that science as a widespread institutional practice has not obtained all the desired effects of realizing those values. In fact, on numerous occasions science has effectively realized the opposite. This being the case, not only does it appear incumbent to re-examine our scientific practices, but also, before applying these wholesale to psychology, acknowledge that the history and subject matter of psychology as a scientific discipline is radically different from that of the natural sciences.

The idealizations implicit in natural science practice as transposed from the ancients' experience of the heavens, may prove of even less applicability for deriving scientifically objective psychological knowledge than the myths and metaphysics of those self-same ancients. Consequently we had best ask, and in this the ground-breaking and complementary work of Koch, Polanyi, and Merleau-Ponty can serve as "idealized" guides, what kind of idealizations should psychology consider that are appropriate to its subject matter, and for its methodology; guided by what values, and to what end? For we cannot rely on rules or method to ensure scientific objectivity, but appear instead to need to engage in critical reflective work that orients us to our values, our history, and ultimately to our own personal experience – even if this experience is mostly inarticulate and grounded in traditions which precede us.

Notes

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2. The best example of a type of historical analysis which sustains this as an explicit theme is Charles Taylor's *Sources of the Self* (1989). In this regard see especially Ch. 12, "A digression on historical explanation".

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