9

How to Naturalize Sensory Consciousness and Intentionality within a Process Monism with Normativity Gradient

A Reading of Sellars

Johanna Seibt

Sellars's philosophy has created a continuous stream of exegetical, critical, and constructive commentary. Early commentators typically involved themselves close-up with one aspect of the complex tapestry of Sellars's work. More recently, however, with increasing temporal distance, philosophical interaction with Sellars often aims to identify general strategies and "master thoughts." For example, John McDowell finds in Sellars's EPM the "master thought…that the conceptual apparatus we employ when we place things in the logical space of reasons is irreducible to any conceptual apparatus that does not serve to place things in the logical space of reasons"; this "master thought as it were draws a line: above the line are placings in the logical space of reasons, below it are ["causal"] characterizations that do not do that" (McDowell 1998: 433). Similarly, Robert Brandom identifies in EPM the "master idea" that Sellars's "two-ply account of observation" involves "two distinguishable sorts of abilities: the capacity reliably to discriminate behaviorally between different sorts of stimuli, and the capacity to take up a position in the game of giving and asking for reasons."[1]

The following engagement with Sellars's philosophy is a contribution to such endeavors of taking the larger contours into view. But my aim in presenting a wide-scope reconstruction is not to identify reasons for why and how we can leave Sellars's philosophy safely behind.[2] Rather, I will highlight elements in Sellars's work that have

---

[1] Brandom 2000: 599; here quoted from the English original.
[2] For instance, as a "scientistic" misinterpretation of Kant, cf. McDowell 1998: 469.

received little attention so far, precisely in order to show that Sellars's thought belongs into the future of twenty-first century philosophy rather than in its past.

Unlike other commentators, I put Sellars's explicit commitment to a "future process metaphysics" center stage; elsewhere I have explored the systematic significance of Sellars's commitment to "pure processes" more locally and in greater detail.[3] The concrete task of this paper is to step back from the trail of process-metaphysical pointers that Sellars left us, to connect the dots to a trajectory, and to let an outline appear that can plausibly claim to be a candidate interpretation for the process monism that Sellars envisaged.

The main motivation for this reconstructive enterprise is that Sellars's process monism contains a philosophical explanation of 'the place of mind in nature' that is of undiminished or even increasing relevance. Cognitive science, especially after the turn from classical computationalism to "embodied cognition," has come to conceive of cognition along largely Sellarsian lines—as a complex interaction between environment and cognizant nature where mechanistic causal information is gradually transformed into forms of processing that generate conceptual content. On the other hand, that this is indeed a view of cognition 'along Sellarsian lines,' and just how well Sellars's account of intentionality and sentience could interface with cognitive science research, we can appreciate only if we attend to the process-ontological subtext in Sellars's work.

To highlight this interface between embodied cognition research and Sellars's philosophy of mind I will simply use it in one direction and draw on current notions of nonlinear causation in my explication of Sellars's work. This will, I hope, enable a Gestalt switch in our reading of Sellars that will make his philosophy more relevant to the current discussion in the intersection of philosophy of mind and cognitive science than the 'standard interpretation' does.[4] Sellars is best known for debunking the "myth of the given," that is, for his rejection of the classical empiricist claim that conceptual contents, which are essentially "normative" items produced by following rules, could be, as such, causal effects produced in accordance with mechanistic laws. According to our common reading of Sellars, this attack on the myth of the given leaves Sellars with a metaphysical bifurcation, splitting the "causal order" and the normative "space of reasons." Against this common view I will argue in this paper that Sellars adopted a thoroughgoing naturalist process monism that countenances a wide spectrum of types of processing, ranging from the mechanically causal to the functional or normative.

More precisely, a key element in Sellars's reconfiguration of the problem space of a philosophical theory of experience is his insistence that we should not follow the

---

[3] Cf. Seibt 1990a, 2000, 2007, 2009a.

[4] The process-metaphysical reading can also be shown to be 'the correct one', in my view, in the sense of being much closer to Sellars's overall aims, as these can be gauged from texts and subtexts from published and unpublished material; my reading is motivated by Sellars' own reactions (1986–8) to a process-focused interpretation of his work (see also Sellars's preface to my 1990). The larger enterprise of a detailed documentation belongs elsewhere—some of it can be found in studies cited in fn. 3, but here my goal must be merely to present the process-metaphysical reading as a plausible possibility.

classical 'theory of ideas' in assimilating the deliverances of sensory consciousness to conceptual contents. As I will argue, Sellars's idea was to apply this crucial insight within a process-ontological account of cognition where different process organizations generate different forms of 'significances' arising from increasing regulatory dependencies, without relapsing into the mistake of treating sensations and images as "low-grade examples of conceptual thinking" (PSIM V ¶83, SPR 30, ISR 398). Sellars's texts give us both sufficient reason and sufficient leeway to reconstruct his accounts of cognitive faculties as levels of processing with a 'normativity gradient,' in the sense of a gradual increase of regulatory dependence up to normativity.

That Sellars can be counted among the 'process philosophers,' in a suitably restricted sense of that term, is likely to appear as a novel epithet to some readers.[5] Stranger yet will probably be the idea that normativity is a matter of dynamic architecture. Thus, preparing the ground, I introduce in section 1 the contrastive fiction of a 'standard interpretation' in order to highlight two common misconceptions in readings of Sellars. In section 2 I list five core tenets that contain the basic philosophical intuitions of Sellars's thought and drive his process monism. In section 3 I introduce some auxiliary terminology, in order to sketch, in section 4, the types of processing that on Sellars's view constitute sensory consciousness, map-making, imaging, nonverbal languaging (thinking), and verbal languaging. In conclusion I suggest that it is indeed justified to speak of the 'naturalization' of (both sensory consciousness and) intentional contents, since on a process view the latter are, in the Scientific Image, not only causally but also logically reducible—or, rather, this distinction falls away.[6]

1. Two Preliminaries

We have accustomed ourselves to understanding Sellars's account of the place of mind in nature along the lines of what I will call here the 'standard interpretation.' The standard interpretation characterizes Sellars's views on experience and intentionality in terms of the distinctions that loom large in EPM and SM: the distinction between the "order of causes" and the "space of reasons," between "causal receptivity" and "normative spontaneity," or between the "real order" and the "logical order," respectively.

---

[5] At least to those readers who take their bearings from the current entry in the *Stanford Encyclopedia of Philosophy* (accessed August 2013). While Sellars's process-ontological commitments have been discussed on occasion (cf., e.g., Smart 1983, Rosenberg 1982, McGilvray 1983), there are, to my knowledge, currently only three comprehensive expositions of Sellars's philosophy that explore the systematic significance of Sellars's process metaphysics more extensively, namely, Seibt 1990a, O'Shea 2007, and Seibt 2007.

[6] My reading is largely in line with O'Shea's suggestion that we should attribute to Sellars the unusual position that we find actually formulated in his writings, early and late, namely, a "naturalism with a normative turn" (e.g. 2009: 187) based on the double thesis that normative items are conceptually irreducible but causally reducible to natural items. Within a process ontology the double thesis appears less puzzling, since mechanistic necessitation and normative functioning are a matter of dynamic architecture, and whether a process is "mechanically causal" or "normative" depends on the encompassing processual organization. However, I will suggest below that the conceptual irreducibility of normative contents is merely temporary.

In this way the standard interpretation saddles itself with the puzzlement of a dualist picture where a normative stratum balances in precarious ways on causal foundations. Indeed, the standard interpretation insinuates that Sellars has left us with a naturalism that assigns the all-important task of integrating the normative with the natural to the dubious metaphor of the "Janus-faced character of languagings" as both carrying and embodying a function (NAO 130, V ¶64). Instead of exploring Sellars's notion of "picturing" as a term in his *philosophy of mind* (NAO ch. 5), the standard interpretation focuses on SM (ch. 5) and treats 'picturing' only as a term introduced for the *epistemological* task of providing a criterion for the truth ("S-assertability") of empirical statements, and then complains that the mere postulate of an attainable causal isomorphism cannot fulfill this task.[7] In short, the standard interpretation chooses to attribute to Sellars the deficient stance of an unresolved dualism of causes and reasons, rather than to explore any of Sellars's process-ontological leads for how to achieve integration.[8] Most indicative perhaps is the fact that Sellars's process-ontological solution to the "sensorium-body problem" in FMPP, one of Sellars's major works, is commonly bypassed.

Before I present a counterproposal to the standard interpretation, let me follow Sellars's advice on good methodology (P 184, ¶1, SPR 282) and discuss two reasons for why this interpretation could have appeared right First, claims about a conceptual difference have been (mis)read as claims about a binary division. Sellars's claims about the fundamental conceptual difference between causal uniformities and norms have been reformulated in terms of spatial metaphors—e.g., by McDowell or Brandom, quoted above, as referring to two regions separated by "a line," or to two "plies" of capacities, respectively—and these expository metaphors have been further elaborated in ways that suggest a strict dualism of the causal order and the normative domain, an 'above the line' and 'below the line,' with *no middle ground in between*. But a difference does not entail a bifurcation. Consider for instance Sellars's well-known objections against the "mismating of two ideas" (EPM §10), i.e., the "crossbreeding" (EPM §7) of normative and mechanically causal descriptions of perceptual episodes. Formulations like these do throw the fundamental diversity of the two sorts of characterizations into vivid relief, but they do not imply that the division in mechanically causal and normative descriptions of cognitive episodes is *exhaustive*. If the causal and the normative are the extreme points of a spectrum, their crossbreeding can be claimed to result in monstrous mixtures, while nevertheless leaving space for less than fully

---

[7] The typical treatment of the notion of "picturing" is to proceed immediately to the notion of "picture correctness" and to discuss the latter within the context of Sellars's epistemology in connection with issues such as truth and conceptual change (see, e.g., Margolis 1967, Bonjour 1973, Pitt 1981). Millikan 1984, 1998, 2005, Rosenberg 2007, and Seibt 2009a treat 'picturing' as a label for an account of a natural *process* that establishes the 'representationality' (correlatedness) of natural-linguistic items to natural items.

[8] This choice is, in my view, just another expression of what I have discussed elsewhere as "the myth of substance," a comprehensive theoretical bias against dynamic entities.

normative goings-on in between the endpoints that *do not result from* such crossbreedings.

Second, ontological reticence is (mis)read as ambivalence. That Sellars does not properly work out a category of pure process has been taken as a sign of diffidence. But it is a matter of methodological consistency. Sellars's commitment to process metaphysics runs through the early, middle, and late period of his writings:

The picture of the world in terms of molar things and their causal properties...points beyond itself to a picture of the world as pure episode. (CDCM §51)

The qualities of sense are a dimension of natural process which occurs only in connection with those complex physical processes [which are currently categorized as the central nervous system]. (PSIM VI ¶107, SPR 37, ISR 406)

The world is the ongoing tissue of goings-on.... Objects and object-bound processes would, in traditional terminology, be 'logical constructions' out of, i.e., patterns of, absolute processes. (FMPP 57 II §103; 85 III §112)

The standard interpretation overlooks that Sellars's particular brand of transcendental scientific realism does not allow for (mere) metaphysical speculation to anticipate scientific developments. In Sellars's view ontological category construction is the project of determining, partly reconstructively and partly constructively, the generic inferential types of basic factual or descriptive concepts. As long as the basic concepts of science are concepts of "thing-kinds," the project of developing a detailed philosophical theory of pure processes cannot, in Sellars view, get off the ground. In CDCM (§52) from 1958 he explains:

The conception of the world as pure process, which is as old as Plato, and as new as Minkowski, remains a regulative ideal; not simply because we cannot hope to know the manifold content of the world in all its particularity, but because science has not yet achieved the very concepts in terms of which such a picture might be formulated.

In FMPP Sellars restates that "categories which are not bloodless are functions of the factual content of theories" (FMPP 19, I §81); he ventures into the speculative characterization of some generic features of the category of pure process but is adamant to stress that the features of pure processes will at best be analogical projections of the characterizations provided. In other words, if the business of ontology is to be the "midwife" of a description of reality as conceived in science (SK II §65), i.e., if the business of ontology is to *project* categories relative to a given state of scientific development, governed by the regulative notion of a complete description of reality by the ideal ("Peircean") scientific theory, then the state of scientific development determines which ontological work can be meaningfully undertaken at which time.[9] Without the support of scientific theories of nonlinear dynamics, self-organization, complexity, and embodied cognition Sellars could only vaguely hint at the process-ontological approach that would afford the naturalist account of intentionality he envisaged.

[9] On Sellars's method of category projection, see Seibt 2000.

Today, however, philosophers do have the reassurance that science is leaving the language of "particles" and "thing-kinds" behind in order to describe research results in physics, biology, and, in particular, cognitive science.[10] Thus we are today in a privileged position to move beyond the standard interpretation and read Sellars's philosophy of mind more constructively, as the vision of a process account of cognition.

2. Five Core Tenets

In order to see the overall Gestalt of Sellars's philosophy—and especially, a Gestalt different from the one the standard interpretation has presented—we need to begin by reviewing the basic philosophical intuitions that drive the entire scheme.

The pivotal element in this set of core tenets is the insight that content is a way in which natural items are functioning.

(CT1) For an episode to have content is to function in a certain way.

The entities that primarily can be said to have content are occurrings or "episodes" (akin to 'an episode of headache') not thing-like 'objects,' and the functioning that *is* their content consists in "transitions" between episodes.[11] The specific sort of functioning that endows natural items with content can be described on the model of linguistic content—as determined by three sorts of transitions ("language entry transitions," "intralinguistic transitions," "language exit transitions"); these transitions constitute the role of an episode within a complicated recursive system of roles that includes the roles of episodes with 'meta'-content, i.e., episodes the content of which consists in the rules and meta-rules in terms of which such roles are characterized (cf. SRLG). While we can understand such functioning best on the model of linguistic content—and currently can describe it only by analogical extension from the case of linguistic content— it is in terms of this sort of rule-governed normative functioning *only* that *all* content, including conceptual content and the intentionality of thought, must be philosophically construed (SM ch. III, NAO ch. 5, MEV 340, §§74–80).[12]

---

[10] See in particular the work by M. Epperson, J. Dupre, W. Bechtel, and M. Bickhard, respectively. Most remarkable from a Sellarsian point of view is surely the development in cognitive science. During the last decade cognitive science has witnessed a paradigm change from the "symbolic representation" model trading Cartesian representationalism to the process-geared approach of "embodied cognition" which eschews the classical notion of representation and the Fodorian model of a functionalism with encoding representations (Hendriks-Jansen 1996, Clark 1997, Bickhard 2004, Pfeiffer and Bongard 2006, Calvo and Gomila 2008).

[11] Sellars's conception of linguistic meaning and intentionality as functioning is briefly explained or referred to in most of his writings, but cf. especially SRLG, and NAO ch. 4: Linguistic *expressions* have meaning only derivatively, by being involved in rule-governed linguistic *episodes*; while a linguistic role is embodied in an expression and can be stated and discussed in terms of sentences formulating rules, ontologically speaking it consists in *practices*, episodes of habitual behavior acquired by stimulus-response learning.

[12] With Descartes and Brentano Sellars equates the feature of being 'mental' with the feature of being 'intentional' or 'about something' or having content (SSMB 46; ¶2). He stresses that "the concept of a thought is a concept by analogy" (PSIM VI ¶93, SPR 33, ISR 401), and draws attention to the fact that every analogy has negative and positive similarities (SRII 181, ¶24); it is clear, however, that the positive

It is a corollary of (CT1) that the *mode of occurrence* of a natural item (e.g., of an "expression" or "sign-design") that constitutes the item's content cannot be defined in terms of causal features as commonly understood in classical philosophy, namely, with reference to a stage of science that centers on a mechanical paradigm of causation. Importantly, the content of a natural item E cannot be defined in terms of *its own* (mechanistically) causal and spatiotemporal features, nor in terms of the (mechanistically) causal and spatiotemporal features of *all* natural episodes that are involved in the way in which E occurs to have that content.

This corollary of (CT1) is Sellars's familiar thesis of the "logical irreducibility" (SSMB 55; ¶19) of conceptual content and of rule-governed normativity. In EPM Sellars emphasizes the epistemological dimension of this thesis of the logical irreducibility of conceptual content as tied to normative justificatory practices. Some interpreters of Sellars have made so much of it that they all but dismiss Sellars's accompanying thesis of the "causal reducibility" of items with normative content.[13] To counter such simplifying readings O'Shea (2009) recently has reminded us, with strong textual support, that Sellars indeed was fully committed to the double thesis of the logical irreducibility *cum* causal reducibility of conceptual content and rule-governed normativity. O'Shea's reading invites a further question, however. On which philosophical grounds precisely could Sellars both champion naturalism *and* insist that the normative domain (conceptual content and rule-governed normativity) cannot be fully captured in the vocabulary of causal mechanisms?

In my view the deeper philosophical reasons for Sellars's curious 'double thesis' lie in a combination of two intuitions. The first of these is the metaphysical conviction that the nature of reality is dynamic:

(CT2) *"To be is to make a difference." (FMPP 87, III §126)*[14]

The second intuition is the methodological conviction that science, and only science, exhibits the hallmarks of a human practice of disclosure. In order to understand and describe *all* aspects of reality that 'make differences,' not merely "manifest" or perceptible difference-makers, and *only* those that make *relevant* differences, the philosopher's task is to take her bearings from science, since science is a practice that identifies all and only relevant factors and conditions of difference-making: the causal structure of reality.

---

similarities between intentional aboutness and linguistic meaning center on the idea that content is a *way of occurrence,* a "position" defined in terms of transition potentials (see, e.g., SRLG 327–35 (§§18–39))—"what thoughts are" is like "what a castling is in chess" (PSIM VI ¶95, SPR 34, ISR 402).

[13]   The classical passage on irreducibility is EPM §5; on causal reducibility, see, e.g., EPM §61, SSMB 78, ¶58, PSIM (I ¶14–16, SPR 6, ISR 374), NAO ch. 5, SSIS 439.

[14]   As quoted above, expressions of this metaphysical conviction can be found throughout Sellars's work. The metaphysical conviction dovetails with the ontological injunction against the postulation of entities that do not have a "causal role." This is clearest in FMPP where Sellars explains that the sensory processes he postulates (σ-ings) "would comply with a basic metaphysical intuition: to be is to make a difference" (FMPP 87, III §126).

(CT3) "It is 'scientific objects' rather than metaphysical unknowables, which are the true things-in-themselves." (SM 143, V §79)[15]

Sellars's 'scientific realism' is the conclusion of a transcendental argument in the course of which he establishes that we are entitled to consider science as a practice that (i) is an *interaction* with reality and (ii) generates conceptual episodes that justifiedly can be said to *track* reality, in the sense of providing practical orientation.[16] Since "scientific objects" mentioned in (CT3) are the referents of the theoretical concepts of an ideal science 'at the end of scientific development,' Sellars's transcendental scientific realism saddles the ontologist with the methodological problem of having to 'wait for science.' This difficulty I will address in the next section; here let us note that (CT3) in Sellars's view ties in with what he called the "strong reduction principle which lies at the heart of my ontology" (SSIS 423):

(CT4) "Every property of a system of objects consists of properties of, and relations between, its constituents." (PSIM V ¶74, SPR 27, ISR 395)[17]

Real difference-makers will be characterized in terms of the minimal set of "basic level primitive monadic predicates" for "basic scientific entities" (of ideal science) and relations among these (SSIS 425–6).

Let us now consider how tenets (CT2) and (CT4)—each a 'reality principle' of sorts—drive and shape the corollary of (CT1), i.e., Sellars's claim about the "logical irreducibility" *cum* "causal reducibility" of conceptual content, as well as his treatment of sensations. Let us first note that (CT4) is an ontological principle, defined for entities; using semantic ascent, it can be transformed into a "logical" principle about the definitional reduction of 'higher-level' predicates to 'lower-level' predicates. Assume then that there is a property P of a system S that cannot be reduced to (i.e., defined in terms of) monadic and relational properties $Q_1 \ldots Q_m$ instantiated by the system's constituents $C_1 \ldots C_n$. There are three ways to proceed.

(S1): Give up on (CT4) and postulate P* as an emergent property of the system.

(S2): Retain (CT4) and postulate an additional constituent C_{n+1} that has P*.

(S3): Retain (CT4) and postulate that P* can be defined in terms a set of (monadic and relational) properties $P_1 \ldots P_n$, and that the system's constituents $C_1 \ldots C_n$ possess (singly or jointly) $P_1 \ldots P_n$ in addition to properties in $Q_1 \ldots Q_m$.

[15] To forestall a possible misreading of (CT3) and (CT4), note that the term 'object' in these passages does not have its category-theoretic meaning as a type of entity (thing-like particular) but is used in the generic sense of 'object of science,' etc.; in other places (PSIM VI ¶107, SPR 37, ISR 405–6; FMPP 85f, III §111–20) Sellars explicitly proposes that the 'objects' of ideal science are not conceived of as thing-like particulars but as (categorial analogues of) non-particular processes.

[16] See Seibt 2009a.

[17] Cf. the alternative formulations in SSIS: "Attributes of wholes are reducible to attributes of and relations between their parts" (393) and "If an aggregate is the logical subject of a primitive monadic predicate, then this predicate must be true of the elements of the aggregate" (423). Does (CT3) imply (CT4), i.e., is the method of science committed to operating with predicates that ensure "aggregativity" or decomposability in the sense of (CT4)? On this question cf. Wimsatt (1986).

Sellars discusses the reduction principle (CT4) in connection with the question of how a naturalist can accommodate sensory and conceptual episodes, both of which are "logically irreducible" with respect to (CT4) yet indispensable for the explanatory tasks of the Scientific Image.[18] He explicitly calls strategies (S1) and (S2) "in an important sense, 'emergentist'" (SSIS 393) and adopts the second of these for the case of sensory episodes. Conceptual contents, on the other hand, he treats along the lines of the third strategy. These strategies, especially strategy (S2), only work within a process ontology, as Sellars explains in FMPP. Thus the fifth core principle of Sellars's thought is a commitment to process monism:

> *(CT5) In the sense of a category projection from pre-ideal science, reality consists of entities of a type T that is analogous to our current notion of an 'absolute process'— pure processes.* (FMPP 85)

Only by adopting an ontology with pure processes as basic entities can it at all appear viable *both* (i) to subscribe to a physicalist principle of constituent analysis such as (CT4) while *also* (ii) admitting items that cannot be characterized in terms of basic scientific predicates for inorganic nature. In which way precisely a process ontology allows for such a double commitment shall become clear in the following sections, where I elaborate in detail how reductive strategies (S2) and (S3) are implemented to arrive at naturalist accounts of sensory consciousness and intentionality. But to show the interplay of (CT1) through (CT5) let me offer a quick preview.

First, Sellars's naturalization of sensory consciousness follows strategy (S2). He distinguishes between two types of physical entities: "physical$_2$" entities (episodes) that form the domain of inorganic nature and "physical$_1$" entities (episodes) that form the domain of all of nature including sentient organisms.[19] Sensory consciousness can be

---

[18] Sellars famously takes sensory and conceptual episodes to be *theoretical* entities—unobservables postulated to explain different aspects of observable human behavior. As he states in SSIS 400, the "primary explanandum" of sensory and conceptual episodes is "perceptual thinking-out-loud," with conceptual episodes or 'thoughts' explaining the continuation of certain behavioral sequences when the propensity to 'think-out-loud' is inhibited, and sensory impressions explaining that perceptual thinkings-out-loud may occur when one merely seems to perceive, i.e, ostensible perception.

[19] Significantly, explicit commitments to a process ontology occur in Sellars's writings as early as his distinction between "physical$_2$" and "physical$_1$" entities (episodes), cf. CE 252 (1956); precursors of the distinction go back to 1952, cf. MMB 93. I am indebted to Boris Brandhoff who, commenting on an earlier draft of this paper, drew my attention to a manuscript by Rudolph Carnap in response to discussions with Sellars and other members of the "Minnesota group" in December 1954 ("Remarks on Physicalism and Related Topics: Discussions with Wilfrid Sellars," December 1954, Box 86, Folder 6 Rudolf Carnap Papers, 1905–1970, ASP.1974.01, Special Collections Department, University of Pittsburgh). The manuscript shows that already in 1954 Sellars ("tentatively") entertained the view that a naturalist metaphysics should account for different types of causal efficacy and used a process-based idiom to express this claim; the text also indicates that continuity versus discontinuity conceptions were discussed. Carnap attributes the distinction between physical$_2$ and physical$_1$ "terms" to the "Minnesota group" and mentions that "Sellars raises the following question: Although [sensation terms and special laws] are dispensable for predictions, would it not be desirable to include them into the system in order to be able to account for the difference between the causal structure of the inorganic world and that of the organic world?" Against "emergentism in general" Carnap argues for a physicalism that accounts for "dispositions [of microstructures] for responses of higher and higher degrees of integration," where such "possible degrees of integration form a continuum," and in this context, implicitly

integrated into nature by postulating physical$_1$ episodes called "sensa" that come about once certain physical$_2$ episodes occur in certain constellations. A *sensum* is the *mode* in which certain physical$_2$ processes occur within a sentient organism that interacts with physical$_2$ processes in its environment. Since pure processes are occurring-such-ly's or *modes* of spatiotemporal occurrence, in a process ontology the mode or configuration in which processes occur is itself a process.[20] Some configuration processes can be reduced to its constituents, but some cannot. In such a case the mode of occurrence M of certain basic episodes constituting system S must be reckoned among the basic constituents of S. *Sensa*, claims Sellars, can be equated with such irreducible emergent process configurations.

Second, Sellars's naturalization of intentionality, which follows strategy (S3), turns on the identity criteria of processes. Processes are 'what they do', and what they 'do' is intrinsic to them but can only be described in terms of the differences they make, by referring to the processes they presuppose and those they engender. By choosing different scopes of description we identify different processes. For example, we can characterize what a process 'is qua does' in terms of capacities that are relatively *context-insensitive* and hold across many dynamic organizations—these are the capacities referred to in mechanistically causal descriptions of what is going on in a region, in terms of locomotions, exertions of force, and impacts of force. The particular descriptive focus on doings that are invariant across dynamic contexts renders mechanistically causal processes conceptually more 'independent' of each other.[21] In contrast, once the larger dynamic environment of a natural process is taken into view, once the descriptive scope is opened up to include more encompassing dynamic organizations, deep context-sensitivities and interdependencies appear, including loops and networks of nonlinear 'control structures' with feedback and thresholds. Briefly, within a process ontology differences in descriptive scope can generate the logical 'irreducibility' of one sort of process (mode of occurrence) to another sort of process.[22] Since the predicates of the functional description refer to nonlinear

interacting with Sellars's postulate of sensa, suddenly uses the term 'process': "when more is known about these developments, it will be found that the characteristic features distinguishing, say, sensations or other not-purely-physical processes from purely physical ones, are multi-dimensional; a process A may be of higher degree than B ("more mental," if you like) in one respect and of lower degree in another" (ibid.).

[20] E.g., a vortex is the mode in which certain other processes (movements of water molecules) occur, photosynthesis is the mode (configuration) in which certain other processes occur, and so forth. That even the most basic processes are modes of spatiotemporal occurrence is motivated below—for present purposes it matters only that the dynamic organization of processes can count as a process itself.

[21] As is witnessed by the fact that in mechanistically causal explanations we identify a factor A as the cause of B in terms *other* than 'the cause of B' and we do not make reference to the antecedent history of A or subsequent history of B.

[22] For example, if we describe what is going on in a certain space-time region R with narrow scope as, for example, the transmission of sodium and potassium ions across the membrane of a nerve cell, we identify what is going on in R in terms of causal features, as a causal process; if we describe it as part of the production of the phoneme sequence 'this is red', where the latter in turn is described with reference to the enormously complex dynamic architecture of an individual human organism's linguistic competence, we describe what is going on in R in terms of its functioning within a normative context, i.e., as a normative episode.

architectures, while the predicates of a mechanically causal description refer to linear process architectures, the former are not logically 'reducible' to the latter. But as I shall discuss below, this does not exclude the possibility that there may be future predicates for nonlinear causal processing in terms of which functional predicates may be defined, so that the claim about the logical irreducibility of conceptual contents might be superseded at a later stage of scientific development and allow for a full "identification of conceptual thinking with neurophysiological process" (PSIM VI §96, SPR 34, ISR 402).

In sum, if having content is functioning (CT1) and science is the form of interaction that discloses reality (CT2 and CT3), the postulate of process monism (CT5) can derive strong support from the fact that a process monism—and perhaps even *only* a process monism—enables the necessary reductions of sensations and normative content in accordance with the reduction principle (CT4) and reduction strategies (S2) and (S3).

3. Some Expository Auxiliaries

In order to follow Sellars's process-ontological 'reduction' or naturalization of sensory consciousness and intentionality in more detail, I need to introduce a few terminological tools. One would naturally expect such a clarification of terminology to begin with a characterization of Sellars's notion of process. But here Sellars's metaphysics generates a curious obstacle. His peculiar brand of transcendental scientific realism changes the conditions and possibilities of constructing, at any stage of pre-ideal or 'pre-Peircean' science, category frameworks that are both detailed and metaphysically relevant. Since "categories which are not bloodless…are functions of the factual content of theories," and since "the fruits of painstaking theory construction [in the sciences] cannot be anticipated by screwing up one's mental eye" (FMPP 19, I §82), all that ontologists can do is to explore the space of candidate basic categories for future and 'ultimate' science by way of analogical projection. The encouraging aspect of a *transcendental* scientific realism is, however, that such analogical projections are not entirely arbitrary; "we are not without a glimpse of the end" (PHM 105, VIII ¶104) since we have access to the logical resources for the categories of ultimate science.[23] The

---

[23] In his early papers (PPE, RNWW, ENWW, CIL, LCP) Sellars presents the philosophical program of an analysis of the *model structures* of scientific theories—"world stories"—in order to arrive at a "pure theory of an empirical language" which would specify the conditions of conceptual experience. Sellars later abandoned the formalized approach but not the basic idea; cf. SM II §49: "The thesis I wish to defend, but not ascribe to Kant, though it is very much a 'phenomenalism' in the Kantian (rather than the Berkeleyian) sense, is that although the world we conceptually represent in experience exists only in actual and obtainable representations of it, we can say, from a transcendental point of view, not only that existence-in-itself accounts for this obtainability in virtue of having a certain analogy with the world we represent, but also that in principle *we*, rather than God, can provide the cash." [The cash is] "the use of analogy in theoretical science" [which generates] "new determinate concepts. It does not merely indirectly specify certain unknown attributes by an 'analogy of proportion.' One might put this by saying that the conceptual structures of theoretical science give us new ways of schematizing categories."

task of ontology is thus to abstract from current categories those generic logical deter-
minations—i.e., "transcendentals as *actual, something, somehow*" (FMPP 21) as well as
determinations such as particularity, dependence, and efficacy or dynamicity—that
we use to characterize and differentiate categories, and to recombine these logical
determinations in new ways, guided by what appear to be the most projectable concep-
tual roles for fundamental entities entertained by current science.[24]

   This procedure of 'category projection' has an obvious problem. The combinatorial
space of possible categories is vast and analogical projections of current categories
select wide regions of this space.[25] In application to Sellars's own ontology, it is clear
that in Sellars's view 'particle' is not likely a category that can be projected:

I shall not dwell on the caution with which I have spoken of the as yet dimly glimpsed catego-
rial structure of the Scientific Image, nor of my warning against assuming that the particles of
current physical theory will continue to be 'particles,' rather than singularities in a 'field' or
abstractions from a domain of 'pure process'. (SSIS 416)

It is also clear, from this passage and elsewhere, that the notion of "process" or "pure
process" is Sellars's preferred candidate for a category in terms of which a (or rather:
the) basic category of the Scientific Image can be anticipated.[26] But precisely which of
the many possible categories of 'pure process' is the intended one? Sellars introduces
the basic items in a metaphysics of "pure process" in terms of an analogical projection
of the category of "absolute processes" used as part of the conceptual repertory of the
manifest image, i.e., as denoting the type of dynamic entity illustrated by "there is a
C#-ing in the corner." There are five category features that expressly carry this analogi-
cal projection from manifest absolute processes to pure processes. Like absolute pro-
cesses, 'pure processes' should be (i) "subjectless" or not "object-bound," (ii) "actual,"
(iii) "something" or nameable and identifiable in terms of "typical causes," (iv) "some-
how" or endowed with an "intrinsic character," and (v) "dynamic" in the sense of *also*
engaged in non-mechanistic causal interactions beyond the "impact paradigm of
causation."[27] This list of analogically projected category features is rather minimal,
however, and it is not clear from Sellars's texts how it should be supplemented.

---

[24] For a reconstruction of this peculiar methodology, which I call "projective metaphysics," see
Seibt 2000.
[25] For example, the contemporary ontological discussion uses categories that are characterized in terms
of at least 16 different generic logical determinations and thus operates within a combinatorial space of 2^{16}
possible categories.
[26] Cf., e.g., CDCM §51; PSIM VI ¶107, SPR 37, ISR 406; FMPP 57, II §103–4; 85, III §111–12.
[27] For category feature (i), cf. FMPP 58–9, II §113–14; and 86, §118; for (ii), cf. FMPP 55, II §91 and 87,
III §126; for (v), cf. FMPP 83–4, III §100–1. For (iii) and (iv), cf. FMPP 50–1, II §62–3; note that these two
determinations, something and somehow, must be understood in connection with Sellars's '*flatus voci*'
account of predication according to which ontological 'this-such' units without propositional complexity
are causal antecedents of Jumblese sentences, i.e., names in a specific articulation environment such as the
sign design '---is red'. If an item x is 'nameable' it can figure as the causal antecedent of a singular term of a
"world story" or observation language in use; nameability entails that x has an intrinsic character that can
be causally correlated with the articulation environment of the name of x. See also below section 4.4. For

For example, even though in some places Sellars entertains the idea that the basic entities of the Scientific Image are "particulars" (cf. P; also SSIS 404), this might be for dialectical reasons only since in other places he stresses the need to "penetrate to the non-particulate foundation of the particulate image" (PSIM VI ¶107, SPR 37, ISR 406) and switches terminology from "basic object" to "basic item" (FMPP 57, II §§103–10). Similarly, even though Sellars envisages the dimension of pure process as "*continuous* coming to be and ceasing to be," reminiscent of Bergson's *durée*, the 'pure processes' of the Scientific Image are to be "neither instantaneous processes nor (pace Whitehead) processes which are entities such that it is a rock bottom *ontological* truth that they have finite duration" (FMPP 59, II §124). Furthermore, it is not clear whether Sellars's pure processes have the dynamicities of activities or developments, in the sense of Aristotle's distinction between *energeia* and *kinesis*, or are like Whiteheadian "occasions" phasal unfoldings with internal dynamic structure.

In my view the most adequate reaction to the openness of Sellars's notion of 'absolute process' is to treat the latter as an indeterminate category denoting a range of candidate categories for process-like entities that are, in the sense of (i) through (v) above, *subjectless*, *actual*, *something*, *somehow*, and *dynamic*. When I speak of 'processes' in the following, I am using the term as an indeterminate notion of 'pure process' in this sense. However, the very same metaphysical reasons that motivate Sellars to desist from purely speculative additions of category features also justify the exploration of suitable supplementations at a later time, from the hindsight of further scientific development. Unlike Whitehead's fully axiomatized "philosophy of organism", Sellars's "metaphysics of pure process" is a framework that is intended to be continuously reworked, within a cycle of tentative supplementations and revisions that respond to, as well as occasionally stimulate, conceptual innovations in science (SM 130–50, V §42–102.; CC 184, §§46–50).

In the sense of such a tentative exploratory supplementation let me suggest here one substantive addition to the notion of pure process and introduce a few auxiliary concepts. The substantive addition consists in the postulate that pure processes are non-particular individuals. As I have argued elsewhere, the logic of our reasoning about activities supports the postulate of a new category of dynamic non-particular individuals.[28] So-called 'particulars' are necessarily uniquely occurrent at any time,

---

further discussions of projected attributions of category features to pure processes, see Seibt 1990a: ch. 9, 2000, and 2007: 149–63.

[28] Whether Sellars was ultimately committed to an ontology of particulars (i.e., of entities which are necessarily located in one spatial region, at any one point in time) would require a longer discussion; passages where Sellars expressly refers to absolute processes as particulars often suggest that he equates individuals and particulars (cf., e.g., SSOP 108, §87) as well as particulars and countable objects (FMPP 53, II §§79–83; 55, II §§89–96). For a process ontology constructed with non-particular individuals (earlier called "dynamic masses" and now "general processes" or "dynamics") see Seibt 1990b, ch. 5; 2004, 2005, and 2009b. The theory of general processes (GPT) was developed independently of the systematic background in the philosophy of mind that motivates Sellars's commitment to pure processes.

i.e., they occur in exactly one spatial location at any time at which they exist. Particular entities thus can be individuated in terms of their space-time locations, which is also the reason why particularity and individuality in traditional ontology are always taken to be inextricably linked, at least for concrete entities. But when we speak about activities (*snowing*, *burning*, *electromagnetic radiation*) we speak about concrete individuals that are, like stuffs, not individuated in terms of their space-time location but in terms of 'what they do,' i.e., their typical functionalities or 'dynamic characterization.' Depending on the specificity of their dynamic characterization such individuals—which I call general processes or *dynamics*—are more or less generic; in Leibnizian fashion I take the 'individuals' of classical substance metaphysics to be ultimately specific dynamics. The expression 'a dynamics' can denote a simple process (e.g., a gluon), or a spatiotemporally scattered complex of processes akin to a concrete universal (e.g., *snowing*), or a complex process (e.g., *burning*); note in particular that the interaction of two dynamics is itself another dynamics.

Dynamics 'have' (are) an intrinsic character due to their occurring—they are adverbial modifications of spatiotemporal occurring, a way of 'bringing spatiotemporal occurrence about' that is conceptually not separable from their occurring.[29]

Since our purpose here is to sketch Sellars's idea for a naturalization of sensory consciousness and intentionality, we need to bypass a more technical presentation of such a process-ontology based on non-particular individuals and make do with a few auxiliary stipulations.

(Aux-1)   The terms 'process,' 'dynamics,' and 'mode of occurrence' are used interchangeably for *any more or less specific* non-particular individual; the expression 'episode' is used to denote *a maximally specific dynamics*. The expression 'episode E of a process P' denotes a relationship that can be read as akin to a token-type relation—it means that E is an ultimate specification of P (compare: a *buzzing-in-space-time-region-R-in-dynamic-context-C* is a specification of a *buzzing-somewhere-sometime*).

(Aux-2)   If P and Q are episodes, P *directly dynamically presupposes* Q iff P cannot occur without Q. Otherwise, if neither P or Q are episodes, P *directly dynamically presupposes* Q iff no episode *x* of P can occur without the occurring of a spatially contiguous or overlapping and temporally

---

[29] This feature is perhaps the most subtle to grasp since we are, seduced by the structure of European language, tempted to read the copula into ontology or at least to operate with two-factor ontologies where one factor ("*this* factor") accounts for identificatory placement and the other ("*such* factor") accounts for characterization (the ontological counterparts of referential and predicative expressions). Sellars introduced the idea of an ontology that does not operate with a 'this-factor' and a 'such-factor' early on (cf. LCP, P), and later explained in greater detail its systematic significance (NAO ch. 3 and 5), but only in FMPP decoupled it more clearly from a commitment to *particular* 'this-suches'. Sellars's examples of "subjectless" activities (as denoted by sentences such as "it is raining") are intended to convey the idea of the category but the entities described by quantum field theory would seem to provide a better illustration (cf. Seibt 2005, ch. 5; 2015).

preceding (with possible partial overlap) episode y of Q.[30] The predicate 'P *indirectly dynamically presupposes* process Q' is analogously defined, without spatial requirements.[31] (For brevity I shall also say below 'P (in) directly presupposes Q' or 'P (in)directly depends on Q'.)

(Aux-3)   Processes Q_i are *dynamic consequences* of a process P iff P and any Q_i are causally connected in the form of a linear or nonlinear regular relationship that supports counterfactuals. Since the Q_i may temporally overlap with the occurrence of P, the dynamic consequences of P may affect P's own continuation in the sense of positive or negative feedback.

(Aux-4)   The *dynamic context* of a process P refers to the processes that are dynamic presuppositions or dynamic consequences of P.

(Aux-5)   If P is a complex process or process system, a *constituent* of P is any process Q different from P that is significantly spatiotemporally overlapped by P and directly dynamically presupposed by P.

(Aux-5a)   Let the constituents of P occur at *composition level* L_i of P, while P itself is at level L_{i-1} (counting composition levels from the top).

(Aux-5b)   A complex process or process system has as many levels L_n of composition or functional organization as there are iterations of the constituent relationship (which is irreflexive, non-transitive, and asymmetric.)

(Aux-6)   If P is a complex process or process system, P can have two sorts of constituents at level L_1, namely, contributory and emergent constituents Q_i. S is an *emergent constituent* of P iff S is a constituent, and directly dynamically presupposes all other constituents of P and is directly dynamically presupposed by all other constituents. Any constituent is a *contributory constituent* iff it is not an emergent constituent.

Two processes P and Q are different just in case they are basic processes or they stand in different relations to basic processes.[32]

In sum, in view of the leeway provided by Sellars's method of projective metaphysics, I suggest that we take Sellars's "ongoing tissue of goings-on" (FMPP 57, II §103) to consist of more or less specific dynamics occurring at different levels of systemic

---

[30] For example, the process of your heartbeat cannot occur without your breathing, i.e., oxygen supply. The remaining cases, where either P is an episode but Q is not, or vice versa, are implied.

[31] For example, the human heartbeat in any of us indirectly presupposes the evolution from unicellular to multicellular organisms.

[32] Sellars seems to remain committed to the extensionalist strategy of his early "logical atomism" (e.g., LCP, P). He assumes that in the Scientific Image "basic items" (FMPP 53–5, II §80–96) will be taken to be as simple or primitively different (mereological atoms); these items will serve as the basis for definitions of networks of other items in terms of which they themselves can be further characterized without turning the recursion into a cycle. Based on this idea we can state the identity conditions for processes as follows. Two names for processes 'P' and 'Q' refer to the same process iff all and only the relational predications that are assertible for 'P' are assertible for 'Q'. In view of Sellars's extensionalism the modalities used in (Aux 1–6) would need further unpacking, which is one reason why (Aux 1–6) must remain here mere heuristic tools to aid a first exposition of the ideas.

organization. Dynamics are (either primitively different or) individuated in terms of relations to other dynamics, especially by relations of (causal and conceptual) dynamic presupposition, but also by relations to a more encompassing dynamic context.

4. Seven Modes of Occurrence

Let us now return to the two main theses of the paper. (i) If we take Sellars's commitment to process ontology seriously, as the standard interpretation has not, his treatment of sensory consciousness and intentionality can gain in plausibility and current relevance. (ii) There is no metaphysical bifurcation between the causal and the normative domain. Rather, as I will argue now, there are different forms of dynamic organization generating 'operationalities' of processes at different levels of regulatory complexity, including the regulatory complexity that is characteristic of the functioning of normative content. That Sellars recognized the significance of regulatory—and especially of regulatory nonlinear—process organizations is an achievement we have not yet acknowledged. As I will argue, we can best make sense of Sellars's characterizations of (i) sensing, (ii) map-making, (iii) navigating, (iv) being aware of, (v) being aware of as, (vi) imagining, and (vii) (mental and verbal) languaging if we consider these as different types of regulatory process organizations or complex modes of occurrence. The fact that these process organizations are embedded like a Russian doll renders a linear exposition somewhat difficult, however, since Sellars considers not only the internal or constitutive dynamic relationships of a process system decisive for its classification, but also its external relationships of dynamic presuppositions and consequences. Thus, apart from subsection 4.1, the subsections 4.2 through 4.6, respectively, only provide partial elucidations of the relevant mode of occurrence (process configuration); the fuller characterization of each subsection appears once the embedding context(s), set out in the following subsection(s), has come into view.

4.1 Being in nature

According to Sellars's transcendental brand of scientific realism, we can metaphysically endorse the existence of reality in-itself—"there is a dimension of givenness (or takenness) that is not in dispute" (FMPP 20 I §87), a dimension of givenness that ensures that when we change our concepts "we do not change that to which we are responding" (ibid.)—and the proper way to express this endorsement is by claiming that reality is, roughly put, isomorphic to the ideal scientific description of nature.[33] As pointed out above, the transcendental stance allows Sellars to claim that we can extrapolate some constraints on what possibly could be a basic natural item. Sellars specifies four features of basic natural items, drawing on the projected category features of pure processes.

---

[33] Isomorphy is suggested by Sellars's adaptation of the Tractarian scheme; cf. TC 215, ¶¶50–1), but the claim is rather that the Scientific Image consists of a collection of theories each of which is injective (one-to-one) and which together are surjective (onto); cf. SM 142, V §76.

First, basic natural items are purely actual—while our current scientific explanations still use kind terms for 'things,' i.e. concepts for entities which are "bunching" dispositional aspects (CDCM 263, §50), the explanations of ideal science will be given in "purely episodic terms" (ibid.) with reference to items that have "no potentialities" (FMPP 55, II §91).

Second, if basic natural items are purely actual, "episodic," or occurring, there must be some intrinsic character that these occurrings actualize—whatever occurs, occurs in some way, 'pure occurrence' without occurring in some fashion is inconceivable.[34] If being or actuality is difference-making occurrence—see core tenet (CT2) above—it follows that there must be "intrinsic characters" in nature; or, more accurately, it follows that nature is actualizing of intrinsic characters. Sellars stipulates that basic natural items are simples—they are occurrings that each actualize one simple intrinsic character and are merely such actualizations without internal compositionality into a 'this' and a 'such' aspect.[35]

Third, if basic natural items are occurrings, they occur not only in some way but also *somewhere* and *sometime*. A basic natural item "belongs in the space-time network" (CE 252, ¶23). Such spatiotemporal locatedness is for Sellars the defining trait for being a physical item in the intended wide sense of the term that he marks off as "physical$_1$". While "physical$_2$" is the narrow sense of being a physical item which covers only what is "definable in terms of theoretical primitives adequate to describe completely the actual states though not necessarily the potentialities of the universe before the appearance of life" (CE 252, V ¶23), "physical$_1$" comprises *also* occurrings that "only occur in the context of sentient organisms" (SSIS VII 438).[36] To occur 'in the context of a sentient organism' is not merely a matter of spatial inclusion but inclusion in other dynamic regimes, as will become clear in connection with the following fourth characteristic of basic natural items. Note that occurring *somewhere* and *sometime*

[34] That pure occurrence is unthinkable, nothing more and nothing less, is in my view the underlying motivation for Sellars's curious insistence that "sensa," i.e., something akin to the 'such-aspects' or 'contentualities' of sensory consciousness, must be part of the Scientific Image. While Sellars's inclusion of sensa has puzzled many readers who otherwise readily adopted his ideas (cf., e.g., Dennett 1981), it reflects in my view the deep metaphysical insight that even structural and metrical properties depend on more basic features of 'causal information' in the widest sense—features making a difference in what is going on. Cf. SRII 190, V §54: "As Berkeley, Kant and Whitehead, among others, have pointed out, physical objects cannot have primary qualities only—for structural and mathematical properties presuppose what might be called 'content qualities.'" Cf. also TE 446–7, IV ¶15, where he states that "'qualitative' predicates' must in the last analysis be the underpinning of theoretical magnitudes if they are to be the sort of thing that could 'really exist.'"

[35] In LCP and P Sellars provides several arguments for the required simplicity; for example, if we want to avoid putting negation into nature, we need to postulate that the intrinsic characters of basic natural items are mutually incompatible, and that each basic item actualizes precisely one intrinsic character, so that something that is F can be the ontological correlate of a negated sentence 'this is not-G.'

[36] Later, in FMPP (85, III §§113–14) Sellars characterizes physical$_2$ entities as: "absolute processes which suffice to constitute what goes on in non-living things and insentient organisms," and continues: "In a humorous vein we might refer to them as electronings and quarkings"; physical$_1$ processes, on the other hand, are illustrated by "C#-ings, reddings."

does not imply any specific spatial or temporal location, nor does it exclude repeatability in space or time.

Fourth, the intrinsic character that any basic natural item actualizes by way of occurring is a 'causal' feature in the wide sense of a difference-making, efficacious factor that is not restricted to the paradigm of mechanistic causal interactions. The philosophical difficulties with putting mind into nature derive in Sellars's view largely from the fact that past scientific research exclusively focused on the discovery of causal mechanisms.

This sufficiency of mechanistic variables, combined with the almost tangible *thingishness* of physical objects and with an impact paradigm of causation made it difficult to conceive of a mode of causation in which the development of a system of material particles might be influenced by nonmaterial items. (FMPP 83, III §102)

Sellars's "causal order"—this has been entirely overlooked by the standard interpretation—is not the order of mechanistic causation, nor is science in Sellars's view essentially wedded to the idea that material particles cannot be affected by anything that is 'not a material particle,' such as a systemic organization or a field. Science establishes "inference tickets" or material inference rules for kinds of observable and theoretical entities. While some of these inference tickets formulate context-insensitive causal-mechanistic laws, others formulate regularities that are sensitive to context. Already in 1958 Sellars argues (in a paper co-authored with P. Meehl) that we need to attend to the fact that the dynamic context of physical episodes may affect their behavior (CE V 251):

For example, a brain consists of matter of special kinds in certain arrangements. Complex hydrocarbon molecules, potassium ions, free iron, and electromagnetic fields exhibit certain 'exceptionless' regularities (outside of brains)…Many arrangements turn out to be such that we can deduce their properties, including the ways in which the components will behave *in situ*, from [these regularities]. But for living brains this turns out not to be the case. The flow of electrons at the synaptic interface 'breaks the laws.' But it is not lawless, since [a] more general function…takes care of it.

From today's point of view this passage reads as a surprisingly concrete anticipation of the causal functionalities within nonlinear dynamic systems, and specifically of phenomena of "downward causation."[37] Today it is a scientific commonplace that the behavior of some systems of processes cannot be described in terms of a linear composition of the causal-mechanical features of their components, but display threshold phenomena that "break the laws" and can only be described by a "more general function," i.e., a nonlinear function. 'Complexity theory' has provided the theoretical means to understand a large number of phenomena in process systems with the same

[37] Cf., e.g., Moreno and Umerz 2000. Sellars had Norbert Wiener's *Cybernetics or Control and Communication in the Animal and Machine* (1948) on his bookshelf and likely was familiar with the debate about "circular causality" raised by cybernetics at that time.

architecture, such as the formation of convection cells in air or water, but also the collective behavior of ant hills or bee hives, as causal phenomena where a large number of simple processes cumulate and reinforce each other until a threshold value is reached that distinctly changes the overall behavior of the system.[38] The notion of causality at issue here is non-mechanistic, since the precise process flow within a complex system, i.e., the precise sequence of occurrence of the constituting simple processes, cannot be traced, due to a large number of simultaneously occurring feedback interactions.[39]

To summarize, basic natural items are occurrings that are spatiotemporally located and actualize an intrinsic character with some sort of 'causal' efficaciousness; while some occurrings are 'causal' in the sense of the exceptionless and context-insensitive regularity of mechanical causality, other occurrings contribute to non-mechanistic forms of causal interactions in the course of which other causal factors emerge.

4.2 Sensing

Since processes can be spatiotemporally superposed, basic natural occurrings are individuated in terms of their 'intrinsic character' or 'efficaciousness'. A process *is* the occurring of an intrinsic efficacious character C in the sense of an occurring-C-ly—an occurring in a certain way or mode. Let me call the intrinsic efficacious character of an occurring its 'causal operationality', using 'causal' in the wide sense just explained. A basic natural process thus is the occurring of a single causal operationality and, vice versa, each occurring causal operationality is a (basic or complex) natural process (recall that processes are 'type-like', *general* individuals).

In order to work out Sellars's proposal for a naturalization of sensory consciousness, we need to appreciate that such basic causal operationalities fall in two classes, as we just observed—they may be the sort of context-independent operationalities familiar from mechanical causation, or else they may be the sort of causal operationalities that occur only within contexts with nonlinear architectures.

In order to appreciate relevant differences, let us consider three forms of processual organization—mechanisms, feedback loops, and self-maintaining systems. A mechanism is a linear sequence of process types $P_1 \ldots P_n$ such that it holds for any concrete 'run' of the mechanism, any member in the sequence of episodes of processes from P_2 to P_n directly dynamically presupposes the previous one. Importantly, if a mechanism M is run repeatedly a number of times, the episode that occurs at stage S_i of M is each time an episode of the same specific process type P_i (e.g., an episode of *this gear's making half a turn*). In contrast, in a simple loop of positive or negative feedback it also holds

---

[38] Cf. Sumpter 2010; Mitchell 2009. In its technical sense, the term 'complex' (hereafter marked as 'complex*') refers to the behavior of a nonlinear dynamic system and is frequently used as an explanans for non-mechanistically causal phenomena—"complex systems explain non-trivial emergent and self-organizing behaviors" (Mitchell 2009: 13).

[39] It is tempting to treat Sellars's remark that some physical$_1$ processes are "ingredients" (FMPP 86, III §124) and not "ordinary parts" (FMPP 89, fn 23) as an intuitive anticipation of the interactive entanglement of the processual constituents of a complex* system. For a discussion of the notion of parthood in application to processes, see Seibt (2014).

that after initialization each episode directly dynamically presupposes the previous one, but what happens at stage S_i is not with "exceptionless regularity" always an episode of the same specific process type; rather, at different times we find at S_i episodes of process types that are merely *similar*—at each time a different intrinsic efficacious character may be actualized, dependent on (i.e., dynamically presupposing) a regulatory change to the 'causal signal' upstream. Finally, consider a system of processes that maintains itself 'far from the thermodynamic equilibrium' such as a burning candle.[40] The component processes of the burning candle—e.g., the melting of the wax, the percolation of the wax in the wick, the combustion in the flame, the air convection that adduces oxygen and carries away residues—not only 'feed into each other' in the way in which this could also be said to hold for a mechanism or feedback loop; they each depend on or dynamically presuppose not only each other but also the occurrence of the entire process system. Taken in isolation, the process types *melting of wax* or *percolating of wax* can have episodes that occur without any candle burning. However, once the process system P of a burning candle is set up, any episode of *melting of wax in P* directly dynamically presupposes not only an episode of *heating in P* but also an episode of P—for the process system P as a whole and each of its constituents to occur nothing else but the occurrence of P is required.[41] More generally, making use of our auxiliary terminology introduced above in (Aux-5) and shortening 'dynamically presupposes' to 'presupposes,' a self-maintaining system is a process system P with processes $Q_1 \ldots Q_n$ as contributory constituents and an emergent constituent S such that any episode of a contributory constituent Q_i directly presupposes an episode of some contributory constituent Q_j, indirectly presupposes episodes of all other contributory constituents, and directly presupposes an episode of S; in addition, S is a more specific version of P and directly dynamically presupposes all contributory constituents $Q_1 \ldots Q_n$.

In short, in a self-maintaining system all component processes presuppose each other, directly or indirectly, and directly presuppose, and are directly presupposed by, the encompassing dynamic configuration. In view of these mutual presupposition or dependence relations, the dynamic configuration is to be counted as an emergent yet causally efficacious constituent of the system—it is a configuring dynamics that, metaphorically speaking, 'constrains and maintains' the continued occurrence of all component processes. For our purposes here it is crucial to appreciate that the configurating dynamics is an occurring-thus-ly just as any other contributory constituent, that is, a dynamics with its own intrinsic character. In the case of the candle the intrinsic

---

[40] Cf. Bickhard 2004 for this illustration and a discussion of the process architecture of self-maintaining systems. I deviate somewhat from his analysis but owe much inspiration to Bickhard's process account of cognition; cf. also Bickhard 2009.

[41] Compare: an episode in a mechanism does not directly dynamically presuppose a previous run of the entire process system; the same holds for or an episode in simple regulatory feedback system. In both types of system episodes depend, on the one hand, on the preceding episode (direct dynamic presupposition), and on the other hand, on an episode outside the system that initializes the episode at the first stage of the system (indirect dynamic presupposition).

character of the configurating dynamics is quite palpable—the continued burning of the candle flame is the focal presentation of the configurating dynamics of the process system in question.

We now have worked our way towards the description of a process system that has its own configurating dynamics—which is no less an occurring-thus-ly or the actualization of an intrinsic character as any other process—as an emergent causally efficacious constituent. Let us identify the architecture of such systems in terms of its outstanding feature, the 'emerging configuring constraining' constituent, and call it an ECC-architecture. The ECC architecture was introduced and illustrated by means of self-maintaining 'far-from-equilibrium' systems, but as such it is a process-ontological description of mutual presupposition relationships between processes that can also be attributed to any process system with the relevant dynamic interdependencies.[42] For example, so-called 'self-organizing' complex systems have ECC architecture, and, to use an even more general label, so do process systems with 'downward causation' where component processes are affected by, and thus dependent on, dynamic systemic constraints.

With this sketch of the process configuration 'ECC-architecture' in place, let us now return to the interpretation of Sellars's account of sensory consciousness, which I want to split into two steps. In a first step, which will fill the remainder of this subsection, I will try to show how the emergent configurating dynamics of systems with ECC-architecture can help us to understand Sellars's insistence that *sensa* or sensings *as such* are parts of nature even though they are not physical$_2$ items—how they can fit into the Scientific Image without conflicting with the reduction principle (CT4). But this will only explain why, on the basis of a process ontology, Sellars is *entitled* to *sensa*. In order to see how systems with ECC architecture can be a useful *explication* for what Sellars's sensings concretely can be taken to be, we need to proceed to the next subsection, since it is only in the context of "map-making" that the process configuration of sensing occurs.

Let us thus first hark back to section 2 where I introduced Sellars's principle of constituent reduction (CT4) and claimed that within a process-ontological setting his treatment of sensory consciousness vis-à-vis (CT4) will appear far more plausible. Telescoping Sellars's complex discussion of sensation we can for present purposes concentrate on the following line of thought.[43] (i) Sentences such as 'there appears to John to be a pink ice cube' report "ostensible" perceptual experiences—experiences that a person could have even without there being a physical$_2$ pink ice cube for John to perceive.[44] (ii) Such ostensible perceptual experiences present genuine philosophical explananda (EPM §60). (iii) The classical theories of mind correctly postulate sensory

---

[42] The predicates 'complex* system,' 'self-organizing system,' and 'self-maintaining system' belong to different classificatory perspectives but the respective extensions overlap.

[43] Cf. in particular IAMB, EPM, PSIM, P, SSIS, SSOP, SK, FMPP.

[44] The somewhat peculiar syntax of this statement of ostensible experiences follows Sellars's in SSOP 104, §73: "There appears to P to be an object which is red and rectangular on the facing side."

impressions as the explanantia of ostensible perceptual experiences; working from within the Manifest Image, sensory impressions were categorized as states of perceivers (persons); sensible qualities were located within the perceiver as 'content' of sense impressions (EPM §62). (iv) Since the Scientific Image is to be the ideal explanatory theory, the explanatory role of the concept of a sense impression must be taken over by a suitable successor concept within the Scientific Image (e.g. SSIS IV 418; PSIM VI SPR 36, ISR 404–5). (v) The entities postulated by this successor concept for sensory impressions—called *sensa*—will receive a different categorial guise but must preserve the "logical space" of introspected sensible qualities, namely, that they are "ultimately homogeneous" or have an "intrinsic character"(PSIM VI SPR 35–6, ISR 403–4).[45] (vi) In the Scientific Image all entities of the Manifest Image are "systems" of basic natural entities, and "every property of a system of objects [read: entity] consists of properties of, and relations between, its constituents" (PSIM V ¶74, SPR 27, ISR 395). (vii) But "it is absurd to hold that the 'sensible quality meaning of sensation terms' is transposed, in the Scientific Image, into 'properties or relations of individual scientifically basic entities' where these entities are construed as 'the basic level particles of physics' [i.e., physical$_2$ entities]" (SSIS VII 438). (viii) Thus we need to extend our notion of what it is to be 'physical' and conclude that in the Scientific Image sentient organisms will be described as systems of basic natural entities that include *sensa*:

[T]he theoretical counterparts of sentient organisms are Space-Time worms characterized by two kinds of variables: (a) variables which also characterize the theoretical counterparts of *merely* material objects; (b) variables peculiar to sentient things. (EPM §61)

[W]hen it comes to an adequate understanding of the relation of sensory consciousness to neurophysiological process, we must penetrate to the non-particulate foundation of the particulate image, and recognize that in this non-particulate image the qualities of sense are a dimension of natural process which occurs only in connection with those complex physical processes [which are currently categorized as the central nervous system]. (PSIM VI ¶107, SPR 37, ISR 406)

That is to say, whereas the objects of contemporary neuro-physiological theory are taken to consist of neurons, which consist of molecules, which consist of quarks…—all physical-2 objects—an ideal successor theory formulated in terms of absolute processes (both physical-2-ings and physical-1-ings [sensings]) might so constitute certain of its 'objects' (e.g., neurons in the visual cortex) that they had [physical-1-ings, sensings] as *ingredients*, differing in this respect from purely physical-2 structures. (FMPP 86, III §124, my emphasis)

This last move of Sellars's, the postulation of *sensa* as basic entities of the Scientific Image has been found ad hoc or otherwise unconvincing, and perhaps it is, as long as

---

[45] It is crucial to note that *sensa*—e.g., "C#-ings", "reddings" or "buzzings" (FMPP 50–82, II §62–147; 85 III §§111–16)—is Sellars's label for the theoretical *successor* concept to the notion of 'sense impressions' which is our current ("Jonesean") theoretical notion for the "states of perceivers" that explain certain aspects of perceptual behavior. Which features of sense impressions are analogically transferred to the successor concept of *sensa* and precisely how? For instance, are *sensa*—like sense impressions—something an organism is conscious of? Sellars seems to suggest the latter, but see also footnotes 48 and 50 below.

one follows the standard interpretation and studiously overlooks the process-ontological setting of Sellars's thought. But the puzzling air of the postulate vanishes as soon as we connect it with a process-ontological analysis of differences in dynamic architectures. The thesis that the Scientific Image will contain *sensa* then amounts to nothing more than the claim that (a) the Scientific Image will describe sentient organisms as dynamic systems with ECC architectures that (b) are embedded in a suitable dynamic context. Postponing the elucidation of (b) for a moment, Sellars's account of sensation can be reconstructed as follows. Once we give up on the myth of given categorial guises[46] and realize that sensations do not have to be understood as relations to, or states of perceivers containing, 'impressions' which are intentional objects of sorts, we can adopt an "objectless" or "adverbial" account of sensation as modes of sensing—the sensation of a pink cube is to *sense-(pink-cube)-ly* just as the dancing of a waltz is to dance waltzingly (SSOP 92, §§36–7). In the Scientific Image we will understand a *sensing-(pink-cube)-ly* not as something that involves a perceiver, but rather take the perceiver to consist of a highly complex system of systems of pure processes. Somewhere in this complex layered system of processes there will be a collection of neurophysiological processes that are configured and constrained by an emerging dynamics P that—provided suitable embedding, see the elaboration on (b) below—can be identified with a *sensing-(pink-cube)-ly*. In short, the Scientific Image will describe perceivers as complex process systems some subsystems of which have ECC architecture and *sensa* are the emerging constituents of these subsystems.

Note that this reconstruction of Sellars's argument for the presence of *sensa* in the Scientific Image does not rely on putative premises that the Scientific Image for some reason should 'preserve ultimate homogeneity' or 'preserve sensible qualities,' which have been rightly criticized.[47] But, one might object, while the interpretation of *sensa* as ECC dynamics might explain how such constituents can be claimed to be natural, in which sense do they have an 'intrinsic character'? Above it was pointed out, so the objection continues, that the basic entities of the Scientific Image—all entities, even physical$_2$ entities—are intrinsically characterized since whatever occurs, occurs 'in a way'; why, then, should the way of occurring of ECC dynamics stand out? The answer to this objection lies in the further dynamic embeddings of ECC architectures in organisms—*the ways of occurrings that ECC dynamics are happen to be what some organisms become conscious of.*[48]

---

[46] Cf. FMPP 12, I §45: "To reject the Myth of the Given is to reject the idea that the categorial structure of the world – if it has a categorial structure – imposes itself on the mind as a seal imposes an image on melted wax."

[47] Cf., e.g., McGilvray 1983, Hooker 1977.

[48] One might object that I am introducing the notion of sensing and *sensa* too 'early' in the sequence of dynamic embeddings, since Sellars seems to have held that *sensa* are conscious. Perhaps it would indeed be more accurate to say that a sensing *begins* at the level of processing of ECC architectures within organisms and *ends* at 'higher' levels of processing as map-making that effect that the organism is conscious of the ECC dynamics. On the larger perspectives of this issue, see Rosenthal, this volume, who argues that sensation as discriminative response does not depend on consciousness.

4.3 Map-making

In subsection 4.2 I argued that a *sensum* can be understood as an emergent constituent of a process system with ECC architecture *provided* this process system is itself embedded in a suitable dynamic context (see clause (b) above). This requirement—call it the 'context clause'—relates to the perhaps most distinctive feature of Sellars's naturalist philosophy of mind: attention to the dynamic context in which a process configuration is embedded. Could a process system contain a sensing if it were *not* further processed within an encompassing process system that also exhibits the capacities to conceptualize and think? Sellars in fact raises this and related questions time and again. The hypothetical dynamic environments vary—could process P be taken to be a sensing if it occurred in an animal or a rocket?; could process P count as a languaging or thinking if it occurred in an animal, a child, a deaf person, a robot, a Rylean ancestor?; etc.[49] In each case the discussion reveals that Sellars considers not only the internal or constitutive dynamic relationships of a process system decisive for its classification, but also its external relationships of dynamic presupposition and consequences.

The context clause for sensings is not the embedding within a cognitive system that is capable of conceptualization, but a more modest requirement: the embedding within a dynamics of map-making. If a process system senses-F-ly, the process system, Sellars argues, does not need to be aware of it *as* a sensing-F-ly nor as a *sensing*.

To sense blue-ly is no more to be aware of something *as* blue (roughly: that something is blue) than to breathe sneeze-ily is to be aware of something *as* a sneeze. As I have construed this concept of sensing bluely, it is an ontological interpretation of what it is for there to be a case of blue, just as the concept of breathing sneeze-ily is an ontological interpretation of what it is for there to be a case of sneezing, i.e., a sneeze. Just as it is logically possible for a sneezing to occur without there being an awareness of the sneezing as a sneeze, so it is logically possible for a sensing bluely to occur without there being an awareness of a case of blue *as* a case of blue. (FMPP 31–2, I §152–3)

In fact, a process system can sense, Sellars suggests, without being aware of anything.[50] What is required, however, is that a sensing is part of a process system's differentiated

---

[49] Cf., e.g., SRLG 324–7, §11–17; ITM 526–8, ¶29–49 (Sellars to Chisholm, 31 August 1956); EPM §48–50; SK 303–4, I §32–3; NAO 121–5, V §§105–20; MEV 336–7, IV §56–7.

[50] Cf. SSOP 107, §82, assuming that Sellars speaks here through the mouth of "Smith": "An ˢ(middle C#)ing [i.e., sensing-middle C#-ly] is a constituent of the bundle which is P [the perceiver]…awarenesses of ˢ(middle C#)ings and even awarenesses of ˢ(middle C#)ing *as* ˢ(middle C#)ings *can* also be constituents of the bundle" (last emphasis supplied). In FMPP 61, II §140, Sellars explicitly discusses sensings at a level of cognitive processing prior to reflective awareness: "The C-#ings, whose career in the τ-dimension we have been exploring, are *non-conceptual* states of the perceiver. Merely as existing they provide the subject with no awareness of a C#-ing as a C#-ng, let alone as having temporal features." In other places Sellars stresses that a sensing is something that the perceiver is conscious of—in the sense of 'conscious' in which "someone who is knocked out is not conscious"—and could in this sense also be said to be aware of the sensing, but this does not entail that he is aware of the sensing *as* a sensing (FMPP 31–2, I §152–3). Below I will suggest that 'awareness of as' occurs with the higher-level processing of imaging.

(non-mechanistic) response to the environment in ways that can count as a mapping of the environment, however rudimentary.[51] Consider for instance bacterial chemotaxis, the differentiated responses of a bacterium to changes in the nutrient concentration in its surrounding environment. If the nutrient concentration increases, protein complexes form within the bacterium ("assembly of chemotaxis receptors" and "embodiment of the flagellar motor") that via several steps of biochemical reactions generate a flagellate movement that propels the bacterium in the direction of the sugar gradient; if there is a decrease, there is a sequence of biochemical processes that redirects or stops the flagellate motor action.[52] Roughly speaking, a dynamics D (which is an emergent constituent of a process system with ECC architecture) can count as contributing to map-making, if (i) it translates changes in the environment into (ii) motor actions effected by an encompassing system B. Concerning (i) it is crucial to appreciate, however, that the dynamics D configures $physical_2$ processes that are both 'inside and outside' the encompassing system B. In the case of the bacterium these processes are literally identified as "transmembrane," which is a useful reminder of the fact that the identity criteria for processes make it possible to abandon the classical idea of a 'screen' between environment and perceiver that separates causes from representations. A process-ontological philosophy of mind can gerrymander the conceptual space of relationships between organism and environment in new ways, e.g., by removing separations between perceiving organism and environment and introducing distinctions between types of environment-organism interactions. Even for higher organisms one can claim that what is configured and constrained by an emergent dynamics of sensing are $physical_2$ processes that *end* as neurophysiological processes but *begin* at the surfaces of physical objects.[53]

In other words, the context requirement establishes that a sensing is as closely related to $physical_2$ mechanistically causal processes as possible—it is an emergent dynamics that configures and constrains the (end phases of) such processes without being itself a mechanistically causal process. Altogether, then, we can say more precisely:

(Def-sensing): A sensing is the emergent constituent D_i at level L_i of an ECC-system P_i at level L_{i-1} iff D_i is embedded into the dynamic context of a map-making, i.e., iff there is another dynamics D_j (of a similar type as D_i, i.e., emergent constituent at level L_i of a ECC-system P_j at

---

[51] The interpretation of rudimentary map-making I am presenting here is modeled on Bickhard's interactivist account of representation (2004). Bickhard argues that processes within "recursively self-maintaining systems" that "functionally presuppose" environmental processes fulfill the criteria for "representations" as formulated in the philosophical literature. While Sellars would have endorsed Bickhard's general argument in my view, he would have warned against the premature use of "representation" and "function" at this comparatively primitive level of dynamic organization.

[52] For details, see, e.g., Park et al 2006: 400.

[53] Proponents of "embodied cognition," "grounded cognition," and "extended cognition" recently have begun to question the spatiotemporal boundaries of cognition in these ways, partly arguing that cognition includes sensory-motor processing or even entities in the physical environment of perceivers; cf. Calvo and Gomila 2008, Clark 1997, Hendriks-Jansen 1996, Pfeiffer and Bongard 2006.

level L_{i-1}) and there is a dynamics of map-making M in system P_k at level L_{i-2} such that M dynamically presupposes D_i and D_j, and D_i and D_j have as dynamic consequences motor actions A_i and A_j which are contributory constituents of M.

4.4 Navigating

The necessary conditions for map-making I set out in the previous section are more austerely specified than in Sellars's own discussion of dynamic contexts of sensings in rockets, robots, and rats. The conditions I highlighted so far establish that sensings are 'causal responses' to environmental conditions, since they configure physical$_2$ mechanistically causal processes without themselves being mechanistic effects, and translate mechanistically causal changes in the environment non-mechanistically into actions. That this translation can be called a sensing's 'significance' becomes more plausible if we consider map-making as it occurs in organisms with the capacity of navigating. In MEV Sellars specifies conditions for "representational systems or cognitive map-makers" in terms of operationalities that explicitly are intended to include "animal representational systems" in bees and rats (MEV 326, §57). Despite Sellars's exceptional use of the idiom of 'representation' here, the message of MEV is clearer than ever: the significance (representationality) of a natural episode is a matter of its operationality, which might be "brought about by natural selection and transmitted by genes" (ibid.). In order to count as a "cognitive map-maker," i.e., in order to generate *non-rudimentary* map-making dynamics which I distinguish here as 'navigating,' a process system must fulfill the following requirement.

An episode is a component of a navigation dynamics if it is a sensing as just defined and, in addition, is embedded in two further process systems or complex dynamics: 'locating' and 'characterizing'. First, the episode—or: occurring-thus-ly that every episode is and *only* is—activates relative to its way of occurring or 'adverbial modification' a processing module or locating dynamics that generates a *location in 'represented' space and time*. Such a 'location in represented space and time' must be understood in purely operational terms as some form of 'coordinatization' that ties in with the set of motor actions typical for responses to a located item.[54]

Second, the episode's way of occurring or 'adverbial modification' also triggers off (i.e., has as dynamic consequence) a characterizing dynamics. Before we take a look at the structure of the characterizing dynamics, let us briefly note that we are here at the systematic source for Sellars's peculiar claim that the "*flatus voci*" account of predication is "the crucial step" to a naturalist theory of mind (MEV 332, §§37–8) that "can scarcely be overestimated" (MEV 339, §72), amounting to "Ariadne's thread to the labyrinth of metaphysics" (TTP §131). When Sellars stresses that "we must take even more seriously than Frege succeeded in doing, the primacy of the sentential role"

---

[54] How one should conceive of the workings of such a locating dynamics remains unclear; in FMPP (61–2) Sellars speculates about the dynamic genesis of temporal locatedness in a "specious present"; cf. also SSOP 111, §94.

(NAO 71, III §74) and that "the very *function* performed by predicates is dispensable" (NAO 59, III §37) in the sense that predicates are only articulation environments for names, he recommends a radically operational perspective focused on that which matters about a sentence for the purposes of navigation, literally or figuratively conceived. The point of Sellars's *flatus voci* account of predication is to emphasize that *any* item, whether grapheme or phoneme, whether a neurochemical process or an electric impulse, could perform the function of map-making, provided it can suitably trigger off localizing and characterizing dynamics. These triggers do not need to be separable material components, as Sellars illustrates with the sentences of "Jumblese" (NAO ch. III).[55]

In the case of rudimentary map-making as sketched above, the characterizing dynamics that is engendered by the occurrence of a certain episode (sensing) consists in the simple causal link to a motoric process (e.g., movement of the flagellum); in more sophisticated forms of map-making there are additional, intermediate stages of a characterizing dynamics D_i that link up with stages of other characterizing dynamics $D_{k..n}$ and diversify the motoric outcome of D_i. This overall *transition potential* of a sensing episode within a characterizing dynamics could, in principle, be described concretely and precisely in terms of an extremely complicated dynamic organization; what matters for a naturalistic philosophy of mind is that the "qualitative" aspect of a sensing episode S—the 'F-ly' mode that a 'sensing-F-ly' has by its very occurrence—is nothing else but the episode's transition potential as realized in the characterizing dynamics engendered by S, and more generally by any other episode of the process P of which S is an episode.

One might draw further distinctions in map-making, depending on whether the characterizing dynamics D_i engendered by a sensing episode belongs to a "Humean" system of characterizing dynamics $D_1 \ldots D_n$ where transitions are direct pathways constrained only by the dynamic architecture, or whether it belongs to an "Aristotelian" system which implements transitions as 'inferential' transitions guided by analogues of "logical vocabulary."[56] As the complexity[57] of the dynamic architecture of the transition network increases, the analogical use of vocabulary for human reasoning appears increasingly more justified.

To be an RS [representational system] is to be a primitive or sophisticated form of a perceiving—inferring—remembering—wanting—acting organism. These features are essentially connected. Thus each of them is essentially involved in the referential and characterizing aspects of representational states. (MEV 338, §71)

---

[55]   Sellars's idea that an item could, by way of nothing else but its existence, engender both a localizing and a characterizing dynamics has been found quite puzzling (cf. Hochberg 1975, 2000). But it makes good sense once the constituents of a map-making dynamics are conceived of as pure processes. For a detailed discussion, cf. Seibt 1990a ch.6.

[56]   Cf. MEV 339–44, §§73–101. See also Seibt 2009a.

[57]   Here and below I am using the term 'complex' to denote the disjunction of the common and the technical sense of complexity. If the technical term is meant, I write 'complex*'.

With increasing complexity of the interplay of characterizing dynamics engendered by sensing episodes, the navigational capacities of animals begin to resemble human navigational capacities, and increasingly also navigation in its figurative sense as purposeful practical interaction—as the "knowing one's way around" (PSIM SPR 1–5, ISR 319) that is for Sellars the correct paradigm for all knowledge, including philosophical knowledge.

The increasing complexity of transition networks generated by interlacing characterizing dynamics transforms the status of its mode of operationality, from causal operationality to a type of operationality that gradually takes on the operationality of navigational 'significance' until—as the subsequent subsections will sketch—it reaches the level of complexity at which episodes can be said to 'function' and to have normative content. In rudimentary map-making the transition potential of a sensing only pertains to a motor action; if at all, one can only speak of a sensing's 'significance' qua causal contribution to the continued existence of the organism. As the characterizing dynamics engendered by sensings form more complex transition networks, however, what a sensing process 'does' can no longer be cashed out in terms of the motor action caused but must be described with reference to its operationality within such networks—its 'significance' within that network. The transition networks implement regulatory constraints—either directly (in "Humean" navigating) in the architecture of the network, or by including additional regulatory subcycles that steer the transition within a network akin to the way in which logical vocabulary steers inferences ("Aristotelian" navigating).

While Sellars's speculative pointers to architectures of neurophysiological processing await replacement by scientific descriptions, the process-ontological reconstruction can convey, I hope, that Sellars's basic idea of treating normative content as a matter of functioning within a transition system goes hand in hand with the idea that there is a gradual transition from simpler to more complex operationalities constituting 'significances' from the causal to the semantic or conceptual sense of this term.

4.5 Being aware of, being aware of as, imagining

In this series of organisms with increasingly more complex and sophisticated navigation dynamics, where should we draw the line between (i) 'mere' sensing, (ii) sensing that is also an awareness of a sensible 'character' or 'quality', and (iii) sensing that is also an awareness of a sensible character *as* that character or quality? As far as I can see, for Sellars there is no principled difference between a 'mere' sensing that is part of rudimentary map-making, and a sensing that engenders more complex kinds of map-making dynamics due to which the emergent sensing could be something the organism is aware of.[58] Moreover, Sellars also seems to envision a gradual transition between

---

[58] If a sensing-F-ly is an ECC dynamics, the awareness of such a sensing could be an additional ECC dynamics generated by an ECC architecture within the map-making dynamics engendered by this sensing, i.e., besides the locating and characterizing dynamics.

awareness of a sensory feature F and awareness of F *as* F. Consider the following passage in MEV 336:

§57. Such representational systems (RS) or cognitive map-makers, can be brought about by natural selection and transmitted genetically, as in the case of bees. Undoubtedly a primitive RS is also an innate endowment of human beings. The concept of innate abilities to be aware *of* something *as* something, and hence of pre-linguistic awarenesses is perfectly intelligible.

§58. My point, then, is that a much greater degree of integration of responses to triangles *as* triangles into the rat's RS is required before we can appropriately say that the rat has even the most primitive concept of a triangle. (MEV 336, §§57–8)

I take Sellars here to suggest that whether we can ascribe to a process system awareness *as*, i.e., the 'ur-concept' of a triangle, depends on the "degree of integration of responses," i.e., of the complexity of the transition network within a map-making dynamics.

The processes that constitute an awareness-as occur in the dynamic context of the dynamics of conceptualization that generates perceptual experience.[59] In order to get some purchase on the constitution of the latter, Sellars turns to Kant's notion of the 'power of imagination,' which he interprets as an intermediary process that configures sensings into perceptual experience:

[Perceptual] consciousness involves the constructing of sense-image models of external objects. This construction is the work of the imagination responding to the stimulation of the retina. From this point on I shall speak of these models as image-models…Roughly, imaging is an intimate blend of imagining and conceptualization…thus, imagining a cool juicy red apple (*as* a cool juicy red apple) is a matter of (a) *imagining* a unified structure containing as aspects images of a volume of white, surrounded by red, and mutually pervading volumes of juiciness and coolth, (b) *conceptualizing* this unified image-structure as a cool juicy red apple. (IKTE §§23, 25)

While for Kant productive imagination is a "faculty," Sellars describes the formation of image models as program-guided processing: "a unique blend of a capacity to form images *in accordance with a recipe*, and a capacity to conceive of objects in a way which *supplies* the relevant recipes." (IKTE §31) How these 'imaging' processes yield 'perceptual experience'—whether the latter should again be conceived as an emergent constituent of a ECC architecture—remains open; what does become clear, however, is that perceiving is a dynamic construction of significances (i.e., transition potentials) that can be systematically "mistaken" for, or "conceptually responded to," as aspects of physical objects.[60]

---

[59] See for the following also Rosenberg 2000: 239.

[60] Cf. IKTE §31: "The perspectival character of the image model is one of its most pervasive and distinctive features. … Image-models are "phenomenal objects." Their *esse* is to be *representatives* or *proxies*. Their *being* is that of being complex patterns of sensory states constructed by the productive imagination."

The productive imagination generates both the complex demonstrative conceptualization

> This red pyramid facing me edgewise

and the simultaneous image-model, which is a point-of-viewish image of…a red pyramid facing one edgewise. (IKTE §36)

Just as (or so I have argued) in visual perception we mistake our sensory states for features of physical objects (including our body), i.e., we conceptually respond to them, for example, with

> •This cube of pink ice over there facing me edgewise•

So we conceptually respond to what is *in point of fact* a simultaneous array of sensory states in the τ-dimension with

> •(Over there in the corner) it C#ed, then Eb-ed and just now G#ed• (FMPP 62, II §145)

Altogether, then, Sellars leaves us with a view of perceptual experience as a complex regulatory dynamics that we can understand as the gradual build-up of more complex transition networks with significances or transition potentials being constrained by every new level of embedding. The neurophysiological process that has the transition potential of •*This cube of pink ice over there facing me edgewise*• integrates the transition networks of a collection of sensings (ECC dynamics)—there is nothing more to awareness *as* than being operational within a transition network (map-making dynamics) of a certain complexity and operational differentiation. It is important to note, however, that the embedding dynamics constrains the operationality of contributory constituents 'downward.'

The coming to see something as red is the culmination of a complicated process which is the slow building up of a multi-dimensional pattern of linguistic responses (by verbal expressions to things, by verbal expressions to verbal expressions, by meta-linguistic expressions to object-language expressions, etc.) the fruition of which as conceptual occurs when all these dimensions come into play in such direct perceptions as that this physical object (not that one) over here (not over there) is (rather than was) red (not orange, yellow, etc.). (PHM 90, V ¶71)

Using our auxiliary concept of dynamic levels (counted from the top), the locating and characterizing dynamics at level L_{i-1} of sensings at levels L_1 contribute to the formation of image models (imaging) at level L_n, which in turn is constrained by the dynamics of languaging at level L_k, where $i > n > k$.

4.6 Mental languaging alias thinking, and verbal languaging

Into this series of ever more complex map-making dynamics Sellars introduces a classificatory boundary between rudimentary conceptualization and conceptualization proper, in order to "carve nature at its joints" (MEV 340, §78) or, rather, to demarcate the domain of normative content. Remarkably, however, the class of dynamics of languaging runs across this cut. As pointed out above, rudimentary dynamics of languagings Sellars takes already to be realized in animal navigation systems ("representational systems"), once sensings engender more complex transitions that involve a localizing and a characterizing dynamics, and further operational differentiations into analogues of 'perceiving—inferring—acting' are in place. In association with such rudimentary

languagings we can attribute to animals rudimentary forms of conceptualizing and thinking. The difference between Humean navigation—with 'hardwired' inferences—and Aristotelian navigation—with explicit analogues to logical vocabulary—marks for Sellars the difference between natural episodes that are languaging dynamics and languaging dynamics that are thoughts.[61]

At and above the level of Aristotelian navigation systems the complex integration of transition networks includes not only analogues to logical vocabulary but also analogues to explicit normative vocabulary. This is the type of processing that amounts to conceptualizing and thinking in the full-blown sense. Here the transition networks of neurophysiological episodes constitute maximally complex operationalities including (analogues to) norm-guided metalinguistic evaluations. The presence of such (analogues to) metalinguistic regulatory loops and (analogues to) normative vocabulary is for Sellars the hallmark of (an analogue to) rule-governed processing. Thus one can justifiedly call operationalities at this highest level 'functions' and 'roles' and claim that the intentional content of a thought is its role or functioning within the overall navigation system.

The dynamics at the level of normative nonverbal languaging or thinking cannot occur, however, without the dynamic context of normative social practices of *verbal* languaging. Verbal languaging has a wider dynamic context—it also involves physical$_2$ (e.g., phonetic) processes and process-bundles constituting persons, i.e., other members of a linguistic community. Sellars insists that thought or "inner speech" in "Mentalese" depends on "outer speech" or "overt linguistic expressions" (SK 302–15, I §§32–66). This is not only the claim that a functionalist account of linguistic *meaning* is the key to a philosophical account of mental *content* but also the thesis that the dynamic architectures of nonverbal languagings could not be bootstrapped without the normative social practices of verbal languagings—that the reflective or evaluative dimension of thought only unfolds in the course of socialization within a linguistic community and the acquisition of metalinguistic and normative vocabulary.[62]

Each episode of verbal languaging is a dynamics that engages a gigantic transition network containing modules of language entries, intralinguistic transitions, and language exits, as well as regulatory loops of metalinguistic evaluation, as well as social

---

[61]   Sellars announces his discussion of such low-grade forms of conceptualization and thinking in MEV with the somewhat cryptic remark: "What I have held is that the members of a certain class of linguistic events are thoughts" (MEV 325, §1), where 'linguistic events' refers to the class of all kinds of languaging dynamics.

[62]   Episodes of nonverbal languaging can count as having a 'role' only if they involve nonverbal analogues to normative and metalinguistics vocabulary that explicitly regulate the use of verbal expressions in human languages. But what might such analogues be? On the process-ontological reconstruction developed here a Mentalese 'sentence' token would be an episode of a languaging dynamics embedded within a dynamic architecture of *explicit regulation*. However, in order to describe the architecture of 'explicit regulation' in process-ontological terms, one would need to introduce 'second-order' dynamics, i.e., transition networks that 'represent' general features of the processing of transition networks, just as a first-order languaging dynamics (the transition network of *this-F-ly*) 'represents' general features of physical$_2$ processes. It is difficult to see, however, how such internal 'representations' could be architecturally realized without the intermediate step of a conceptualization of external *verbal* episodes that function as metalinguistic and normative vocabulary.

practical validation in the course of scientific research and conceptual change (SRGL IV, §§25–9). These large-scale dynamic dependencies at the level of social practices are well-known and too well explicated to need any further commentary.[63] All that needs to be added is a reminder that this regulatory interplay of 'practices' is part of a consistent process model of cognizant nature, with processes (not norms) 'all the way down'— natural processes that are organized with gradually increasing operational articulation and regulatory complexity 'up' to normative content and beyond to reflective evaluations of normative practices regulating normative content.

5. Conclusion

The aim of this paper was to present in outline the process-ontological account that underlies Sellars's naturalist philosophy of mind. I tried to show that some of Sellars's notoriously mysterious moves become plausible once one acknowledges five basic intuitions—especially the principles that to be is to occur and thereby make a difference, and that significance lives in a process organization and is a matter of operating ('functioning' in the widest sense). I have argued that Sellars's puzzling insistence on 'qualitative' aspects of the reality described in the Scientific Image derives from the insight that occurring is always an 'occurring-thus-ly'; the difference-making, intrinsic character of any occurring becomes operative (begins to 'function') as information within the dynamic context of the process architecture of sentience, and, within the dynamic context of the processing architectures of mind, functions as meaning. Similarly, in order to make sense of the puzzling transition from the "causal order" to the "space of reasons" I have tried to sketch in process-ontological terms the "complex matter-of-factual relation" (SM 136, V §58) of "picturing" or cognition that future science will know how to describe. If 'norm-governed' processing is, as Sellars claims, processing *constrained* by an encompassing dynamic "pattern"—a pattern that involves the processing of episodes embodying the functions of metalinguistic and normative vocabulary—there is a wide range of regulatory dynamic architectures in between normativity and mechanistically causal production that can be aligned with more and less rudimentary forms of cognitive capacities, from sensing to map-making, navigating, imaging, and languaging.

That Sellars conceives of human cognition (picturing) as processing with gradually increasing regulatory complexity up to normativity was the first point I wanted to convey by reconstructing Sellars's process metaphysics. The second point was that on Sellars's view there is a classificatory 'cut' between significance and normative content but no *metaphysical* dichotomy between causal (physical$_1$ and physical$_2$) and functional processes. In conclusion I wish to bring this second point more clearly into view.

I argued above in section 2 that Sellars's treatment of sensory consciousness and his treatment of intentionality follow two different strategies of working around the

---

[63] Cf. Brandom 1994.

reduction principle (CT3). As regards sensory consciousness, I argued that Sellars's idea that *sensa* are basic constituents of the Scientific Image can be interpreted as an anticipation of emergent dynamics (ECC dynamics) in nonlinear dynamic systems (self-maintaining systems). ECC dynamics cannot be defined as a linear function of basic causal constituents as required by (CT3), i.e., they are not causally reducible in the sense of mechanic causation; relative to the mechanical sense of causation they must be postulated, as Sellars suggests, as basic constituents. Yet they can be considered as belonging to the causal order, since they are causal products in the wider sense of non-linear causation, and they might themselves occur in linear causal relationships.

But why does Sellars not pursue a similar line of argument with respect to thoughts? If the Scientific Image contains as basic constituents the "intrinsic features" of sensings—i.e., on our reconstruction: if the Scientific Image contains as basic constituents certain ECC dynamics in organisms—why should it not also contain the distinctive modes of occurrence ('intrinsic features') of thoughts (dynamics with normative content)? Sellars in fact contemplates and rejects this possibility:

If (as I do not believe) it should turn out, for example, that the behavior of persons requires for its description and explanation 'mental acts' having an 'intentionality' which cannot be explicated in terms of the forms and categories of an extensional logic [i.e., reduced in the sense of (CT3) to basic constituents of the Scientific Image], then it would be odd to include these 'mental acts' as part of the subject matter of a 'physical theory,' and to speak of them as 'physical' events. (SSIS VII 439)[64]

On the process-ontological reconstruction I offered here this decision has a straight-forward explanation. Thoughts are not basic constituents of the Scientific Image, since the modes of occurrence that thoughts are, namely, processings of transition networks at the level of normative contents, can be defined in terms of "properties and relations" of the basic entities constituting them, as required by the reduction principle. Since the constituents of thoughts are not merely physical$_2$ entities but also physical$_1$ entities—the ECC dynamics of sensings—*sensa* and mental contents present two decisively different cases of reduction. To define sensory qualities in terms of physical$_2$ basic items with purely metrical features is in Sellars's view impossible in principle; above, in section 2, we have aligned this claim with the acknowledgement of nonlinearity. By the same token it is also impossible in principle to define normative contents ("functions," "roles") in terms of mechanically causal relationships. But this leaves open the possibility of defining contents or roles in terms of nonlinear causality. "If thoughts are items which are conceived in terms of the roles they play, then there is no barrier *in*

---

[64] McDowell has charged that Sellars's philosophy of mind has a "blind spot": "[Sellars] simply does not consider that someone might want to say a difference in what [conceptual episodes] are directed towards can itself be an intrinsic difference in [conceptual episodes]" (McDowell 1998: 55). As witnessed by this quotation, Sellars does in fact briefly consider this option; see also PR, where Sellars reports Roy Wood Sellars's criticism of "direct realism": From "the Sellarsian outlook," Wilfrid Sellars writes, the notion of 'intrinsic differences' of thoughts was bound to fail, at least as long as intrinsicness was tied to givenness: "how is error possible?" (PR 20, IV ¶17).

principle to the identification of conceptual thinking with neurophysiological process" (PSIM VI ¶96, SPR 34, ISR 402). It is merely *currently* impossible to define the normative content of a thought episode in terms of complex architecture of regulatory constraints and emergent configurations of natural episodes. Currently we need the normative idiom of functions and roles to refer to processings within dynamic architectures we cannot yet describe, but this logical irreducibility might well be temporary. In the long run the space of reasons might well be part of the causal order—not, of course, of the mechanically causal order with strict or statistical predictability.[65] But of course: "All of this is more or less speculative, less so now than even a few years ago" (Sellars PSIM VI ¶93, SPR 33, ISR 401).[66]

References

Bickhard, M. (2004). "Process and emergence: Normative function and representation," *Axiomathes* 14: 121–55.

Bickhard, M. (2009). "The interactivist model," *Synthese*, 166(3): 547–91.

Bonjour, L. A. (1973). "Sellars on Truth and Picturing," *International Philosophical Quarterly*, 13(2): 243–65.

Brandom, Robert B. (1994). *Making It Explicit: Reasoning, Representing and Discursive Content* (Cambridge, MA: Harvard University Press).

Brandom, Robert B. (2000). "Sellars' Zwei-Komponenten Konzeption," *Deutsche Zeitschrift für Philosophie* 48(4): 599–613; tr. by J. Seibt.

Calvo, P. and Gomila, A. (eds.) (2008). *Handbook of Cognitive Science: An Embodied Approach* (Amsterdam: Elsevier).

Clark, A. (1997). *Being There: Putting Brain, Body and World Together Again* (Cambridge MA: The MIT Press).

Dennett, D. (1981). "Wondering Where the Yellow Went" (comment on Wilfrid Sellars's Carus Lectures), *The Monist* 64: 102–8.

Hendriks-Jansen, H. (1996). *Catching Ourselves in the Act: Situated Activity, Interactive Emergence, Evolution, and Human Thought* (Cambridge MA: The MIT Press).

Hochberg, H. (1975). "Mapping, Meaning, and Metaphysics," *Philosophica* 16:7–29.

Hochberg, H. (2000). "Sellars' Widerlegung der Realismus widerlegt," *Deutsche Zeitschrift für Philosophie* 48: 661–75.

Hooker, C. (1977). "Sellars' Argument on Secondary Qualities," *Philosophical Studies* 32: 335–48.

McDowell, J. (1998). "The Logical Form of an Intuition," *The Journal of Philosophy* 95: 451–70.

McGilvray, J. (1983). "Pure Processes," *Philosophical Studies* 43: 243–51.

---

[65] Cf. NAO 116–17, in particular §18: "But the micro-processes which take place, according to theory, when salt dissolves in water do not stand to the dissolving as cause to effect. They *are* the dissolving more adequately conceived. The motions of the micro-particles which take place as a cloud moves across the sky do not cause the clouds to move; they *are* the motion of the cloud."

[66] I am much indebted to Boris Brandhoff, Alex Mourelatos, Jim O'Shea, Mark Bickhard, Martin Mose Bentzen, as well as an anonymous reviewer for helpful comments on an earlier draft of this paper.

Margolis, J. (1967). "On Picturing and Signifying," *Logique et analyse* 10: 277–80.

Millikan, R. G. (1984). *Language, Thought and Other Biological Categories* (Cambridge, MA: The MIT Press).

Millikan, R. G. (1998). "Language Conventions Made Simple," *The Journal of Philosophy* 94: 161–80.

Millikan, R. G. (2005). "The father, the son, and the daughter: Sellars, Brandom, and Millikan," *Pragmatics & Cognition*, 13(1): 59–71.

Mitchell, M. (2009). *Complexity—A Guided Tour* (Oxford: Oxford University Press).

Moreno, A. and Umerz, J. (2000). "Downward Causation at the Core of Living Organization," in P. Andersen, E. Emmeche, N. Finneman, and P. Christiansen (eds.), *Downward Causation* (Aarhus: Aarhus University Press), 99–118.

O'Shea, J. (2007). *Wilfrid Sellars: Naturalism with a Normative Turn* (Cambridge: Polity Press).

O'Shea, J. (2009). "On the Structure of Sellars' Naturalism with a Normative Turn," in W. deVries (ed.), *Empiricism, Perceptual Knowledge, Normativity, and Realism: Essays on Wilfrid Sellars* (Oxford: Oxford University Press), 187–211.

Park, S. Y., Borbat, P. P., Gonzalez-Bonet, G., Bhatnagar, J., Freed, J. H., Bilwes, A. M., and Crane, B. R. (2006). "Reconstruction of the chemotaxis receptor-kinase assembly," *Nature Structural & Molecular Biology*, 13: 400–7.

Pfeifer, R. and Bongard, J. (2006). *How the Body Shapes the Way We Think: A New View of Intelligence* (Cambridge MA: The MIT Press).

Pitt, J. C. (1981). *Pictures, Images, and Conceptual Change* (Dordrecht: Reidel).

Rosenberg, J. (1982). "The Place of Color in the Scheme of Things: A Roadmap to Sellars' Carus Lectures," *The Monist* 65: 315–35.

Rosenberg, J. (2000). "Perception vs. Inner Sense: A Problem About Direct Awareness," *Philosophical Studies* 101: 143–60.

Rosenberg, J. (2007). "Sellarsian Picturing," in J. Rosenberg, *Wilfrid Sellars: Fusing the Images* (Oxford: Oxford University Press), 104–27.

Seibt. J. (1990a). *Properties as Processes—A Synoptic Study of Wilfrid Sellars' Nominalism* (Atascadero, CA: Ridgeview).

Seibt. J. (1990b). "Towards Process Ontology—A Critical Investigation of Substance-Ontological Premises," PhD Dissertation, University of Pittsburgh, UMI Publication.

Seibt. J. (2000). "Pure Processes and Projective Metaphysics," *Philosophical Studies* 101: 253–81.

Seibt. J. (2004). "Free Process Theory: Towards a Typology of Processes," *Axiomathes* 14: 23–57.

Seibt. J. (2005). "General Processes—A Study in Ontological Category Construction." Habilitationsschrift at the University of Konstanz.

Seibt. J. (2007). *Wilfrid Sellars*, Series: Moderne Klassiker (Berlin: Mentis Verlag).

Seibt. J. (2009a). "Functions between Reasons and Causes: On Picturing," in W. deVries (ed.), *Empiricism, Perceptual Knowledge, Normativity, and Realism: Essays on Wilfrid Sellars* (Oxford: Oxford University Press), 247–81.

Seibt. J. (2009b). "Forms of Emergent Interaction in General Process Theory," *Synthese* 166, 479–512.

Seibt, J. (2014). "Non-Transitive Parthood, Levelled Mereology, and Emergent Parts of Processes," *Grazer Philosophische Studien* 91: 165–90.

Seibt, J. (2015). "Ontological Scope and Linguistic Diversity," *The Monist*, 98: 318–43.

Sellars, W. (ENWW) (1947). "Epistemology and the New Way of Words," *Journal of Philosophy* 44: 645–60; reprinted in PPPW.

Sellars, W. (PPE) (1947). "Pure Pragmatics and Epistemology," *Philosophy of Science* 14: 181–202; reprinted in PPPW.

Sellars, W. (CIL) (1948). "Concepts as Involving Laws and Inconceivable without Them," *Philosophy of Science* 15: 287–315; reprinted in PPPW.

Sellars, W. (RNWW) (1948). "Realism and the New Way of Words," *Philosophy and Phenomenological Research* 8: 601–34. Reprinted in *Readings in Philosophical Analysis,* edited by Herbert Feigl and Wilfrid Sellars (New York: Appleton-Century-Crofts, 1949), and in PPPW.

Sellars, W. (LCP) (1949). "On the Logic of Complex Particulars," *Mind* 58: 306–38; reprinted in PPPW.

Sellars, W. (MMB) (1952). "Mind, Meaning, and Behavior," *Philosophy of Science* 3: 83–95.

Sellars, W. (P) (1952). "Particulars," *Philosophy and Phenomenological Research* 13: 184–99; reprinted in SPR.

Sellars, W. (SSMB) (1953). "A Semantical Solution of the Mind-Body Problem," *Methodos* 5: 45–82; reprinted in PPPW.

Sellars, W. (PR) (1954). "Physical Realism," *Philosophy and Phenomenological Research* 15: 13–32.

Sellars, W. (SRLG) (1954). "Some Reflections on Language Games," *Philosophy of Science* 21: 204–28; reprinted with additions in SPR, 321–58.

Sellars, W. (CE) (1956). "The Concept of Emergence" (co-authored with Paul Meehl), in H. Feigl and M. Scriven (eds.), *Minnesota Studies in Philosophy of Science* I, 239–52.

Sellars, W. (EPM) (1956). "Empiricism and the Philosophy of Mind," in H. Feigl and M. Scriven (eds.), *Minnesota Studies in Philosophy of Science* I, 253–329; reprinted in SPR.

Sellars, W. (CDCM) (1957). "Counterfactuals, Dispositions, and the Causal Modalities," in H. Feigl, M. Scriven, and G. Maxwell (eds.), *Minnesota Studies in Philosophy of Science* II, 225–308.

Sellars, W. (ITM) (1957). "Intentionality and the Mental," a symposium by correspondence with Roderick Chisholm, in H. Feigl, M. Scriven, and G. Maxwell (eds.), *Minnesota Studies of Philosophy of Science* II, 507–39.

Sellars, W. (PHM) (1961). "Phenomenalism," in SPR: 60–105.

Sellars, W. (PSIM) (1962). "Philosophy and the Scientific Image of Man," in R. Colodny (ed.), *Frontiers of Science and Philosophy* (Pittsburgh, PA:University of Pittsburgh Press), 35–78; page references to the reprinting in SPR.

Sellars, W. (TC) (1962). "Truth and Correspondence," *Journal of Philosophy* 59: 29–56; reprinted in SPR.

Sellars, W. (SPR) (1963). *Science, Perception and Reality* (London: Routledge & Kegan Paul; reissued by Atascadero, CA: Ridgeview, 1991).

Sellars, W. (TE) (1963). "Theoretical Explanation," in *Philosophy of Science: The Delaware Seminar,* Vol. II (New York: John Wiley), 61–78; reprinted in EPH, 439–54.

Sellars, W. (IV) (1964). "Induction as Vindication," *Philosophy of Science* 31: 197–231.

Sellars, W. (IAMB) (1965). "The Identity Approach to the Mind-Body Problem," *Review of Metaphysics* 18: 430–51.

Sellars, W. (SRII) (1965). "Scientific Realism or Irenic Instrumentalism: A Critique of Nagel and Feyerabend on Theoretical Explanation," *Boston Studies in the Philosophy of Science,* Vol. II,

edited by Robert Cohen and Marx Wartofsky (New York: Humanities Press): 171–204. Reprinted in PPME.

Sellars, W. (SM) (1968). *Science and Metaphysics: Variations on Kantian Themes*, The John Locke Lectures for 1965–66 (London: Routledge & Kegan Paul; reissued by Atascadero, CA: Ridgeview, 1992).

Sellars, W. (SSIS) (1971). "Science, Sense Impressions, and Sensa: A Reply to Cornman," *Review of Metaphysics* 25: 391–447.

Sellars, W. (CC) (1973). "Conceptual Change," in P. Maynard and G. Pearce (eds.), *Conceptual Change* (Dordrecht: D. Reidel), 77–93; reprinted in EPH, 172–88.

Sellars, W. (EPH) (1974). *Essays in Philosophy and its History* (Dordrecht: D. Reidel).

Sellars, W. (SK) (1975). "The Structure of Knowledge: (1) Perception; (2) Minds; (3) Epistemic Principles," the Matchette Foundation Lectures for 1971 at the University of Texas. In H. Neri-Castañeda (ed.), *Action, Knowledge, and Reality: Studies in Honor of Wilfrid Sellars* (Indianapolis, IN: Bobbs-Merrill), 295–347.

Sellars, W. (IKTE) (1978). "The Role of Imagination in Kant's Theory of Experience," The Dotterer Lecture 1978, in Henry W. Johnstone, Jr. (ed.), *Categories: A Colloquium* (University Park, PA: Pennsylvania State University Press), 231–45.

Sellars, W. (NAO) (1980). *Naturalism and Ontology* (The John Dewey Lectures 1973–74) (Atascadero, CA: Ridgeview).

Sellars, W. (PPPW) (1980/2005). *Pure Pragmatics and Possible Worlds: The Early Essays of Wilfrid Sellars*, edited and introduced by Jeffrey F. Sicha (Atascadero, CA: Ridgeview).

Sellars, W. (FMPP) (1981). "Foundations for a Metaphysics of Pure Process" (The Carus Lectures), *The Monist* 64: 3–90.

Sellars, W. (MEV) (1981). "Mental Events," *Philosophical Studies* 39: 325–45.

Sellars, W. (SSOP) (1982). "Sensa and Sensings: Reflections on the Ontology of Perception," *Philosophical Studies* 41: 83–111.

Sellars, W. (TTP) (1983). "Towards a Theory of Predication," in James Bogen and James McGuire (eds.), *How Things Are* (Dordrecht: D. Reidel), 281–318.

Sellars, W. (PPME) (2011/1977). *Philosophical Perspectives: Metaphysics and Epistemology* (Atascadero, CA: Ridgeview).

Smart, J. J. C. (1983). "Sellars on Process," *The Monist* 65: 302–14.

Sumpter, D. J. (2010). *Collective Animal Behavior* (Princeton, NJ: Princeton University Press).

Wiener, N. (1948). *Cybernetics or Control and Communication in the Animal and Machine* (Paris: Hermann & Cie, and Cambridge, MA: MIT Press); 2nd rev. ed., 1961.

Wimsatt, W. (1986). "Forms of Aggregativity," in A. Donagan, A. Perovich, and M. Wedin (eds.), *Human Nature and Natural Knowledge* (Dordrecht: Springer Netherlands), 259–91.