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Merleau-Ponty and the Measuring Body

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Introduction

Maurice Merleau-Ponty is known as the philosopher of the body and embodiment, and almost any study, analysis or theory dealing with these topics has traces of his influence. His radical reframing of embodiment has been deeply formative of contemporary philosophical and critical thought about perception and cognition, which challenges Cartesian and neo-Cartesian notions of vision and mind (e.g. Varela et al., 1991; Noë, 2004; Gallagher, 2005). Merleau-Ponty is not, however, a philosopher who is spontaneously thought of in the context of science and technology studies. He is largely absent from efforts by a growing number of scholars in science studies and related fields to develop new approaches to ontology that, to an increasing extent, account for both knowledge and being in terms invoking process, networked agency, and performativity (e.g. Stengers, 2000; Mol, 2002; Latour, 2005; Barad, 2007; Coole and Frost, 2010; Dolphijn and van der Tuin, 2012; Braidotti, 2013). These efforts often go together with a renewed interest in the instrumentation of science and the roles played by symbolisms and tools, which are no longer thought of as external to being but as integral to processes of becoming (Simondon, 1958; Stiegler, 1994, 1996, 2001). This article aims to bring Merleau-Ponty into these conversations. We focus in particular on his later work, and on his reframing of the body through the notion of

flesh. Readers will discover resonances with current attempts to displace entrenched dualisms and offer alternative ontologies, as well as with present-day efforts to theorise the co-functioning of embodiment and technicity[2]. First, we re-affirm Merleau-Ponty's position as a precursor of today's innovative recastings of technoscience. Second, we show that arriving at a non-dualist ontology from the direction of his phenomenological grounding makes a difference and brings a distinctive contribution. We formulate this through a new conceptual tool, the 'measuring body', which brings bodies, symbolic systems and technologies into a new constellation that reconfigures agency and materiality.

Choosing to focus on Merleau-Ponty for a re-thinking of technologies may appear to be an odd choice since Merleau-Ponty's references to technologies are often asides to the main thrust of his thought on embodied perception, and though illuminating, these references are few, especially in his major works. While Merleau-Ponty's philosophy has had a huge resurgence since the body and embodiment in all its forms have come to take centre stage in studies of perception and experience across disciplines such as cultural and gender studies, anthropology, science studies, cognitive science, and aesthetics, he has been criticised for his failure adequately to account for technology[3]. We believe, instead, that there is an unrealised potential in the œuvre of Merleau-Ponty to give a novel account of the roles of technologies in science, including their ontological import. This potential arises, however, not so much from Merleau-Ponty's explicit remarks on technology as from his thoroughgoing re-thinking of the relationship between the sensible and the intelligible, which, as pointed out by Mauro Carbone, is necessary for a philosophical reformulation of ontology in dynamic terms (Carbone, 2004: xiv). Much recent

scholarship focuses precisely on the ontological implications of Merleau-Ponty's reconfiguring of the perceiving body (e.g. Barbaras, 2004 [1991]; Carbone, 2004; Toadvine, 2009; Bannon, 2011), and by extension, on the implications for understanding language, mediated artefacts, and the normative dimension of human engagements and entanglements with the world (e.g. Abram, 1997; Dastur, 2004; Baerveldt and Voestermans, 2005; Günzel, 2007). The relevance of Merleau-Ponty's thinking has also been affirmed by scholars working on digital technologies and new media art, notably by Mark B. N. Hansen (2006, 2014)[4]. We agree with Hansen that 'Merleau-Ponty's final ontology of the flesh, with its postulation of a fundamental indifference between body and world, requires a technics -- a theory of the originary technicity of the human' (Hansen 2006: ix). However, whereas Hansen claims that the technical dimension of embodiment is missing in Merleau-Ponty's work and seeks to catalyse this dimension by engaging with digital media art and other philosophers, we aim to show that there are also resources to conceptualise this dimension in Merleau-Ponty's own work.[5]

This article contributes to the ongoing work of reformulating ontology and understanding the technical dimension of embodiment by developing an approach that reconsiders some of Merleau-Ponty's key ideas regarding the expressive and revealing capacities of the perceiving body, with particular emphasis on the formative and transformative capacities of tools, symbolic systems, and other cultural forms of expression[6]. While his own distinction between the body and technologies at some points led to an impasse and a failure fully to realise the potential of his own resources, we exploit these resources by going further in the direction sketched out in extremely suggestive and thought-provoking texts, notes and passages found in his later work,

taking Merleau-Ponty beyond himself. Our intervention focuses on a cluster of ideas revolving around the body as a standard or measure of things, which in *The Visible and the Invisible* (1968 [1964]) and *Nature* (2003 [1995])[7] were worked out within the framework of Merleau-Ponty's expansive notion of flesh (to be explained below). Taking our inspiration from some key quotes in these and other works, we develop a conceptual tool that we will refer to as the 'measuring body'[8]. In this context, 'measuring' and related terms such as 'measure' and 'measurement' are conceived more broadly than their strictly quantitative meaning. Indeed, in the quotes that inspired this article, Merleau-Ponty treats 'measurement' as an ontological concept that concerns the inner scaffolding of the existential field, the 'invisible armature' of the perceived (Merleau-Ponty, 2003: 224). These passages all emphasize the complicity and reversibility between measuring agencies and measured phenomena[9]. As a 'measure of being' (Merleau-Ponty, 1973: 124), the perceiving body is seen as mutually intertwined or entangled with the phenomena it targets, bodies and environments co-shaping each other in ongoing processes of differentiation. While Merleau-Ponty did not himself use the term 'measuring body' in this exact wording, we hope to show that the possibility of this further development offers itself at many points in his published and unpublished works. The advantage of this new conceptual tool is that it neither privileges nor coincides with sensory perception. It acknowledges that technoscientific interrogations of the world involve distributed and displaced agencies of observation that engage in a two-way formative exchange between observer and observed -- challenging pre-conceived dualisms between bodies and environments, humans and nonhumans.

The originality of Merleau-Ponty's work lies in the way that epistemological questions, and in his later thinking, ontological questions, converge on the perceiving body. In recent years, there has been a keen interest in Merleau-Ponty, since it is to his *Phenomenology of Perception* (1962 [1945]) that we owe the first systematic treatment of the perceiving body invoked in a double critique of both 'objectivism'[10] and 'intellectualism'. The renewed interest in the body is often associated with different attempts at developing anti-essentialist or relational ontologies. Here too, Merleau-Ponty is a precursor, since a persistent concern in Merleau-Ponty's philosophy is to develop an alternative to substantivist ontologies and representational epistemologies. His first attempts culminated in the *Phenomenology of Perception*, but no sooner had he completed this work, than he already saw the limitations of identifying the body with sensory perception, for two reasons: first, since the *Phenomenology of Perception* starts with the consciousness-object distinction, it never fully succeeds in overcoming this distinction; and second, since it foregrounds the descending movement into incarnated, perceptual meaning, it does not really succeed in accounting for the passage from perceptual to ideational meaning.[11] In his later work, Merleau-Ponty resumes his concern with the crucial role played by the perceiving body and what he identifies as 'the most difficult point' namely 'the bond between the flesh and idea' (1968: 149). He now integrates his investigation of perception with an ontological exploration, developing his own 'ontology of the flesh'[12]. The resulting approach, which Merleau-Ponty did not get the chance to elaborate fully, revolves around the highly original and, we believe, path-breaking idea of the body as a standard of measurement.

Despite his reservations about his earlier approach, Merleau-Ponty did not discard perception as the primary mode in which the lived body relates to its surroundings. He repeatedly insists that the passage to the conceptual world is continuous, and that ideational meanings are never really uprooted from perception -- not even in their formalized versions. How is this possible? In his introduction to a recent edited volume on Merleau-Ponty, Emmanuel de Saint Aubert gives us a clue: If Merleau-Ponty's earlier approach to embodied perception is characterised by its descending and centripetal movement into incarnated meaning, his later work -- converging on the notion of flesh -- emphasizes instead an expansive and expressive dynamic that does not stop at sensory perception but extends into and comprises intellectual life (Saint Aubert, 2008: 10, 14). This is precisely the point where we make our intervention. The aim of this article is to explore and further elaborate upon the expansive notion of flesh, outlining an approach that, to an even larger extent than does the later Merleau-Ponty, emphasizes the mediated nature of knowledge and being, by more radically integrating mediating artefacts into the perceptual/conceptual complex. This implies granting a relative agency and autonomy to symbolisms and tools, whose 'nonhuman' modes of operation[13] serve to decentre and displace the interrogating capacities of the perceiving body in productive ways. By thus further accentuating the expansive dynamic of the flesh, the proposed approach reconfigures the perceiving body into a symbolically and technologically distributed measuring body. This reconfiguration calls attention to the ontological import of symbolisms and tools, which, each in their own way, operate as 'measures of being' (Merleau-Ponty, 1973: 124).

Flesh and the Body as Standard or Measure

In his later work, Merleau-Ponty continues his critical engagement with the Cartesian legacy, which is now supplemented by a critical engagement with the thinking of Jean-Paul Sartre. He reproaches the latter for a disjunction between subjects and objects, brought about by his sharp distinction between the 'in-itself' and the 'for-itself'. Sartre, Merleau-Ponty maintains, conceives subjectivity as holding being in front of itself as a spectacle and, hence, as not operating 'from the middle of things' (Merleau-Ponty, 2008: 48, our translation). This contrasts with Merleau-Ponty's project, which explores the in-betweenness, the lived relations in which we are embedded. There is also a further and deeper sense in which Sartre, in Merleau-Ponty's view, fails to start from the middle of things. Sartre's conception of human beings as free remains bound up in the distinction between the for-itself and the in-itself. Thus, human beings can only be free at the cost of the lack of freedom of natural objects. Again this contrasts with Merleau-Ponty's approach, according to which nature offers resistance to the operation of free subjectivity (2008: 53). There is a *depth* in being that is lost in Sartre's account, since, by conceiving the for-itself (consciousness) as a mere *negation* of the in-itself, it fails to address the productive negativity *in* being and *from which* being is born. It is precisely this notion of a productive and working negativity in being[14] that Merleau-Ponty is getting at when he coined the term 'flesh'. Merleau-Ponty's main objection to Sartre's philosophy of subjectivity, and to the Cartesian tradition more generally, is that these approaches fail to ascribe an appropriate role to the perceiving body. What sets Merleau-Ponty's ontological exploration apart, is that it accords the perceiving body a non-trivial ontological role, invoking a notion of corporality that is not the

object-body but flesh in its formative role as productive negativity. It is important to note that, in contrast to philosophies of subjectivity, flesh is not conceived as the formative activity of a masterly subject but as a site of reciprocity and mutual responsiveness where perceivers and environments shape and co-constitute each other. Flesh, therefore, as Merleau-Ponty conceives it, does not fit into established ontological categories. It is not substance or matter in the sense of the hard in-itself, but nor is it spirit or consciousness. Flesh does not rest comfortably on any side of traditional ontological divides; it is, rather, 'the formative medium of the object and the subject' (1968: 147).

An idea that has received less attention in commentaries on Merleau-Ponty's notion of the flesh is that of the body as a standard or measure[15]. The terms 'measure' and 'measurement' recur at several points in Merleau-Ponty's writing, but their meanings and connotations change from one text to another. In *Phenomenology of Perception* (1962: 122), in the context of a discussion of the way that the lived body inhabits time and space, he states that '[a]t every moment, previous attitudes and movements provide an ever ready standard of measurement' (1962: 122). This already points towards the 'measuring' role of the body, which is accentuated in his later discussions of flesh. In 'Indirect Language and the Voices of Silence' (1993b: 86), he mentions the way in which perspectival painting uses a 'standard of measurement' of the sizes of things. In 'Eye and Mind' (1993c: 133–134) this form of measurement, which is normally associated with Cartesian or 'prosaic' vision where objects are seen as external to vision and as extended before it, is re-thought as issuing from 'poetic' vision where seer and seen are understood to labour in complicity[16]. The shift is definitive in *The Visible and the Invisible*, and

at several points in *Nature*, where vision no longer merely *uses* a standard of measurement; rather the seeing body is *itself* a standard of measurement. In the working notes to *The Visible and the Invisible*, for example, Merleau-Ponty writes: 'my body is not only one perceived among others, it is the measurant (*mesurant*) of all, *Nullpunkt* of all the dimensions of the world' (1968: 248–249). The first four of the eight sketches published in *Nature* (2003)[17], work and re-work the idea of the body as measure, or standard of measurement, as Merleau-Ponty experiments with different ways of trying out this idea. For example, in the second sketch he writes:

> This means that instead of a science of the world by relations contemplated from the outside (relations of space, for example), the body is the measurement of the world. I am open to the world because I am *within* my body. But how do I have a sort of commonality with this mass of matter? -- Precisely because it is *not* a mass of matter, it is rather a *standard of things*. (Merleau-Ponty, 2003: 217)[18].

It is the latter idea of the body as a 'standard of things' that we develop further under the name of the 'measuring body'.

While Merleau-Ponty himself did not coin the term 'measuring body', our use of the term is intended as one way in which the trajectory of the notions of measure and measurement can be further developed. In its role as a 'measurant of the things', as Merleau-Ponty points out in *The Visible and the Invisible*, the body is neither a thing nor an idea. (1968: 152) The reason why the notion of the measuring body does not fit established ontological categories, is that it forces us to

recognize something that is unheard of in the dualist scheme of things, namely, 'an ideality that is not alien to the flesh' -- an ideality, that is, which gives flesh 'its axes, its depth, its dimensions' (1968: 152). Likewise, it forces us to recognize a 'logos of perception', or, as he also puts it, a 'natural symbolism' of the body, which is tacit but fully operative in living beings of all kinds[19]. This, then, is why the measuring body is a promising starting point for addressing the difficult question about how to overcome the divide between the intelligible and the sensible worlds.

Key Concepts for a Dynamic Reformulation of Ontology

The idea of the body as a standard or measure forms part of Merleau-Ponty's broader ontological project. In this section we discuss some of the key concepts in Merleau-Ponty's endeavour to ontologically reframe perception, which at the same time allow us to further develop the notion of the measuring body. All of these concepts emphasize the mutual intertwining and entanglement of the seen and the seeing, of the measured and the standard of measurement, each concept adding another nuance to the articulation of a carnal, integrated and dynamic ontology.

Environment (*Umwelt*)

A central concern of Merleau-Ponty's philosophy of the flesh is the attempt to develop an alternative to substantivist ontologies and mechanistic ways of thinking about causation. In this, he found support in the biological theory of his time, where he took a particular interest in those biologists who offered alternatives to mechanistic causal accounts of animal behaviour, such as

Jakob von Uexküll, Edward S. Russell, Adolf Portmann, and Konrad Lorenz, whom Merleau-Ponty discusses in depth in the series of lectures dedicated to the 'modern biology'[20]. This new form of biology tended to give prominence to the complex feedback systems among organs and physiological processes in an organism, and among organisms and environments. The turn to the insights of the thinkers at the forefront of 'modern biology' coincided with Merleau-Ponty's grappling with the relation between measurement and the body. Jakob von Uexküll's notion of 'environment' (*Umwelt*) is especially significant, delineating as it does an in-between world[21]. Uexküll accounted for biological processes in terms of meaningful behaviour, and therefore as always oriented towards something in a targeted way, rather than mechanistically caused. Depending on their structure, different kinds of organisms address different aspects of the physical world, which means that even if they live in the same physical locality, they live in different 'environments' in Uexküll's specific meaning of the term. For Uexküll, the environment of an organism is constituted through the range of possible interactions between organism and the physical world. However, in contrast to 'lower animals', which, according to Uexküll, are not reliant, for their behaviour, on feedback from the physical world (one example given is the amoeba), 'higher animals' are characterized by the way that they respond to stimuli with fine-grained actions that are not determined in advance, neither by the structure of the organism nor by the structure of the physical world[22]. For these animals, the environment is an opening onto an existential field of possible perceptions and actions, which is to say that the organism relates to the world as a transformer rather than as a mere receptor. For Merleau-Ponty, the philosophical attraction of Uexküll's notion of environment is that it is 'destined to join what

we usually separate' (2003: 173). Merleau-Ponty sees himself as continuing the project of the biological theories by which he was inspired, in his reconfiguring of the body and its relation to its environment through an ontology of the flesh conceived as a deep critique of mechanistic causal thinking. This brings us to the next concept.

Circuit

Georges Canguilhem, one of the proponents of the new biology to whom Merleau-Ponty frequently refers, outlines the main characteristics of the new approach to interactions between organisms and their environment in this way: The relationship between the organism and the environment is the same as the part-whole relationship within the parts of the organism and the whole organism. This results in a different ontological parsing of organism and environment, in that the organism does not abruptly end at the outside layer of its skin, but extends into its environment as much as the environment extends into it. In addition**,** there is a functional interchangeability between the variables in the relationship. 'To live', therefore, 'is to spread out; it is to organize a milieu starting from a central reference point that cannot itself be referred to without losing its original meaning' (Canguilhem, 2001: 21). This way of thinking about biological relationships is better expressed by means of metaphors of spheres, circles, or centred formations, which, as Canguilhem notes, rejects the thinking of environment in mechanistic or quantitative terms (2001: 11). This same metaphor of the circle or circuit is often used by Merleau-Ponty for describing the relationships of perception and lived experience throughout his work[23]. The idea of the circuit that emerges from the work of biologists such as Uexküll

destabilises the ontology that sustains mechanistic thinking, because the complex dialogical patterns of actions and reactions that they describe are not in a simple relation of causality. Instead of causal relations, it opens the possibility of thinking in terms of behaviour and meaning, that is, in terms of organisms that are oriented toward and act upon their environments which in turn respond and shape the organism. The circuit is a space of mutual and co-constitutive interactions -- or better perhaps, an evolving space of 'intra-actions'[24]-- which may well be triggered by something in the physical world, but this triggering would count for nothing if it were not already anticipated by an orientation of the organism which must first of all be equipped to notice it, and importantly, have an interest in it, for example, as something that might be ingested. The interactions between organisms and environments, therefore, are *targeted* interactions, and this is how *meaning* comes into the picture. Thus understood, the existence of an organism is not 'a punctual correspondence between the present milieu and the action of the organism' (Merleau-Ponty, 2003: 192). If behaviour is understood from moment to moment, we lose track of its meaning. That a behaviour is 'meaningful' means that it forms part of a larger whole:

> Each part of the situation acts only as part of a whole situation; no element of action has a separate utility in fact. Between the situation and the movement of the animal, there is a relation of meaning which is what the expression *Umwelt* conveys. The *Umwelt* is the world implied by the movement of the animal, and that regulates the animal's movements by its own structure. (Merleau-Ponty, 2003: 175)

As is clearly seen in this quotation, meaningful behaviour implies a capacity for *movement* on the part of the organism or animal, as it is in movement that the targeting of the environment by the organism is manifested. Merleau-Ponty takes this further and makes movement an indispensable ingredient in his new ontology by conceiving it as a prerequisite for the perceiving body's expressive and revealing capacity.

Movement and Body Schema

According to Uexküll, the movement of the organism as it interacts with its environment is crucial to the development of physiological features of the organism, such as its musculo-skeletal structure and its nervous system[25]. Merleau-Ponty would have found an echo of his own re-appraisal of movement as an indispensable element of sensibility and perception. From the time of his 1953 lectures, he was working on a conception of movement that would overcome two prevailing opposing conceptions: the 'objective' notion of movement as conceived from the outside, as if it takes place in a space in a punctuated series, and the contrasting 'subjective' notion, which identifies movement with an immanent duration of consciousness[26]. Merleau-Ponty seeks to overcome this false opposition between the subjective and the objective poles, by outlining an account that starts off from their mixing (*mélange*), which occurs in moving one's own body. Taking movement and action as the starting point, notions such as interior and exterior, before and after, here and there (Merleau-Ponty, 2011: 92), are not merely juxtaposed but integrated in a dynamic way. Put simply, the sphere of possible movements is formed

through both the body's plans and projects, and the possibilities offered by the existential field, acting indissolubly together. In Merleau-Ponty's thinking this gives rise to an incarnated notion of movement which stresses the way that the movement of the body is already pre-figured in the body's projects and plans (*motifs*) projected onto the existential field but also figured in response to that existential field. Hence, the existential field is a 'charged field' (Merleau-Ponty, 1968: 264). Thus understood, the notion of movement ties directly into Merleau-Ponty's notion of 'body schema'[27], which precisely highlights the body's function as a dynamic integrator. In analogy with the nervous system of the animal as conceived by Uexküll, the body schema is formed in the circuit between the living being and its environment, as it moves and interacts with things in the physical world. For Merleau-Ponty, the body schema is a 'system of references' in terms of which action in an environment is 'planned' (at a pre-reflexive level), and also a relationship to external space which results in the body and the space in which it is set being one system (Merleau-Ponty, 2011: 129). This is another instantiation of the body extending into the world and vice versa, forming a circuit; the body schema is not simply *of the body*. In this circuit between body and environment, the body schema is that through which there is symbolism and expression[28] already in the sensible world; and movement is that through which the circuit is engendered. But as the circuit is engendered, so too is an environment with particular dimensions. We turn to this next.

Dimensions

In Uexküll's conception of the mutual interactions between organisms and environments, not all organisms have the same environment. There is not one environment for all, but specific lived environments with dimensions apt for the needs and sensorimotor equipment of the organism in question. Merleau-Ponty uses the notion of dimension throughout his work. In *Phenomenology of Perception* it is associated with perception and expression, as well as with space and time, whereas in 'Cézanne's Doubt' (1993a) and 'Indirect Language and the Voices of Silence' (1993b) it is used in the context of the treatment of depth in perspectival painting. Later treatments of the term, however, specifically resist treating dimensions as an accumulation of layers (from 1D through 3D and, adding time, 4D), and instead re-think dimension as closely related to the notions of productive negativity and reversibility. For example, in 'Eye and Mind' (1993c), he writes that depth is not a 'third dimension', as though it could be stripped away leaving any form of meaningful experience. Instead, depth is beyond any particular dimension, being rather 'the experience of the reversibility of dimensions, a global locality' (1993c: 140). By 'reversibility of dimensions' he means that any particular access or point of opening onto space can be displaced and can itself become that which is opened upon. In his late work, this dynamic of reversibility is what characterizes incarnated existence as a general mode of being (1968: 147), which is neither substance nor consciousness. The familiar example of reversibility given by Merleau-Ponty is that of the two hands touching each other, and the exchange between them as they alternate between touching and touched. Flesh is that which allows for the reversibility of one hand to touch in one moment and to be touched in the next. The experience as toucher is defined not as a positivity, but rather in terms of a productive negativity of that

which is not now realised but will or can be. It is in this sphere of possible or imminent reversals that lived experience with its qualities and characteristics is played out. This means that the dimensionality of the lived world is produced by a 'pattern of negations, a system of oppositions that means that what is not this, is that, field, dimension' (2003: 238).

The reversibility of toucher and touched is possible because there is a gap between them (the experiences of touching and of being touched do not completely coincide), a gap which is both temporal and spatial, which holds them apart as experiences, but which also allows for a differentiation between them. This means that touching and touched are not defined as experiences in and of themselves, but only in their divergence from each other. The differentiation therefore is not arbitrary, but conditioned by that from which it differs: it is a divergence or a splitting off from what is already there. Merleau-Ponty refers to this process as 'écart'[29]. Merleau-Ponty also conceives of this divergence in terms of a dynamic figure-ground relationship. The gradual taking-shape of a figure against a background is for Merleau-Ponty a basic meaningful structure whose dynamic is repeated at all levels. This is why, in *The Visible and the Invisible*, he refers to the figure-ground dynamic as a 'key to the problem of the mind' (1968: 192). However, in its ongoing process of divergence and differentiation the body does not open onto everything. It is a 'specified opening' (2003: 238)[30] that engenders specific dimensions of a lived environment with a particular range of possibilities of actions, interactions and perceptions. Living being, in other words, never moves in an abstract universal space but in a lived, concretised and dimensioned world. It always moves in the middle of things, rooted in the presently available reversibilities of flesh. Further, even if it is 'specified', the opening is

never fixed but variable. The body schema has the capacity to be modified or transformed, for instance, by training and learning new skills, and even more so when symbolisms and tools (each with their own 'nonhuman' mode of operation) are introduced into the circuit -- hence the insistence on the expansive dynamic of flesh.

Interworld

Uexküll's notion of environment implies that lived worlds are plural. However, it does not imply, that these worlds are private, solipsistic spaces. The body schema is not just a relation to space and to things, but essentially, a relation to other body schemas too, making every 'world' always already an 'interworld' shared with others (Merleau-Ponty, 1968: 48, 62, 84, 269[31], 2003: 210, 214). Body schemas open onto each other and are interlaced into each other: it is not just that we are aware of others but that the interlaced body schema articulates shared modes of lived being, among which there is neither complete alterity nor complete coincidence. Continuing with the example of the two hands: each hand does what the other does in turn, not independently but based on a mutual recognition of a behaviour that each can take on or adopt, reciprocally. The experience of recognition is possible because of a commonality of the touched with the body schema of toucher; they are, as Merleau-Ponty puts it, 'made of the same stuff' (2003: 224). The dynamic reversibility exemplified by the two hands also extends into the interworld: far from being exterior, accidental others, other body schemas are essential in forming the nature of experience of each living being. There is a mutual recognition in and across body schemas, which means the behaviour of living beings is meaningful also in the sense of being recognisable

by others. The movements of individual beings are inscribed into a visible structure that is seen by others as expressive, that is, something that is recognised as a behaviour that others can take up and adopt. This means that that there is a collective aspect to behaviour; as soon as something is taken as expressive there is a carnal communicability to it, and with that an 'opening to generality'[32]: There is an identification and co-perception between body schemas; living beings live the behaviours offered by others as their own; they perceive other living beings as perceiving the same sensibles that they could themselves perceive (2003: 225).

Productive negativity, reversibility and the *écart*, and the interlacing of body schemas are all ways through which the dimensions of the lived interworld are engendered, which make it livable as having specific possibilities of spatiality and temporality, with specific possibilities of behaviours and comportments. It is against the background of these concepts that the notion of the measuring body must be placed. The measuring body is the instantiation of flesh as formative medium for which and through which there is a lived interworld with specific dimensions; it is the being that enters into a circuit with the environment and fellow beings, as a body schema intertwining and overlapping with other body schemas, as a dynamic reversibility instituting specific dimensions and styles of behaviour recognisable by others.

As we have seen, embodied being is expressive in the sense that there is a carnal communicability to its behaviours. However, it is also expressive in another sense, relating to an inventive aspect at the heart of the body's functioning -- the capacity to institute new phenomena, to open new dimensions and hence to displace the horizons of the established. Productive negativity is the inventive principle at work in this ongoing dynamic process of

opening new dimensions of being, while by the same token, it closes others. In this way, Merleau-Ponty's later thinking significantly deepens the analysis of embodied perception by foregrounding an expansive dynamic that, rather than accounting for the body as the basis of perception and meaning, explores the ways in which bodily perception, in its interactions with the lived world is already a kind of language, and already presupposes the work of an expressive function (2011: 45). It makes room, in other words, for a symbolism[33] that is already at work in the sensible world, and whose differentiating figure-ground dynamic is repeated at other levels.

Symbolisms and Tools as Measures of Being

In this section we draw together the different concepts that delineate Merleau-Ponty's ontological project, which emphasises the expansive dynamic of flesh. We carry this expansion further by recasting symbolisms and tools as measuring agencies in their own right ('measuring' here taken in Merleau-Ponty's ontological meaning), which, when injected into perceptual circuits, take on ontological import.

Merleau-Ponty's suggestion that there is a symbolism of the sensible world is radical, since it implies that there is a 'universality of sensation' (2003: 78)[34]. However, as it is used here, 'universality' takes on a new meaning that is captured with Merleau-Ponty's notion of 'style' of being. As soon as there is a style of being, there is a *way* of doing or being, among other ways. Styles can be particular and individual; but they also have generality in the sense of regularities or patterns that can be recognised by others, and even taken up by others, and 'made their own'. There is also generality in the sense that styles of being anticipate possible situations, something

that further underscores that there is no point-to-point correspondence between the organism and what is perceptually available here and now. Returning to the biological inspiration for Merleau-Ponty's thinking, in their dialogical encounters with the environment organisms manifest styles of behaviour, even in their instinctual behaviours. This is evident in cases where animals mime their own behaviours in an exaggerated way, as when a duck uses the movements involved in taking off in flight as a sign for training the young, or in behaviours that involve ritualisation, as in battles of wolves (2003: 195–196). Merleau-Ponty uses these examples to show that, through the generality of style, there is a symbolic aspect to the behaviour of animals (2003: 198). The suggestion that there is a symbolism of the sensible world is radical also because it implies that there is 'invention' on the side of nature. This is already implicated in living beings' capability of anticipating possible situations, since anticipation involves a way of actively targeting the environment. At the same time, the affordances (Gibson, 1979) of the environment shape the targeting activity. In the circuit of this to-and-fro between targeting and targeted, living beings and environments are co-created, forming 'dimensions' or 'worlds' that exhibit particular styles or patterns, and, in so doing, enact a specific 'type of organizing' (2011: 54) that Merleau-Ponty refers to as the 'logos of perception', and sometimes also as the '*wild* principle of Logos' (2011: 54, 1968: 211).

In the preparatory notes for his courses on the sensible world and the expressive world, Merleau-Ponty formulates a new 'program' for integrating the notion of expression[35] into his notion of perception. Through this new and deeper analysis of perception, he hopes to achieve two things: first, to 'develop a concrete theory of the mind'; and second, to 're-establish the unity

and at the same time the difference between the perceived world and the intelligible world' (2011: 45, our translation). To accommodate the expressive function, however, the notion of perception has to be expanded so as to comprise what it has traditionally been opposed to: cognition, intellect, understanding, judgement, and the like. According to Merleau-Ponty's program for integrating expression and perception, everything is still perception, but no longer in a restricted sensory meaning (2011: 54). The 'universality' at work in living being is a universal of a new kind (not recognized by the philosophers Merleau-Ponty is criticizing), since it is material or carnal: 'The universal is not the concept but this perception in flesh and blood, foundation of my relation with others.' (2003: 78). The 'universal' in this new meaning cannot be identified with the concept alone floating free of anything bodily and material. Perception itself is both bodily and conceptual or general, just as language is both material and signifying. As Merleau-Ponty writes: 'An organ of the moving senses (the eye, the hand) is already a language because it is an interrogation (movement) and a response […], speaking and understanding' (2003: 211). In this way Merleau-Ponty's idea of an operative and carnal universality, makes room for new notions of agency and materiality, which find their roots on neither side of the nature-culture divide but precisely at the junction or crossing-over of *physis* and *logos* (2003: 199). Thus understood, the 'most difficult point' is no longer framed in terms of *passing* from one world (sensible) to the other (intelligible); rather, the intelligible world installs itself in the sensible world, and, by so doing, displaces its horizons. What we have to do with is a 'surpassing that does not leave its field of origin' (1968: 153). Reciprocally this means that the meanings and formalisations of the intelligible world also need to be understood

differently: 'pure ideality is itself not without flesh nor freed from horizon structures' (1968: 153).

In his attempt to develop an ontology that foregrounds the expansive and expressive dynamic of flesh, Merleau-Ponty is acutely aware of the need to take account of tools as well as other artefacts, primarily works of art. In *Le monde sensible et le monde de l'expression*, for example, where he sets himself the task of integrating perception and culture, he considers tools and artefacts not just as the expressions of humans, but as something that expresses objects or the world (2011: 48, 54). He also points to the transformative effect of tools and works of art (2011: 53). In his later thinking, it is clearly works of art that preoccupy him, and explicit references to technologies are scarce. Critics of Merleau-Ponty, who point to a lack of attention to technology[36] tend to overlook the extent to which works of art, symbolisms and tool are all in the same category for him. For example, in *Le monde sensible et le monde de l'expression*, he standardly refers to tools and works of art in the same sentences (2011: 48, 53, 54, etc.), and in 'Eye and Mind' -- which is his most developed account of art -- he again refers to 'technical objects, such as tools and signs' in the same breath as he discusses the role of mirrors in painting (1993c: 129). In 'Eye and Mind' he goes far in acknowledging the ontologically transformative roles of symbolisms and tools, by stating that '[e]very technique is a "technique of the body", by illustrating and amplifying the metaphysical structure of our flesh' (1993c: 129).

In this and similar passages, tools, works of art, and other symbolic forms of expression are understood as instances of flesh that play a formative role as productive negativity. In 'Eye and Mind' for example, while discussing the cave paintings of Lascaux, he maintains that images

are not something that one looks at 'as one looks at a thing, fixing it in its place'; rather than seeing it, one sees 'according to, or with it' (1993c: 126). There is, in other words a 'logos' of painting, an operative and carnal universality, which Merleau-Ponty, in his essays on painting (1993a, 1993b, 1993c), takes to be illustrative and exemplary of the operative logos of vision as such. Painting, then, is one way of 'amplifying the metaphysical structure of our flesh'; and hence, one way of 'surpassing' the sensible word without leaving its 'field of origin'. But in what sense are symbolisms and tools, exemplified here by painting, 'measures' of being, and in what sense do their expressive dynamic amount to a kind of 'measurement'?

As we have already mentioned in the Introduction, Merleau-Ponty's use of the term 'to measure' is broader than the ordinary sense of determining the extent, dimensions, or quantity of something by comparison with a standard. Merleau-Ponty's use of the term differs from this in two important respects: First, it differs by emphasising the reversibility between the measured phenomena and the standard of measurement. This means that the measured does not precede the measure but nor is it a spontaneous projection of the measuring apparatus -- it is neither simply recorded nor merely fabricated. The measured and the measuring are co-instituted in the to-ing and fro-ing characteristic of the circuit, according to a specific 'type of organizing' (2011:54). Second, it differs by maintaining that the body *is* a standard of measurement. However -- and this is how the proposed approach reconfigures the perceiving body into a symbolically and technologically distributed measuring body -- there is no single all-purpose standard of measurement. The standard differs according to which symbolisms and tools are injected into the circuit. This, then, is how symbolisms and tools are granted a relative agency and can be

considered measuring agencies in their own right: When they are caught up in the circuit, they take on the role as 'measures of being', displacing the horizons of sensory perception and giving rise to new kinds of meanings and entities that, even if calibrated to bodily sensory registers, can never be reduced to these.

As we have seen, the notion of the measuring body implies that the interaction of organisms and their environments gives rise to specific dimensions. A point that Merleau-Ponty does not fully develop, however, is that once the ontological force of symbolisms and tools is fully acknowledged, the environments opened are not one-dimensional but 'multidimensional' -- in the sense that, depending on symbolism and tool in question, they are specified in multiple different ways. For each modification new dimensions of the world open up, new ranges of possible modes of measuring and being measured. This in turn creates new modes of living the dimensions of the world, of acting and interacting. However, in line with the general interrogating capacity of the flesh, which operates according to a principle of negativity (that is, an integrating and differentiating figure-ground dynamic), each 'gain' in measuring (perceiving, conceiving, interacting) comes at the price of introducing new blind zones. This should come as no surprise, though, since for a 'concrete theory of the mind' there is no such thing as total access to pre-given and self-subsisting realities. There is always a style or mode according to which phenomena make themselves manifest.

The Measuring Body: Measurement as an Engaged Operation

We started this article by pointing to the need for new philosophical accounts of the role of symbolisms and tools in knowledge and being, and in order to achieve this, we have introduced and developed the notion of the measuring body. The promise of this approach is that it makes us realise that *perception and mediation are not apart from ontology*, and further, that the sensible and the intelligible are not stacked one above the other, and do not follow one after the other. Rather, they are always intertwined. The key contribution of the later Merleau-Ponty is to reframe perception in ontological terms through the notion of flesh as a 'metaphysical structure.' In this reframing there is a convergence of the epistemological and the ontological, and perception is reconfigured as an apparatus for interrogating, explicating and revealing phenomena. The later Merleau-Ponty opens a new trajectory for understanding agency and materiality by positing the perceiving body as a measure or standard of things, and this is the point that we develop further with the notion of the 'measuring body'. For Merleau-Ponty, the perceiving body is like a central point of reference, or what he also refers to as the '*Nullpunkt* of all the dimensions of the world'. As we have already noted, this is not a static point of reference, since the body schema continues to be modified and transformed. As we have also noted, the body schema institutes a type or style of organisation[37].

The measuring body further develops these ideas in a direction that accentuates the decentring of the perceiving body as well as the relative autonomy of symbolisms and tools. Certainly, Merleau-Ponty's notion of body schema is already decentred, in at least three respects: First, in that it is not *of the subject* (rather, it is the formative medium of subject and object), second, in that it is not *of the body* (it extends into the environment as much as the environment

extends into it), and third, in that it has the capacity to alter its own borders, by acquiring new habits and by incorporating symbolisms and tools. However, despite the increasing focus on the expansion of the flesh, Merleau-Ponty's account retains a centrality for the perceiving body. In our proposal of the measuring body as a conceptual tool, mediation is not so much about incorporation as it is about the way that the perceiving body participates in a distributed system that goes beyond the perceiving body, and that it cannot fully control. So, while Merleau-Ponty, in defining the perceiving body as a central reference point, ascribed this role to 'my' body ('my body ... is the ... *Nullpunkt*'), the 'body' in the measuring body is a *shared* body. In addition, even if, as in the case of painting, Merleau-Ponty goes far in acknowledging the transformative roles and ontological import of mediating artefacts, he tends to focus on the continuities between bodily, symbolic and technological expression. Although the expressive dynamic of flesh is now understood to expand far beyond the sensible world, there seems to be a continued privileging of bodily perception as the origin of meaning -- not in the sense of source, but in the sense of beginning or point of departure. This, then, is where we take Merleau-Ponty beyond himself: We further develop his idea of the body as a 'measure' of things by granting symbolisms and tools the status of 'measures' in their own right, that is, as 'agencies' with their own relative autonomy. Certainly, Merleau-Ponty is right that there is no way we can escape the carnal conditions of our being-in-the-world, which is why, both for him and for us, ontological questions inevitably converge on the perceiving body. However, Merleau-Ponty's notion of flesh introduced a dissociation between the carnal and the sensible (as exemplified by the carnality of painting), and the measuring body pushes this dissociation further.

The measuring body is not an extended perceiving body. It is a distributed system where bodies, symbolic systems, technologies and environments are intertwined and in which phenomena are articulated in characteristic ways, according to particular styles. In science -- which like art, is an expression of lived, intellectual and cultural life -- the measuring body is an integrated interrogating apparatus for querying, explicating, revealing and engaging with phenomena (evidence, entities, objects) that are instituted with the measuring body. In such distributed interrogating systems, technologies play a key role, for two reasons. First, symbolic systems and technologies are themselves standards or measures of being, which have the capacity to transform the metaphysical structure of the interrogating apparatus and hence to displace the horizons of the perceptible/intelligible world. They open new dimensions by extending the scope and radius of our actions, and by giving rise to new kinds of meanings and entities. Second, by serving as generative mediators, symbolic systems and tools play an important *coordinating* role, and in so doing they amplify -- to an extent not fully brought out by Merleau-Ponty -- the *collective* aspect of interrogating behaviour. The multi-dimensioned worlds opened by measuring bodies are not only interworlds shared with others. Due to the coordinating roles of symbolic systems and technologies, the carnal communicability of these worlds is not limited to identification and co-perception between body schemas but extends to intellectual and cultural life. Further, it extends to the possibility of *shared vision through alignment and repeatability*.

The measuring body is a standard or system of standards. However this is not a 'subjective' standard, since the measuring body shapes the observers just as much as the

observed. Nor is it an 'objective' standard in the received sense of a detached 'view from above, from nowhere', as Donna Haraway (1988) famously puts it. Rather, the point we want to make here is that the dualist notions of subjectivity and objectivity fall away together with the possibility of seeing subjects and objects as separately and independently constituted. The upshot of the approach we propose is that the measuring body conditions what it means to be an observer or observed in that specific apparatus. On this conception, agency is shifted from the observer to the distributed measuring body. This is in line with recent debates concerning agency that have argued that agency should not be limited to human observers (Pickering 1995, Latour 2005, Barad, 2007). However, the measuring body differs from the approaches just referred to in that agency is phenomenologically reframed in terms of an opening of dimensions. On the proposed approach, the measuring body both has agency, through its being a mode of opening, but also specifies agency in its particular distributed system. It is a distributed system of intertwined agencies of observation, which, in accordance with Merleau-Ponty's notion of flesh, operates through a generative figure-ground dynamic that configures the space of observation. As distributed interrogating systems, measuring bodies involve displaced agencies of observation and measurement where the symbolic or instrumental set-ups take on the role as coordinating standards that amplify, guide, and align vision.

As a conceptual tool, the measuring body contributes to the ongoing theoretical articulation and empirical exploration of embodied and technologically mediated knowledge and being. It resonates with current postphenomenological approaches to the philosophy of technology, such as those of Don Ihde (2002) and Peter-Paul Verbeek (2005), who decentre

perception while at the same time arguing for the continued relevance of phenomenological frameworks[38]. The measuring body also resonates with the concerns of contemporary posthumanist approaches (Barad, 2007; Braidotti 2013), due to the way that it emphasises that no perceiver is at the centre of their own perception, and in this it breaks with a certain interpretation of phenomenology. Moreover, like the performative and multiple bodies theorised by many in science and technology studies, notably by Annemarie Mol (2002), the measuring body is multiple. Once again, though, we reframe this phenomenologically, arguing that the measuring body opens onto multi-dimensioned worlds.

The notion of the measuring body understood as a distributed system consisting of intertwined agencies of observation ontologically reframes scientific vision, and this has many further implications for our understanding of science. We conclude this article by pointing to one such implication, which concerns the very notion of measurement[39]. It may seem that what we have been saying about measuring has little to do with actual measuring as practiced in science, since in the approach presented here measuring is used in a much more general sense as the dimensioning of worlds, the very armature of being. However, what we argue is that measuring practices in scientific contexts are continuous with this sense of measuring; in fact, they are embedded in and made possible by it. As specific instances of measuring bodies, they enact the same dynamic but in highly particular ways and in more controlled settings. This also means that, contrary to the rhetoric of objectivity that surrounds them, there is a qualitative side to quantitative methods that cannot be ignored. For example, the computational approaches that are currently emerging in fields such as biology use a rhetoric of greater precision and predictiveness

in view of the quantification of biological processes, while in fact blending observational, mathematical, and computational practices, and thereby blurring qualitative and quantitative methods[40]. The point that scientific phenomena do not exist independently of measurement has been made by others: including notably Hacking (1983), Barad (2007), and Chang (2012). The difference in arriving at these points through grappling with Merleau-Ponty's thinking, is first, the consideration of measurement and phenomena as mutually and reciprocally caught up in circuits of intertwinement with technologies, symbolisms and bodies, and second, the way that agency is framed in terms of opening of dimensions. In the proposed approach, scientific measurement practices enact measurement as *engaged operations*, that is, not as operations that intervene in a domain from the outside, but as operations that act from the middle of things, carving out the axes and dimensions of the domain under investigation.

References

Abram, David (1997) *The Spell of the Sensuous: Perception and Language in a More-Than Human World*. New York: Vintage Books.

Baerveldt, Cor and Voestermans, Paul (2005) Culture, emotion and the normative structure of reality. *Theory & Psychology* 15(4): 449–473.

Bannon, Bryan. E. (2011) Flesh and nature: Understanding Merleau-Ponty's relational ontology. *Research in Phenomenology* 41: 327–357.

Barbaras, Renaud (2004) [1991] *The Being of the Phenomenon: Merleau-Ponty's Ontology*. Toadvine, Ted and Lawlor, Leonard (trans.). Bloomington and Indianapolis: Indiana University Press.

Barad, Karen (2007) *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning.* Durham and London: Duke University Press.

Braidotti, Rosi (2013) *The Posthuman*. Cambridge: Polity Press.

Buchanan, Brett (2008) *Onto-Ethologies: The Animal Environments of Uexküll, Heidegger, Merleau-Ponty, and Deleuze*. Albany: SUNY Press.

Canguilhem, Georges (2001) [1965] The living and its milieu. Savage, John (trans.). *The Grey Room* 3: 6–31.

Carbone, Mauro (2004) *The Thinking of the Sensible: Merleau-Ponty's A-Philosophy*. Evanston: Northwestern University Press.

Carusi, Annamaria (2008) Scientific visualisations and aesthetic grounds for trust. *Ethics and Information Technology* 10: 243–254.

Carusi, Annamaria (2016) Modelling systems biomedicine: Intertwinement and the 'real'. In: Whitehead, Anne and Woods, Angela (eds) *The Edinburgh Companion to Critical Medical Humanities*. Edinburgh: Edinburgh University Press, 50–65.

Carusi, Annamaria and Hoel, Aud S. (2014a) Toward a new ontology of scientific vision. In: Coopmans, Catelijne, Vertesi, Janet, Lynch, Michael and Woolgar, Steve (eds) *Representation in Scientific Practice Revisited*. Cambridge, Mass. and London: MIT Press, 201–221.

Carusi, Annamaria and Hoel, Aud S. (2014b) Brains, windows and coordinate systems. In: Carusi, Annamaria, Hoel, Aud S., Webmoor, Timothy and Woolgar, Steve (eds) *Visualization in the Age of Computerization*. New York and London: Routledge, 145–169.

Chang, Hasok (2012) *Is Water H2O? Evidence, Realism and Pluralism*. Dordrecht: Springer.

Coole, Diana and Frost, Samantha (2010) *New Materialisms. Ontology, Agency and Politics.* Durham and London: Duke University Press.

Dastur, Françoise (2004) *La phénoménologie en question: Langage, altérité, temporalité, finitude*. Paris: Vrin.

De Saint Aubert, Emmanuel (ed.) (2008) *Maurice Merleau-Ponty*. Paris: Hermann.

De Saint Aubert, Emmanuel (2011) Conscience et expression: Avant-propos'. In: Merleau-Ponty (2011), 7–38.

Dolphijn, Rick and van der Tuin, Iris (2012) *New Materialism: Interviews & Cartographies*. Open Humanities Press.

Dreyfus, Hubert (1972) *What Computers Can't Do*. New York: MIT Press.

Dreyfus, Hubert (1992) *What Computers Still Can't Do: A Critique of Artificial Reason*. New York: MIT Press.

Gallagher, Shaun (2005) *How the Body Shapes the Mind*. Oxford: Oxford University Press.

Gibson, James J. (1979) *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.

Günzel, Stephan (2007) *Werk und Wirkung: Eine Einführung*. Wien: Turia + Kant.

Hacking, Ian (1983) *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science*. Cambridge: Cambridge University Press.

Hansen, Mark B. N. (2006) *Bodies in Code: Interfaces with Digital Media*. New York and London: Routledge.

Hansen, Mark B. N. (2014) *Feed Forward: On the Future of 21st Century Media*. Chicago: University of Chicago Press.

Haraway, Donna (1988) Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies* 14(3): 575–599.

Hoel, Aud S. and Carusi, Annamaria (2015) Thinking technology with Merleau-Ponty. In: Rosenberger, Robert and Verbeek, Peter-Paul (eds) *Postphenomenological Investigations: Essays on Human-Technology Relations*. Lanham, Boulder, New York and London: Lexington Books, 73–84.

Ihde, Don (2002) *Bodies in Technology*. Minneapolis, Minn.: University of Minnesota Press.

Ihde, Don and Selinger, Evan (eds) (2003) *Chasing Technoscience: Matrix for Materiality.* Bloomington and Indianapolis: Indiana University Press.

Ihde, Don and Selinger, Evan (2004) Merleau-Ponty and epistemology engines. *Human Studies*, 27: 361–376.

Johnson, Galen A. (ed.) (1993) *The Merleau-Ponty Aesthetics Reader: Philosophy and Painting*. Evanston: Northwestern University Press.

Landes, Donald A. (2013) *Merleau-Ponty and the Paradoxes of Expression*. London, New Delhi, New York and Sydney: Bloomsbury.

Latour, Bruno (1999) *Pandora's Hope: Essays on the Reality of Science Studies.* Cambridge, Mass.: Harvard University Press.

Latour, Bruno (2003) Interview with Bruno Latour. In: Ihde and Selinger (2003), 15–26.

Latour, Bruno (2005) *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.

Merleau-Ponty, Maurice (1962) [1945] *Phenomenology of Perception.* Smith, Colin (trans.). London: Routledge and Kegan Paul.

Merleau-Ponty, Maurice (1968) [1964] *The Visible and the Invisible.* Lefort, Claude (ed.); Lingis, Alphonso (trans.). Evanston: Northwestern University Press.

Merleau-Ponty, Maurice (1973) The algorithm and the mystery of language. In: *The Prose of the World*. Lefort, Claude (ed.); O'Neill, John (trans.). Evanston: Northwestern University Press.

Merleau-Ponty, Maurice (1993a) [1945] Cézanne's doubt. In: Johnson (1993), 59–75.

Merleau-Ponty, Maurice (1993b) [1952] Indirect language and the voices of silence. In: Johnson (1993), 76–120.

Merleau-Ponty, Maurice (1993c) [1961] Eye and mind. In: Johnson (1993), 121–149.

Merleau-Ponty, Maurice (2003) [1995] *Nature: Course Notes from the Collège de France*. Séglard, Dominique (ed.); Vallier, Robert (trans.). Evanston: Northwestern University Press

Merleau-Ponty, Maurice (2008) La Nature ou le monde du silence: Pages d'introduction. In: Saint Aubert (2008), 41–53.

Merleau-Ponty, Maurice (2011) *Le Monde sensible et le monde de l'expression: Cours au Collège de France, Notes 1953.* De Saint Aubert, Emmanuel (ed.). Genève: Metis Presses.

Mol, Annemarie (2002) *The Body Multiple: Ontology in Medical Practice.* Durham and London: Duke University Press.

Noë, Alva (2004) *Action in Perception*, Cambridge, Mass.: MIT Press.

Pickering, Andrew (1995) *The Mangle of Practice: Time, Agency and Science*. Chicago: University of Chicago Press.

Simondon, Gilbert (1958) *Du mode d'existence des objets techniques*. Paris: Aubier.

Stengers, Isabelle (2000) *The Invention of Modern Scienc*e. Smith, Daniel W. (trans.). Minneapolis and London: University of Minnesota Press.

Stiegler, Bernard (1994, 1996, 2001) *La Technique et le temps* (3 Vols.). Paris: Éditions Galilée.

Toadvine, Ted (2009) *Merleau-Ponty's Philosophy of Nature*. Evanston: Northwestern University Press.

Uexküll, Jakob von (1982) [1940] Theory of meaning. *Semiotica* 42(1): 1–24.

Umbelino, Luís A. (2013) The melody of life: Merleau-Ponty, reader of Jacob von Uexküll. *Investigaciones Fenomenológicas* 4(1): 351–360.

Varela, Francisco J., Rosch, Eleanor and Thompson, Evan (1991) *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, Mass.: MIT Press.

Verbeek, Peter-Paul (2005) *What Things Do: Philosophical Reflections on Technology, Agency, and Design*. University Park: The Pennsylvania State University Press.

Zylinska, Joanna (2016) The creative power of nonhuman photography. In: Kuc, Kamila and Zylinska, Joanna (eds.): *Photomediations: A Reader*. Open Humanities Press, 201–224.

[1] Joint first authors.

[2] 'Technicity' understood here 'as a relation to exteriority, as exteriorisation' (Hansen, 2006: viii).

[3] See for example Bruno Latour's comment on Merleau-Ponty and phenomenology in Ihde and Selinger (2003: 16-17), Latour (1999: 9-10), and Ihde and Selinger (2004: 361-367).

[4] Of special interest for Hansen is Merleau-Ponty's 'motor intentionality for the constitution of "reality"', which is brought to the fore by the current mixed reality paradigm with 'unprecedented clarity and force' (Hansen 2006: 7-8).

[5] These resources include notions such as: flesh, productive negativity, logos of perception, natural symbolism, expression, body schema, reversibility, écart, language, wild principle of logos, system of equivalences, chiasm, and

of particular interest here, 'measure of being' -- many of which we discuss in this paper, or other papers (Carusi and Hoel, 2014a and 2014b; Hoel and Carusi, 2015).

[6] For a discussion of Merleau-Ponty's particular use of the notion of expression, and the connections between Merleau-Ponty and Simondon, the thinker of technicity and individuation, see Landes (2013).

[7] Both of these were published posthumously. *The Visible and the Invisible* is the book that Merleau-Ponty was working on when he died, which consists of an incomplete manuscript followed by working notes. *Nature* consists of written traces of Merleau-Ponty's lectures on the concepts of nature held at Collège de France in the 1950s. The course notes are written both by Merleau-Ponty and his students.

[8] Associating Merleau-Ponty with measurement may seem a strange move, especially when he is most closely identified with notions such as pre-reflective experience, motor intentionality and tacit cogito elaborated in his seminal work, *Phenomenology of Perception*. These are notions that have been, and still are, called upon in criticisms of the abstractions of theoretical science, including its ongoing efforts to mathematise and quantify nature. A famous example is Hubert Dreyfus' critique of the rationalist vision underpinning the artificial intelligence research programme (Dreyfus, 1972, 1992). However, associating Merleau-Ponty with measurement should not be taken as a surrender to the very rationalist ideas that Merleau-Ponty has pointedly shown to have no foundation (and quite literally so), including the excesses of the will to quantify. Rather, the connection to measurement has to do with a shift in strategy in his later thinking, where, instead of seeking to recover a primordial, pre-reflexive layer in experience, he seeks to integrate rational processes in a new way, rethinking rationality as a formative force that permeates all layers of experience. Terms such as 'measure' and 'measurement', then, are invoked only to be transformed in accordance with the expansive dynamic of flesh.

[9] This complicity, by different names, is also emphasised in contemporary approaches such as Hacking (1983), Barad (2007), and Chang (2012)

[10] Depending on the discipline, this thought paradigm could also be referred to as 'naturalism', 'behaviourism', and 'mechanism'.

[11] See *The Visible and the Invisible* (1968: 176, 200) for Merleau-Ponty's own account of the shortcomings of *Phenomenology of Perception*. In the later work he goes so far as to advise against the use of the term 'perception' at all: 'We exclude the term perception to the whole extent that it already implies the cutting up of what is lived into discontinuous acts, or a reference to "things" whose status is not specified, or simply an opposition between the visible and the invisible. Not that these distinctions are definitively meaningless, but because if we were to admit them from the start, we would re-enter the impasses we are trying to avoid' (1968: 158).

[12] For excellent introductions to Merleau-Ponty's later thinking and the notion of flesh, see Barbaras (2004 [1991]) Carbone (2004) and Toadvine (2009).

[13] As in Zylinska (2016), the term 'nonhuman' here refers to actants whose agency '[go] beyond that of human decision or will, even if [they] may be influenced by human action' (202). In this article, the 'nonhuman' aspect is connected with the way that symbolisms and tools are conceived as measuring agencies in their own right (see the section below entitled 'Symbolisms and Tools as Measures of Being').

[14] Merleau-Ponty puts this in different ways, among which are the 'fecund negative' (Merleau-Ponty, 1968: 263); and 'the negativity that works' ('négativité qui travaille') (quoted in Saint Aubert, 2008: 35). On productive negativity, apart from Saint Aubert's introduction to the collection titled *Maurice Merleau-Ponty* (2008: 7–40), see also his introduction to *Le Monde Sensible et le Monde du Silence* (2011).

[15] A notable exception is Mauro Carbone, who discusses the reversibility of the notions of the measured and the standard of measurement in his discussion of latent intentionality (Carbone, 2004: 18–19).

[16] See Carusi and Hoel (2014b) for an in-depth discussion of this essay.

[17] These sketches are Merleau-Ponty's own notes, written between 1958 and 1960, as opposed to other sections of *Nature*, which are students' notes.

[18] See for example Merleau-Ponty (2003: 211, 223, 224) for similar formulations.

[19] See also Merleau-Ponty (2011: 54, 2003: 211, 1968: 169, 211). The phrase 'logos of the sensible world' is used at (2003: 166).

[20] Among others that Merleau-Ponty associated with what he termed 'modern biology' are George E. Coghill, Kurt Goldstein, Arnold Gesell and Catherine Amatruda, and George Canguilhem.

[21] For accounts that deal specifically with Merleau-Ponty's use of Uexküll, see Buchanan (2008) and Umbelino (2013).

[22] See Uexküll (1982) and Merleau-Ponty (2003: 167–73). Carusi and Hoel (2014a) discusses Merleau-Ponty's use of Uexküll's theory in the context of computational instruments used for systems biology.

[23] In fact the notion of the circuit is like a red thread to be followed from an early work such as *The Structure of Behavior* (1963 [1942]) all the way through to, for example 'Eye and Mind' (1993c [1961]); his use of the term remains associated with his preoccupation with breaking with mechanistic and causal thinking from his early career. However, despite the apparent continuity of the term, Merleau-Ponty constantly reworks it and deploys it differently.

[24] To underscore the mutual constitution and entanglement of organism and environment in the circuit, we could use Karen Barad's term 'intra-action', which she defines as follows: 'The neologism "intra-action" *signifies the mutual constitution of entangled agencies.* That is, in contrast to the usual "interaction", which assumes that there are separate individual agencies that precede their interaction, the notion of intra-action recognises that distinct agencies do not precede, but rather emerge through, their intra-action.' Barad (2007: 33).

[25] See Uexküll (1982). There is an ongoing debate about development in biology, but we are here only referring to these ideas as they were influential for Merleau-Ponty's thinking.

[26] Merleau-Ponty ascribes this latter position to Henri Bergson, see Merleau-Ponty (2011: 90-91).

[27] Merleau-Ponty introduced this notion already in the *Phenomenology of Perception*.

[28] And hence, in the terms of Mark Hansen, technicity or a relation to exteriority.

[29] The term 'écart' has multiple meanings ranging over gap, interval, distance, difference and divergence, all of which Merleau-Ponty exploited.

[30] That Merleau-Ponty is experimenting with using this term is marked by its being followed by question marks in his notes.

[31] In the English translation of *Le Visible et l'invisible* 'intermonde' is translated as 'intermundane space'.

[32] See also Carusi (2008) for an earlier version of the idea of communicability.

[33] Or technics (in Hansen's terms).

[34] This breaks, for example, with the Kantian tenet of the heterogeneity of sensibility and understanding, which implies that there is no universality on the side of sensibility, that is, prior to the schematisation of intuitions.

[35] And hence, technics and exteriority.

[36] Apart from the much referred to cane of the blind man in *Phenomenology of Perception*.

[37] Elsewhere Merleau-Ponty and we call this a 'system of equivalences', see for example Merleau-Ponty (1993c: 142) and Hoel and Carusi (2015).

[38] For a discussion of Merleau-Ponty's relevance to the philosophy of technology, and more specifically, to postphenomenology, see Hoel and Carusi (2015).

[39] Elsewhere, we have developed some implications of the proposed approach for understanding the visualisation practices of computational biologists and neuroscientists, respectively (Carusi and Hoel, 2014a, 2014b). Carusi (2016) mobilises the measuring body framework for rethinking the 'realism' of models in systems biology.

[40] For a detailed example of how Merleau-Ponty's later thinking throws new light on the methods of computational biology, see Carusi and Hoel (2014a).