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MERLEAU-PONTY'S EXISTENTIAL  
CONCEPTION OF SCIENCE  
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Maurice Merleau-Ponty is best known as a philosopher of science for his detailed investigations of psychology. Perhaps because of this, the significance of his work for a broader philosophical reflection on science has been overlooked. But Merleau-Ponty intended his work as a general investigation of the epistemological and ontological status of meaning and structure. The structures discovered through research in solid-state physics or molecular biology must be included within the scope of his inquiry as much as the more primary perceptual structures of color or visual depth. It is true that he often insisted that science cannot account for or understand a particular phenomenon, and went on to contrast his phenomenological discoveries with the inadequate analyses produced by science. But when Merleau-Ponty spoke of 'science' in this way, he used the term interchangeably with 'objective thought'. The task remains to show that scientific investigation can also be freed from the traditional prejudices of objective thought, and exhibited as a mode of human existence. Merleau-Ponty himself was admittedly ambivalent about this possibility, and he rarely thematized scientific research in the course of his investigations. The aim of this paper, however, is to develop an existential conception of science within the context of Merleau-Ponty's work. It seems clear to me that his project cannot be completed unless it incorporates science, and not just the body and the perceived world, poetry and history, painting and love.

Already in La Structure du Comportement, Merleau-Ponty insisted that the concept of 'structure' or 'form' employed by the Gestalt psychologists must be extended to the physical sciences as well:

But in reality, what Kohler shows with a few examples ought to be extended to all physical laws: they express a structure and have meaning only within this structure.<sup>1</sup> Merleau-Ponty's argument for this claim will be familiar to philosophers of science. The concepts and laws developed in science cannot be attached to the world one-by-one, but only as a structural whole, because any attempt to match physical law or theory with the world brings into play a host of other theories and theoretically informed descriptions of initial conditions.

The physical experiment is never the revelation of an isolated causal series: one verifies that the observed effect indeed obeys the presumed law by taking into account

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<sup>1</sup> Merleau-Ponty (1942), pp. 148-149, English Translation, p. 138. Future reference to this work will be denoted in the text by (1942, page number, E.T., page number).

a series of conditions, such as temperature, atmospheric pressure, altitude, in brief, a certain number of laws which constitute the proper object of the experiment. (1942, p. 150, E.T., p. 139)

Merleau-Ponty was most concerned to investigate the philosophical significance of this sense of 'structure'. In La Structure du Comportement, his principal target of attack was realism. A structure (or a "system of complementary laws" in science) cannot be regarded as an object existing in itself, but must be disclosed to a perceiving consciousness.

Thus form is not a physical reality, but an object of perception; without it physical science would have no meaning, moreover, since it is constructed with respect to it and in order to coordinate it.... [F]orm cannot be defined in terms of reality but in terms of knowledge, not as a thing of the perceived world but as a perceived whole.... (1942, p. 155, E.T., p. 143)

But it is insufficient to say that structure always is essentially related to consciousness, without clarifying what that relation is. Merleau-Ponty was equally insistent that structure cannot be constituted by a consciousness completely in possession of itself. His aim in Phénoménologie de la Perception was to investigate and undermine the shared assumptions which allowed realism and idealism to appear as opposed and exhaustive philosophical alternatives.<sup>2</sup> Only after thus clearing the ground can we develop a more adequate philosophical interpretation of the relation between consciousness, the structures of scientific laws, and the perceived world.

Realist interpretations of scientific theories have been widely discussed in recent philosophy of science. Many of the arguments for scientific realism acquire their force from critiques of idealism.<sup>3</sup> Merleau-Ponty's arguments against

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<sup>2</sup> Ian Hacking (1983) has persuasively argued that recent Anglophone debates over realism are better construed as debates over classification (with realism and nominalism as the opposing positions) rather than over existence (realism versus idealism). But for Merleau-Ponty, the dispute between realism and idealism concerned the constitution of meaning rather than existence. Moreover, since understood conceptual content in terms of structures and inferential relations rather than classification, his challenges to realist and idealist accounts of meaning incorporate the issues between realist and nominalist accounts of classification.

<sup>3</sup> Transcendental idealism is rarely taken seriously by Anglo-American philosophers of science. When they speak of "idealism", the word is usually interchangeable with

realism, and his attempt to articulate a nonidealist alternative to it should thus be of more than just historical interest.

I

Merleau-Ponty's attack on the antinomy of realism and idealism in ontology (and of empiricism and rationalism in epistemology) proceeded in two stages. He first argued that neither the body nor the perceived world can be understood on the basis of this antinomy. Only then was the argument extended to encompass all forms of cultural expression, science included. This strategy is particularly important in the case of science, since Merleau-Ponty argued that the meaning of scientific concepts and laws is dependent upon the world as disclosed through perception.

The whole universe of science is built upon the world as directly experienced, and if we want to subject science itself to rigorous scrutiny and arrive at a precise assessment of its meaning and scope, we must begin by reawakening the basic experience of the world of which science is a second-order expression.<sup>4</sup>

We shall have to return to this claim, and clarify the relation between this "basic experience of the world" and the "second-order expression" of it in science. But in order to do this, we must give some account of Merleau-Ponty's descriptions of sensation, the body, and the perceived world, which he regarded as the foundation of other meaningful structures.

Traditional analyses of perception begin with sensations, which are taken to be the given content of perceptual experience. Empiricists (as Merleau-Ponty used this label) take sensations to be the result of a causal interaction between the body and other objects in the world. Meaning arises through the habitual association of sequences of sensations. Rationalists (also Merleau-Ponty's descriptive label) regard the sensation as the given content upon which consciousness reflects and imposes meaning. Merleau-Ponty believes both positions share an error.

We started off from a world in itself which acted upon our

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"instrumentalism" or "empiricism," but more commonly in philosophy of science nowadays, the debates are between realists and social constructivists rather than realists and empiricists (for a good recent survey of the debates, see Kukla 2000). Because Merleau-Ponty's arguments against "idealism" attack the possibility of any autonomous source for the constitution of meaning, they readily extend to arguments against any of these forms of antirealism (empiricist, transcendental idealist, or social constructivist).

<sup>4</sup>Merleau-Ponty (1945), pp. II-III, English translation, p. viii. Future references to this work will be denoted in the text by (1945, page number, E.T., page number).

eyes so as to cause us to see it, and we now have consciousness of or thought about the world, but the nature of this world remains unchanged: it is still defined by the mutual exteriority of its parts, and is merely duplicated throughout its extent by a thought which sustains it. (1945, p. 49, E.T., p. 39)

Both accounts overlook the meaningful structure of the perceptual field itself. A perceived figure always stands out against a background. The ground is not a given content. Its content is indefinite, receding from awareness as the figure stands out. It is not given, since it continues behind the figure (and is perceived as such), and is not confined by the physical limits of the visual field. The ground fades out and continues beyond what we explicitly see; it is there as a potential field to be explored, to be transformed into figure, and it is there perceptually. We do not have to imagine the continuity of the visual field, we see it (even though we do not see what it continues as) (1945, p. 321, E.T. p. 277).

There is more to the perceived figure too than is actually given. It has a back side whose "virtual figure" (its implicit presentation to a possible observer elsewhere) contributes to its perceived sense. If our sense of how the figure continues is violated by further exploration, its look is transformed upon return to our original view. The house which upon further exploration turns out to be only a facade later looks like a facade. The figure stands out from the ground, but its sense is rooted in the ground, in what is perceptually present but not explicitly seen. As Merleau-Ponty pointed out, it is only through this horizontal structure that the perceived object retains its identity throughout our exploration of it (1945, p. 82, E.T., p. 68). When Merleau-Ponty said that

Perception...is not even an act, a deliberate taking up of a position; it is the background from which all acts stand out, and is presupposed by them (1945, p. v, E.T., p. x-xi), he was using the word 'act' in two different senses. Perceiving is not a pure activity of consciousness, not an explicit synthesis or taking of a position; the perceived object in turn is not pure actuality, but is laden with potentiality which can never be made fully determinate. We are situated in a perceptual field, which we cannot make fully explicit because we inhabit it.

The body which we are is not an object in the world either. The body is unified not through an explicit synthesis of its parts, but through a tacit grasp of its possibilities. The body is of space, not in it (1945, p. 173, E.T., p. 148). Thus, Merleau-Ponty insisted that

What counts for the orientation of the spectacle is not my body as it in fact is, as a thing in objective space, but as a system of possible actions, a virtual body with its phenomenal 'place' defined by its task and situation. My body is wherever there is something to be done. (1945, p.

289, E.T., p. 249-250)

This grasp of possibilities, this "I can" which is embodiment, cannot be a purely intellectual synthesis either. The body is directed toward a situation, and is not explicitly deployed, but rather responds to that situation as a field of potentialities. The body touches and sees, but is also seen and touched. It is subject to disease, to deformity, to clumsiness, in short, to incapacities which it cannot fully comprehend.

[Rationalism] was itself unable to account for the variety of experience, for the element of senselessness in it, for the contingency of contents. Bodily experience forces us to acknowledge an imposition of meaning which is not the work of a universal constituting consciousness, a meaning which clings to certain content. My body is that meaningful core which behaves like a general function, and which nevertheless exists, and is susceptible to disease. (1945, p. 172. e.t., p. 147)

Merleau-Ponty argued that there is a mutual implication between the body as I live it and the perceived world. The ambiguity and potentiality with which I inhabit my body extend to the world as well. For Merleau-Ponty, the world cannot be taken for granted as something existing independently of us. He insisted that,

We must not, therefore, wonder whether we really perceive a world, we must instead say: the world is what we perceive. (1945, p. xi, E.T., p. xvi)

The body is intentionally directed toward the world; we are a "motor project". Through its explorations, it acquires the capabilities which constitute it, and the world is disclosed to us. The structure and style of the world are correlates of our bodily style of investigation.<sup>5</sup>

[W]e have found underneath the objective and detached knowledge of the body that other knowledge which we have of it in virtue of its always being with us and of the fact that we are our body. In the same way we shall need to reawaken our experience of the world as it appears to us in so far as we perceive the world with our body. (1945, p. 239, E.T., p. 206)

The body is its intentional relatedness to the world and the world is likewise constituted through that relation.

Merleau-Ponty supported this claim by examining some of the important structures of the world as perceived. He extended his earlier arguments against reducing sensations to given contents by arguing that they are modulations of the world as inhabited by my body.

When we say that red increases the compass of our reactions,

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<sup>5</sup>The interplay between intersubjective and personal aspects of bodily structure and style is an important topic which we are unable to discuss here.

we are not to be understood as having in mind two distinct facts, a sensation of redness and motor reactions--we must be understood as meaning that red, by its texture as followed and adhered to by our gaze, is already the amplification of our motor being. (1945, p. 245, E.T., p. 211)

Just as the body is not a collection of discrete organs, but a unified intentional project, so sensations have intersensory significance. Merleau-Ponty reported that we see and hear hardness and brittleness, that weight and elasticity are visible (1945, pp. 265-666, E.T. pp. 229-230, and that (citing Cézanne with approval) we should be able to paint even odors<sup>6</sup>. He concluded,

...the sensible has not only a motor and vital significance, but is nothing other than a certain way of being in the world suggested to us from some point in space, and seized and acted upon by our body, provided that it is capable of doing so, so that sensation is literally a form of communion. (1945, pp. 245-246, E.T., p. 212)

The spatiality of the perceived world is likewise the intentional correlate of the spatiality and motility of the body. Space is oriented into vertical and horizontal fields, whose senses are not interchangeable. Depth is not an interchangeable dimension, either (it is not breadth turned endways). Indeed, it can never be understood objectively since, as Merleau-Ponty observed, "it quite clearly belongs to the perspective and not to things" (1945, p. 296, E.T., p. 256). Space is laid out along the course of our potential projects within it; it always already has a significance.

The vertical and the horizontal, the near and the far, are abstract designations for one single form of being in a situation, and they presuppose the same setting face to face of subject and world. (1945, p. 309, E.T., p. 267)

Perceived movement is rooted in the bodily grasp we have upon the world as a situation into which we project ourselves. Only because our gaze is "lodged and anchored" in a setting, and yet is "attracted" and "drags at its anchors" do we see movement (1945, p. 322, E.T., p. 278). Movement is a solicitation to our body to track the moving thing against a field in which we are already established. Thus, space as described in geometry cannot encompass orientation, movement, or significance. Only a space which is centered upon and directed from the body can characterize the world perceived. Even the thing in space is a correlate of our embodiment. Its unity through a manifold of appearances reflects the felt unity of the body which explores it, and which can track the exploration so as to record its present manifestation as the outcome of past exploration and a

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<sup>6</sup>Merleau-Ponty (1948), p. 28, English translation, p. 15.

solicitation to encounter more of it.<sup>7</sup>

The thing is correlative to my body and in more general terms, to my existence, of which my body is merely the stabilized structure. It is constituted in the hold my body takes upon it....(1945, p. 369, E.T., p. 320)

Merleau-Ponty had been arguing against the conception of the perceived world as a universe of objects in geometrical space. This argument attacks not just the realist sense of the world, but also that of the idealist or social constructivist for whom the world (or its sense) is constituted by consciousness (or a community united by language, interest, or shared beliefs and norms). They share the same misconception: in neither case is subjectivity found within the world. Thus, Merleau-Ponty concluded,

We must conceive the perspectives and the point of view as our insertion in the world-as-an-individual, and perception, no longer as a constitution of the true object, but as our inherence in things. (1945, p. 403, E.T., pp. 350-351)

The relation between body and world cannot be understood abstractly, because it depends upon the real presence of body to world. Just as a motor skill cannot be accurately simulated in the absence of the object to which it skillfully responds, so the object cannot be adequately grasped without understanding its significance for the human capabilities it extends. Body and world become what they are through the motivated exploratory activities of embodied subjects.

I have the world as an incomplete individual, through the agency of my body as the potentiality of this world, and I have the positing of objects through that of my body, or conversely the positing of my body through that of objects, not as any kind of logical implication, as we determine an unknown size through its objective relations to given sizes, but in a real implication, and because my body is a movement towards the world, and the world my body's point of support. (1945, p. 402, E.T., p. 350)

This correlation between body and world does not imply some sort of relativism, since the world is never possessed or determined by the body, and because the body is not a thing, but an open system of possibilities. The world always exceeds what I make of it, and often resists it. I encounter the world as having irreducibly opaque and alien aspects, which cannot be accounted for by some other projection of the world which is the true one, and thus explains the world's resistance to my projects.

[A]ny attempt to define the thing either as a pole of my

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<sup>7</sup>For a detailed exposition of this claim, see Todes (1966). pp. 262-265.



bodily life, or as a permanent possibility of sensations, or as a synthesis of appearances, puts in place of the thing itself in its primordial being an imperfect reconstruction of the thing with the aid of bits and pieces of subjective provenance....What is given is....something transcendent standing in the wake of subjectivity. (1945, pp. 375-376, E.T., p. 325)

The body-subject does not remain unaffected by its encounter with transcendent things, either. It does not impose a project and a perspective upon the world, but rather discovers the world through its project, which it adjusts in response to what is discovered. Merleau-Ponty repeatedly described body and world as being in communication, each becoming what it is in response to the other.

## II

We are now prepared to ask how the world conceived in scientific theory stands in relation to the perceived world. I have already cited Merleau-Ponty's claim that science is a "second-order expression" of the world that is disclosed prereflectively to the embodied perceiving subject. We can now see why this claim has no affinity to that empiricist approach to understanding science, which attempts to reduce the sense of its results to the contents of sensation. Merleau-Ponty thought perception is misunderstood if regarded merely as the presence of a certain sensory content. Perception is not something given, but rather an openness to further determination. Perception gives us not sensations, but a hold upon the world. The perceiving subject is open to new forms of expression, including science, which reflect back upon, and even transform its original sense of the world. Merleau-Ponty's concern was not to show that science (or any other cultural form of expression) adds nothing original to the world as perceived, but to show how its contribution is rooted in our prior familiarity with that world. Science presupposes perceptual consciousness, without being reducible to it. Merleau-Ponty called this relation between science and the perceived world a

...two-way relationship that phenomenology has called Fundierung: the founding term or originator---time, the unreflective, the fact, language, perception---is primary in the sense that the originated is presented as a determinate or explicit form of the originator, which prevents the latter from reabsorbing the former, and yet the originator is not primary in the empiricist sense and the originated is not simply derived, since it is through the originated that the originator is made manifest. (1945, p. 451, E.T., p. 394)

At several points (1942, p. 227, E.T., p. 210; 1945, pp. 151-152, E.T., p. 130), Merleau-Ponty indicated that the model for his account of the relation of "Fundierung" is the relation between already acquired concepts and meanings, and original

speech which creates new meaning. Acquired meanings and originating speech always have a reciprocal relationship. All original speech rests on a background of already understood speech. Even the small child who does not yet speak encounters language as something already achieved, as a meaningful "world" already enveloping him or her, which he or she must gradually catch on to. When I speak, and do not merely repeat a thought previously articulated, I build upon a background of prior acquisitions.

Speech is, therefore, that paradoxical operation through which, by using words of a given sense, and already available meanings, we try to follow up an intention which necessarily outstrips, modifies, and itself, in the last analysis, stabilizes the meanings of the words which translate it. (1945, pp. 455-446, E.T., p. 389)

This last phrase illustrates the other side of the reciprocal relation between constituted and originating speech. For if all speech rests on an already acquired conceptual background, that background itself was acquired through earlier originating acts of speech. Merleau-Ponty took originating speech as that upon which constituted speech is founded. Constituted language is made manifest only through the ways it is taken up and used, and yet it alone opens up the expressive possibilities which originating speech actualizes.

The decisive question for Merleau-Ponty was how original expression can be achieved. How, given a stock of words already at our command, can new meanings arise and be understood? He prepared his answer to this question by considering how we come to understand gestures. Gestures are not natural signs, which are simply seen as one might see an object. If they were, the specificity of our understanding of gestures would be inexplicable.

If [the meaning of a gesture] were given to me as a thing, it is not clear why my understanding of gestures should for the most part be confined to human ones. I do not 'understand' the sexual pantomime of the dog, still less of the cockchafer or the praying mantis. I do not even understand the expression of the emotions in primitive peoples or in circles too unlike the ones in which I move. (1945, p. 215, E.T., p. 184)

The reason for this inability is that gestures are not signs that I interpret in a cognitive operation, but bodily possibilities that I comprehend by taking them up as an expressive potential of my own. It is not that I act out the gesture of the other, but rather that I recognize my own possibilities for expression in hers.

The communication or comprehension of gestures comes about through the reciprocity of my intentions and the gestures of others, of my gestures and intentions discernible in the conduct of other people. It is as if the other person's

intention inhabited my body and mine his. (1945, p. 215, E.T., p.185)

The meaning of a gesture is not self-contained, but is inseparable from its insertion in a world that it points toward and further articulates as a space of possible expression. Gestures cannot simply be described as conventional, since without some prior grasp of the expressive possibility of the gesture, it is unclear how the convention could ever be proposed and agreed upon.

What is true of gestures is true of "linguistic gestures" (1945, p. 217, E.T., p. 186) as well. Merleau-Ponty claimed, The spoken word is a genuine gesture, and it contains its meaning in the same way as the gesture contains its. (1945, p. 214, E.T., p. 183)

There is to be sure a difference in that the gesture is mute, and can indicate only relations with the surrounding world, while the spoken sentence "aims at a mental setting which is not given to everybody" (1945, p. 217, E.T., p. 186). But Merleau-Ponty insisted that the cultural background we share with others provides a surrogate "world" within which linguistic gestures may function.

Available meanings, in other words former acts of expression, establish between speaking subjects a common world, to which the words being uttered in their novelty refer as does the gesture to the perceptible world. (1945, p. 217, E.T., p. 186)

Learning language, or learning a new meaning for a word within a language, is not a matter of grasping a meaning privately and cognitively, then assigning to it a conventional sign. I take up a possible use of a word and make it part of my repertoire of expressive skills. Constituted language is not a transparent acquisition, but an expressive power bound to the situations to which it can respond.

The word has never been inspected, analyzed, known, and constituted, but caught and taken up by a power of speech and, in the last analysis, by a motor power given to me along with the first experience I have of my body and its perceptual and practical fields. As for the meaning of a word, I learn to use it as I learn to use a tool, by seeing it used in the context of a certain situation. (1945, p. 462, E.T., p. 403)

Why is it, then that words often seem straightforwardly comprehensible, independent of the particular vocal modulations or inscriptions in which they are embodied, and without reference to the situations within which I first learned them? Merleau-Ponty claimed that the familiarity of speech, and of the already constituted meanings within which most of our speaking is confined, conceals from us the obscurity and ambiguity which lies behind those familiar expressions. We overlook that what is now habitual and obvious was once only an obscurely grasped

possibility; the obscurity has been forgotten rather than removed.

We think that language is more transparent than music because most of the time we remain within the bounds of constituted language, we provide ourselves with available meanings, and in our definitions we are content, like the dictionary, to explain meanings in terms of each other. The meaning of a sentence appears intelligible throughout, detachable from the sentence and finitely self-subsistent in our intelligible world, because we presuppose as given all those exchanges, owed to the history of the language, which contribute to determining its sense. (1945, p. 219, E.T., p. 188)

I "inhabit" these acquired meanings analogously to the way I inhabit a familiar space, not through a familiarity born only of habit and repetition, but through appropriating them into my capabilities. The meanings which I acquire are not a fixed "conceptual scheme" which can be taken as a self-enclosed structure. They point beyond themselves toward the expressive possibilities that arise out of them, just as my body outruns itself towards the world.

[My] acquired thoughts are not a final gain, they continually draw their sustenance from my present thought, they offer me a meaning, but I give it back to them.... Thus what is acquired is truly acquired only if it is taken up again in a fresh momentum of thought, and a thought is assigned to its place only if it takes up its place itself. (1945, p. 151, E.T., p. 130)

It is thus not coincidental that Merleau-Ponty's phenomenology of perceptual consciousness ended in discussions of temporality and freedom. We have seen that originating speech (and the same could be said of other forms of expression) arises obscurely out of its history and projects itself indefinitely into the future. What is already achieved can only be understood through how it lends itself to that indefinite and ambiguously delineated future, which in turn is rooted in those prior achievements without being determined by them.

The meaning of a sentence is its import or intention, which once more presupposes a departure and arrival point, an aim and a point of view. (1945, p. 491, E.T., p. 430)

We can infer that the relation of Fundierung which Merleau-Ponty claimed to hold between the theoretical constructions of science and the perceived world, which was modeled on the relation between originating and constituted speech, is essentially a temporal relation.

How might this affect the philosophy of science? Presumably Merleau-Ponty would have insisted, with Kuhn and Lakatos, that the philosophically significant unit of science must be the research program rather than the theory. The sense of a theory cannot be confined to its explicit content any more than could

the sense of ordinary utterances. Theories have temporal horizons, which are integral to what they say about the world. They cannot be adequately understood except as the outcome of other theories proposed and investigated, and as the progenitor of further research as yet only partially anticipated. Such research brings out dimensions of meaning only latent in the theories upon which that research was based. The sense of current theories thus has yet to be fully disclosed; they are laden with potential. Only when those theories cease to play a role in ongoing research, that is, when they cease to be scientifically significant, will they escape this open-ended incompleteness.

That is why Merleau-Ponty rejected any formalized interpretation of scientific theories. Only a completed theory (or a theory taken as if completed, shorn of its temporal horizons) could be formalized, he would have argued. But as a result, formal philosophies of science must overlook the elements of invention and discovery which comprise scientific research. Science formalized is science dead.

Although attempts at formalization may be conceived, it is in any case quite certain that they lay no claim to provide a logic of invention and that no logical definition of a triangle could rival, for abundant variety, the actual sight of the figure, or enable us to reach, through a series of formal operations, conclusions not already established by the aid of intuition... [T]he fact that formalization is always retrospective proves that it is never otherwise than apparently complete, and that formal thought feeds on intuitive thought. (1945, p. 441, E.T., p. 385)

This emphasis might suggest that Merleau-Ponty's principal contribution to the philosophy of science, in Anglo-American terms, was to assign priority to the context of discovery over the context of justification. But to read him this way is to overlook important subtleties in his position. Merleau-Ponty's work demands that we look at the relation between discovery and justification in a new way, and this can lead us to a new understanding of the philosophical issues surrounding justification.

There was never a question of justifying the atemporal validity of an utterance for Merleau-Ponty. Taken out of its historical context, the utterance has no validity. Whatever sense it makes rests upon the obscurity of past utterances which now function as familiar and unquestioned acquisitions. It may be argued against this claim that the truth of an utterance does not depend upon its history. No matter what led me to make a particular claim, its truth or falsity will depend only upon how the world is. But Merleau-Ponty could make at least three responses to this objection. The first is that there is more to justification than truth. Any utterance, he remarked, has a whole 'sedimentary history' which is not only relevant to the

genesis of my thought, but which determines its significance (sens) (1945, p. 452-443, E.T., p. 395). Thus both the sense of what is being said about the world, and the significance it has for science, depend upon this sedimentary history. There are, after all innumerable truths with no scientific import, and well justified, significant scientific claims which are false. Scientific claims are evaluated for what they contribute to scientific understanding as a whole. Scientific understanding is not an accumulating stock of truths, but involves ever-shifting capacities which are not simply the sum of their parts. Scientific understanding is constantly being renewed and reorganized. It is no accident that science continually outruns its textbooks, since a new discovery affects the significance of past achievements, if only by redirecting the project of research in terms of which that significance is assessed.

Merleau-Ponty's epistemological holism, which I cited earlier, is the basis for his second response. Scientific claims form a structure, from which the contribution of a particular claim cannot be disentangled. Confirming or challenging a scientific claim confirms or challenges a whole scientific approach to the world. Accepting or rejecting a particular claim never leaves unaffected the rest of the discipline to which it belongs. If one claim stands out as inviolable, or conversely as the likely source of error, this can only be on the basis of its place within an ongoing program of research. This consideration then leads to the third and final point. We have already seen that a scientific theory expresses more than its explicit content. Like the perceptual figure whose sense cannot be confined to what is given but must be understood as a solicitation to explore further, as a not fully definite anticipation of what is to come, the scientific claim points beyond itself. Its sense (and its truth) includes its anticipation of possibilities for further research.

The actual possession of the true idea does not, therefore, entitle us to predicate an intelligible abode of adequate thought and absolute productivity, it establishes merely a 'teleology' of consciousness which, from this first instrument, will forge more perfect ones, and these in turn more perfect ones, and so on endlessly. (1945, p. 453, E.T., pp. 395-396)

Scientific claims are justified not by their final correctness, but by their contribution to further research. Thus, even false claims are justified through the eventual disclosure of their error and the significance which this discovery has for subsequent research.

For there is not one of my actions, not one of even my fallacious thoughts, once it is adhered to, which has not been directed towards a value or a truth, and which, in consequence, does not retain its permanent relevance in the subsequent course of my life, not only as an indelible fact,

but also as a necessary stage on the road to the more complete truths or values which I have since recognized.

(1945, p. 451, E.T., p. 393)

Merleau-Ponty illustrated this claim that scientific statements must be understood with reference to their solicitation of further investigation with an extended discussion of geometrical proof. It may seem odd to take an example from mathematics without asking whether it could be straightforwardly extended to the empirical sciences. But Merleau-Ponty wrote in the context of Husserl's argument that what was essential to the development of a science of nature was the indirect application of geometry and geometrical thinking to the natural world.<sup>8</sup> To examine geometry in this philosophical context would be to examine the foundations of physical science. Merleau-Ponty began by pointing out that even the simplest geometrical proofs require constructions. Why is a line through the apex of the triangle and parallel to its opposite side significant when other equally constructable lines are not? How is there a direction (sens) to the proof? How, that is, is the movement possible from a given figure to the demonstration that its angles are equal to two right angles?

It is because my perception of the triangle was not, so to speak, fixed and dead, for the drawing of the triangle on the paper was merely its outer covering; it was traversed by lines of force, and everywhere in it new directions not traced out yet possible came to light. In so far as the triangle was implied in my hold on the world, it was bursting with indefinite possibilities of which the construction actually drawn was merely one. It possesses a demonstrative value because I cause it to emerge from the dynamic formula of the triangle. (my emphasis) (1945, p. 443, E.T., p. 386)

The point can clearly be extended to the theoretical constructions of empirical science, which are "not a collection of objective 'characteristics', but the formula of an attitude, a certain modality of my hold on the world, a structure, in short" (1945, p. 442, E.T., p. 386).

Scientific theories are thus neither purely self-contained structures, nor are they reducible to actual observations which embody them, as empiricists have tried to claim. In this respect, they are like the "virtual figures" we experience in perception (the figures anticipated as the outcomes of possible exploration). Thus, for example, physicists' concept of force is not reducible to any actual experience of forces in the world. But it cannot be understood without some appreciation of how it transforms how physicists see the world and cope with it (this I believe, exemplifies what Merleau-Ponty meant by "a modality of

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<sup>8</sup>Husserl (1945), PP. 20-36, 365-386.

my hold on the world"). His point here is comparable to one made by Kuhn in introducing the concept of a paradigm.<sup>9</sup> Kuhn suggested that the content of scientific theory was embedded in a range of concrete applications. Newton's Laws, he argued, cannot be appropriately understood apart from an ability to pick out the relevant forces, masses, and accelerations in an open-ended variety of actual problem situations. Merleau-Ponty's interpretation would have been that a paradigm in this sense is not reducible to a given content, but is grasped as a skill, which is flexibly applicable to new situations. Such further applications are neither totally unforeseen, nor fully worked out. In examining a new problem, the scientist sees it "traversed by lines of force", and "bursting with indefinite possibilities". These possibilities, as "virtual figures", are the intentional correlates of scientific skills, the ability to follow out those lines of force and develop explicitly the possibilities latent within one's present grasp of the situation. Just as in learning a physical skill like hammering a nail, I learn not a repetitive series of movements, but a flexible skill responsive to new demands (one can fairly easily hammer upside down or backhanded without having to completely relearn the skill); so in learning a scientific theory as a scientist does, one acquires a repertoire of skills for seeing, imagining, and manipulating the world in new ways.

### III

We are now prepared to assess Merleau-Ponty's criticism of realist interpretations of science. It is a nuanced criticism rather than a total rejection of realism.

As philosophy, realism is an error because it transposes into dogmatic thesis an experience which it deforms or renders impossible by that very fact. But it is a motivated error; it rests on an authentic phenomenon which philosophy has the function of making explicit. (1942, p. 233, E.T., p. 216)

What is this authentic phenomenon which realism supposedly misunderstands? It has two aspects, one linguistic, the other experiential. First, realism takes at face value the apparent transparency of language. Words seem to efface themselves and take us directly to things, but only because we take for granted their history. As we have already seen, Merleau-Ponty argued that the apparent clarity of familiar speech rests upon our ability to appropriate a way of speaking as we might take up a gesture and make it our own, without clearly understanding it.

The act of speech is clear only for the person who is actually speaking or listening; it becomes obscure as soon as we try to bring explicitly to light those reasons which have led us to understand thus and not otherwise. (1945, p.

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<sup>9</sup>Kuhn (1970), pp. 187-191.



448, E.T., p. 391)

To be sure, in speaking and hearing we direct ourselves toward the world, but not by discovering and articulating the way the world already is. There is always some opacity in reference, because words have a history. Realism proposes that there are truths which are independent of their history, whose truth resides in the relation between words and things. But only through the history of their acquiring significance do words have a relation to things, Merleau-Ponty argued, or a "content" that could be true or false. Realism acquires its plausibility from our ability to overlook that history; but we can do that only because we have appropriated it into our capabilities.

To give expression is not to substitute, for new thoughts, a system of stable signs to which unchangeable thoughts are linked, it is to ensure, by the use of words already used, that the new intention carries on the heritage of the past, it is at a stroke to incorporate the past into the present, and weld that present to a future, to open a whole temporal cycle in which the 'acquired' thought will remain present as a dimension, without our needing henceforth to summon it up or reproduce it. (1945, pp. 449-450, E.T., p. 392)

Realism also reflects our experience of the achievement of perceptual permanence. Merleau-Ponty described this phenomenon most clearly in the case of visual perception.

I run through appearances and reach the real color or the real shape when my experience is at its maximum of clarity...[D]ifferent appearances are for me appearances of a certain true spectacle, that in which the perceived configuration, for a sufficient degree of clarity, reaches its maximum richness. (1945, p. 367, E.T., p. 318)

The figure stabilizes, and achieves a kind of practical certainty which makes it immune to doubt. Having seen the thing from the optimal point of view, "I commit (j'engage) a whole perceptual future" (1945, p. 415, E.T., p. 361). The certainty one thus acquires through perception is not a guarantee one receives, but a commitment one makes to the world. As Samuel Todes and Hubert Dreyfus have pointed out,

The presumption that these permanent figures will never prove to be illusory is based merely upon a perceptual faith--we would be astonished upon disillusionment--but our experience is organized as if we had a perceptual guarantee to support this faith.<sup>10</sup>

The past activity and future commitment of a perceiving subject underwrite this achievement of perceptual clarity and permanence, as a secure practical orientation rather than as epistemically indubitable.

Now the same phenomenon of stabilization and practical

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<sup>10</sup>Dreyfus and Todes (1962), pp. 561-562.

certainty, after an initial welter of appearances which were suggestive but inconclusive, occurs in scientific research. The correlate to the perceptual figure at "maximum prise" is the fact<sup>11</sup> which has been secured against the possibility of dissolving into artifact. At that point, scientific discourse seems to mirror a world of real objects independent of that discourse.

Previously, scientists were dealing with statements. At the point of stabilization, however, there appears to be both objects and statements about those objects. Before long, more and more reality is attributed to the object and less and less to the statement about the object.<sup>12</sup>

Two points must be made about this phenomenon. The first is that here also (perhaps here especially), the possibility remains that this stabilization will turn out to be merely apparent. The stabilization (or "convergence") of scientific knowledge is not inconsistent with fallibilism. The achievement of scientific fact always rests in part upon scientists' commitment to further research which takes those facts for granted. The second is that this stabilization is the product of scientific research and not its cause.<sup>13</sup> "Maximum prise" is the product of an embodied subject whose explorations lead her or him to an optimal stance, from which the thing shows itself as it is. The scientific fact is the significant outcome of a course of research through which it was achieved, and to which it owes its sense. Merleau-Ponty himself asked,

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<sup>11</sup> Following Ravetz (1971, pp. 187-191), I am not confining the denotation of "fact" to singular true statements. "'Invariance', along with significance for further work and stability under repetition and application, is a necessary condition for a component of a solved problem to be accepted as a fact; and all three together are sufficient" Ravetz (1971, p. 190).

<sup>12</sup>Latour and Woolgar (1986), pp. 176-177.

<sup>13</sup> "Scientific research" must be understood not simply as the activity of scientists, but as also incorporating the phenomena that are the focus of the research. Latour and Woolgar's claim about the splitting of statements is often read (misread, in my view, but I am not primarily concerned with how to interpret their work) as expressing a social constructivist, linguistic idealism. But that reading is tenable only if "statements" are entities that function without dependence upon their circumstances. I think Latour and Woolgar's claim only makes sense if one takes "statements" to be utterances-in-context (where the context includes their material setting), in which case no idealist or constructivist conclusions follow from it.

For what precisely is meant by saying that the world existed before any human consciousness? An example of what is meant is that the earth originally issued from a primitive nebula from which the combination of conditions necessary to life was absent. But...nothing will ever bring home to my comprehension what a nebula that no one sees could possibly be. Laplace's nebula is not behind us, at our remote beginnings, but in front of us in the cultural world. (1945, p. 494, E.T., p. 432)

It is true that both scientific facts and perceived things can be partially freed from the contexts in which they were first disclosed. But in the case of facts, this partial autonomy arises only because they are established in a standardized and often simplified form which allows those who take account of them to overlook the complexities which lay behind their original disclosure.<sup>14</sup> When they are to be used in ways unanticipated in their standard formulations, their origins must be recovered and their original production to some degree reenacted or reperformed. The reference to standardized facts is a specifically scientific example of the apparent clarity of speech which stems from unquestioning acceptance of familiar concepts and expressions, but which rests upon the obscurity of its origins. This is not objectionable scientific practice, for it is what makes original research possible.<sup>15</sup> But it is objectionable when given a philosophical interpretation as scientific realism. The realist interpretation of the stabilization of scientific facts reflects what Merleau-Ponty would call the misinterpretation of the acquired as the eternal (1945, p. 450, E.T., p. 392). As he pointed out in the passage quoted at the beginning of this section, realism as a philosophical thesis makes the phenomenon it describes impossible, since it leaves out of account the investigations which do not simply discover facts already there, but bring them into being as culturally meaningful objects.

The rejection of realism compels us to ask anew about the relation between the world perceived and the world conceptualized in scientific research. To say that scientific theories are cultural objects is not to make them mere fictions or instruments. The realist is correct in asserting that the objects of scientific theory exist, and that they are not ontologically dependent upon the objects of the everyday world. What science does presuppose according to Merleau-Ponty is a

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<sup>14</sup>See Ravetz (1971), pp. 199-292; Fleck (1979), pp. 79, 84-87; and Latour and Woolgar (1979), pp. 176-183.

<sup>15</sup>See, for example, Kuhn's discussion of the efficacy of normal science for producing new discoveries, in (1970), pp. 52, 64-65.

prior and ongoing acquaintance with the world through perception, which he refers to as "preobjective" (1945, p. XIII, E.T., p. xvii). Without this prior familiarity, science would have nothing to refer to, and its theories would be empty formalisms.

To return to things themselves is to return to that world which precedes knowledge, of which knowledge always speaks, and in relation to which every scientific schematization is an abstract and derivative sign-language, as is geography in relation to the countryside in which we have learnt beforehand what a forest, a prairie, a river is. (1945, p. III, E.T., p. ix)

This analogy to geography (henceforth, to maps) can be usefully explored to reveal Merleau-Ponty's ontology of science. Consider the relations between a map, the terrain it represents, and its intended users. Maps do not simply reproduce the user's original sense of the terrain, but instead select certain features to be represented while others are left out. Reading a map presupposes a general acquaintance with terrain (e.g., knowing what a river is), but not with the particular terrain being mapped, nor even necessarily with all of the features the map refers to. A map may indicate features of the terrain which are not directly perceivable, or features which are not immediately apparent. But without some familiar features and some identifiable reference to the world, the map has no significance, except perhaps in play. Maps can be studied as self-contained objects, and their features analyzed internally, but their significance as maps depends upon their possible reference to an actual place. Our original familiarity with the world is not left unchanged by our acquaintance with maps, for they often transform our subsequent perceptual awareness. An acquaintance with the schematic structure of a map can enable us to see new things in the world, and to inhabit it in new ways. We see proximities or features that had not been apparent to us before mapping. Indeed, they are often then so obvious that we have difficulty understanding our previous failure to see them, and cannot clearly recall or reproduce our original experience. Because maps are always selective, the possibility of alternative mappings always remains open. The notion of the ultimate or complete map, even of an exhaustive set of maps, is senseless, since a map is always more or less suited to some purpose. Often our explorations with a map allow us to discover new concerns which require new mapping if they are to be satisfied. Only if the range of possible human concerns could be somehow limited in advance would the "ideal" of a complete map make sense. Yet this does not mean that the features on the map are merely instrumental constructs; they represent real aspects of the world which we encounter as significant and intelligible through our concerns.

All of these aspects of the relations between maps and places mapped have analogues in the relations between scientific

theories and the perceived world. Science does not simply reproduce the everyday world; some features of the latter have scientific significance and others do not. Practicing science presupposes general familiarity with the world, but not necessarily with the particular aspects of it which are under investigation (Rheinberger 1995 offers detailed accounts of how such investigations of novel phenomena proceed with reference to prior familiarity, in the cases of ultracentrifugation of cell components, and electron microscopy of tissue-cultured cells). Scientific theories often refer to objects or aspects of objects which are not directly perceivable or not immediately apparent, but they must have some identifiable connection with ordinarily perceivable events, however tenuous that connection may be. Scientific theories can be and often are studied as self-contained objects and analyzed internally, but without some possible reference to phenomena in the world, they would not have scientific significance. Science certainly does not leave our everyday experience unchanged; it has taught us to see new things, while preventing some old things from ever looking the same again. Scientific theories can never be complete, since which features of the world require scientific description or explanation depends upon our cognitive and practical concerns, As our concerns change our theories must change also (consider what the growing concern to understand weight relations did for and to chemical theory in the eighteenth century). There cannot be an ideal scientific theory any more than there can be an ideal map. There must always be, Merleau-Ponty claimed, a "surplus of the signified over the signifying" (1945, p. 447, E.T., p. 390).

On this view, scientific theories can be true or false just as maps can be accurate or inaccurate. But this truth and falsity is always contextual. Just as the perceptual figure achieved at "maximum prise" requires a compromise between clarity and richness, so scientific theories require choices between competing concerns (simplicity, comprehensiveness, detail, practical applicability, coherence with other theories, and so on). A theory is false when it directs us toward the world with expectations that cannot be satisfied. This outcome has a great deal to do with how things are in the world, But it also depends upon what expectations the theory generates, and that cannot be fully understood, except with reference to theory-users' cognitive and practical concerns, their prior knowledge, and the history of research which brought them to that theory with certain expectations about how it attaches to the world. Theories thus occupy an ambiguous place between us and the world. They seem to be objects with properties independent of us (we discover rather than invent their implications, for example). Yet we also use them to explore the world, and in doing so incorporate them into our own capacities, much as a blind man incorporates his cane.

Once the stick has become a familiar instrument, the world

of feelable things recedes and now begins, not at the outer skin of the hand, but at the end of the stick. (1945, p. 177, E.T., p. 152)

We do not interpret our perceptions in terms of our concepts and theories. The world begins for us at the "far end" of our theories, so that interpretation is not necessary. That is Merleau-Ponty's version of the supposed theory-ladenness of observation. Scientific concepts and theories are incorporated into our bodily synthesis, that sense of our capabilities and skills through which we explore and disclose the world. Science thereby continually reshapes the world we inhabit.

The important question for Merleau-Ponty was what, if any limits there are to such reshaping. It is clear on his account that science cannot totally alter or undermine our ordinary sense of the world.

If I try to imagine Martians, or angels, or some divine thought outside the realm of my logic, this Martian, angelic or divine thought must figure in my universe without completely disrupting it. My thought, my self-evident truth is not one fact among others, but a value fact which envelops and conditions every other possible one. (1945, p. 456, E.T., p, 398)

But what serves as a limit here is not the particular objects or forms of experience of my everyday life, it is the horizon of the world as perceived. In Sellars' terms, Merleau-Ponty does not assign priority to the manifest image over the scientific image of the world.<sup>16</sup> The priority belongs to the world itself, whose actual presence to me as an embodied subject cannot be challenged. The world is the open context within which all my activities take place, and against which both scientific and everyday concepts are measured. Further investigation may require that any particular element of our present understanding of the world be replaced, but the replacement takes place against the background of a world.

There is the absolute certainty of the world in general, but not of any one thing in particular. (1945, p. 344, E.T., 297)

Yet there do seem to be some aspects of my everyday experience which Merleau-Ponty took to be irreplaceable. The experience of the body as lived cannot be replaced by a physiological description of it. The spatiality of everyday life cannot be replaced by or subordinated to a geometrical one, as we have seen. Perhaps the difference is that some structures of preobjective experience are essential and thus unchallengeable,

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<sup>16</sup>Sellars (1963), chapter 1.

while the elements of everyday experience are not.<sup>17</sup> This distinction might be difficult for Merleau-Ponty to sustain, however, since it is not clear how to distinguish essential structures of experience from contingent limitations of imagination. Moreover, some particular components of everyday experience seem to resist the encroachment of science as well. Merleau-Ponty would have no trouble saying that physicists see sub-atomic particles in cloud or bubble chambers, but neither they nor anyone else can see a table as a configuration of such particles (this example is of course highly artificial, since physicists cannot even describe a table this way, but less problematic cases could be constructed).

Reflection can never make me stop seeing the sun two hundred yards away on a misty day, or seeing it 'rise' and 'set', or thinking with the cultural apparatus with which my education, my previous efforts, my personal history, have provided me. (1945, pp. 74-75, E.T., p. 61)

Thus the extent of Merleau-Ponty's pragmatism is not fully clear. The phenomenal field (i.e., the preobjective world) is, he claimed, a transcendental field (1945, p. 77, E.T., p. 63); its structures are immune to empirical revision, since they are presupposed by it. But there is no principled way (apart from the contingencies of imaginative variation) to distinguish such "structures" from what they structure. What aspects of our everyday, culturally informed Lebenswelt must always resist such revision is thus undetermined. At best, such phenomenologically described "structures" could have only a practical certainty comparable to that of the figure at "maximum prise", and not any kind of transcendental necessity.

It should be clear that Merleau-Ponty's response to realism as I have outlined it also contains a response to scepticism. Any particular claim that we assert is fallible. But this fallibility presupposes an ability to distinguish truth and falsity.

We know that there are errors only because we possess truth, in the name of which we correct errors and recognize them as errors. (1945, p. 341, E.T., p. 295)

We possess not particular truths, but truth, the openness to the world which we are by virtue of being a body. What Merleau-Ponty believed both sceptics and those who would refute scepticism fail to see is that we are perceivers, to whom a world is present not as a spectacle to be described or misdescribed, but as a situation to be explored and responded to,

Rationalism and scepticism draw their sustenance from an actual life of consciousness which they both hypocritically take for granted, without which they can be neither

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<sup>17</sup>For a fuller account of this distinction, see Dreyfus and Todes (1962), pp. 560-565.

conceived nor even experienced... (1945, p. 342, E.T., p. 296)

We are in the realm of truth and it is the 'experience of truth' which is self-evident. To seek the essence of perception is to declare that perception is, not presumed true, but defined as access to truth. (1945, p. XI, E.T., p. xvi)

Realists may will respond that this fact (or "value-fact" as Merleau-Ponty described it in the passage we quoted earlier), that a world is present to us as a field of truth and error, demands explanation. Why is it that some of our exploratory stances and conceptions lead to illusion and others do not? What accounts for the difference between truth and error? Only a realist account of the world, it is said, can explain this without invoking miracles.<sup>18</sup> Merleau-Ponty responded that such a demand mistakenly places rationality outside of the world, outside of the experiences in which it is manifest.

To say that there exists rationality is to say that perspectives blend, perceptions confirm each other, a meaning emerges. But it should not be set in a realm apart, transposed into Absolute Spirit or into a world in the realist sense....The only pre-existent Logos is the world itself,...and no explanatory hypothesis is clearer than the act whereby we take up this unfinished world in an effort to complete and conceive it. (1945, p. XV, E.T., pp. xix-xx)

Rationality is not a problem to be solved. Science can never be made secure, if security must be found in the certainty of a given content. The rationality of science, like all rationality, is contingent. It is to be continually achieved, rather than secured once and for all. The "unmotivated upsurge of the world" (1945, p. VIII, E.T., xiv) is the point at which both scientific and philosophical reflection begin, and which neither can transcend or explain.

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<sup>18</sup>Putnam (1978), pp. 18-19, Boyd (1984).



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