11. Sellarsian Picturing and Neo-Kantian Theories of Representation (August Buholzer)

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Abstract Sellars's long-neglected account of picturing has recently found more sympathetic interpretations. At the same time, there has been more sustained engagement with Sellars's Kantianism. However, there has not yet been an inquiry into the notion of picturing in 19th and 20th century Neo-Kantian philosophy prior to Sellars. This chapter examines how neo-Kantians such as Helmholtz, Riehl, and Hertz developed 'picture' theories of representation to bring out epistemological consequences of post-Kantian developments in the sciences. Sellars's version of the concept of picturing is considered in relation to these accounts, and is thus situated within a longer tradition of naturalistic interpretations of Kant.

Keywords: picturing, Helmholtz, Hertz, Schlick, Wittgenstein, representation, idealism, realism

Introduction

Sellars's philosophy of science features two ideas rarely discussed together: his recasting of Kant's phenomena/noumena distinction, which reconceives noumena as the entities revealed to us by successful theories, and picturing, "an isomorphism in the real order" (BBK, ¶41), a relation Sellars takes to underwrite (among other things) the ever-increasing accuracy of these scientific theories. Picturing has received a good amount of attention in recent years (e.g. Seibt 2000; 2009, Levine 2007, Rosenberg 2007b, de Vries 2019, O'Shea 2007, Sachs 2019; 2022, Stovall 2021, Seiberth 2021).

Meanwhile, interpreting Sellars in terms of 'Kantian naturalism' is a now familiar idea from the work of James O'Shea (2007, 2016). While scholars of both Sellars and Kant have examined aspects of Sellars's reading of Kant in detail (Haag 2017, O'Shea 2018, Seiberth 2021), commentators have not yet considered Sellars's views in the context of Neo-Kantian philosophy of science. However, as Sachs (2022) suggests, our assessment of Sellars's Kantianism would benefit from comparison to Neo-Kantian projects similarly geared towards updating Kantian epistemology not only with regard to developments in mathematics and physics, but also the sciences of the mind.

This chapter takes a step in this direction by positioning Sellars's conception of picturing against the background of naturalistic Neo-Kantian conceptions of mental representation. I will point out precursors to Sellars's notion of picturing in the 'physiological' Neo-Kantianism (Pecere 2020) which endeavored to align broadly Kantian theories of knowledge with the latest research in experimental psychology, developing or otherwise engaging with the conception of a representation as an image or picture of reality. Consideration of this notion in Helmholtz, Hertz, Riehl, and Schlick, I hope to show, offers a fresh background against which to view Sellars's attempts to align Kantian epistemological insights with an empirically-informed approach to meaning and mindedness, in the middle of the 20th century. Awareness of the Neo-Kantian history of the 'picture' conception of representation will, I think, help us better appreciate connections between picturing and the transcendental aspects of Sellars's scientific realism.

My aim is not to assess how well Sellars' account of picturing solves the systematic problem(s) for which he introduces it. Instead, I want to show, by way of a selective conceptual genealogy, ways in which the notion of representational picturing was jointly shaped by the developing sciences of the mind and debates surrounding the updating of Kantian epistemology – concerns which would be crucial for Sellars's naturalized Kantianism.

In addition to making picturing intelligible as part of a naturalized Kantian project, an understanding of naturalistic Neo-Kantianism offers insights into Sellars's relationship to his more proximate logical empiricist influences. Among the philosophical precursors to Sellars's distinctive scientific realist reading of Kant was a realist approach to Kant's thing in itself which, unlike in the post-Kantian German idealists, was allied with an epistemology informed by 19th century experimental sciences of the mind.[1]

I will highlight two points of interest in these predecessors: (1) various ways the pictorial approach to representation has been positioned in relation to scientific objectivity, admitting of both realist and anti-realist versions, and (2) the development of pictorial representation into a 'structural resemblance' conception which could then be aligned with a 'transcendental realist' approach to Kant's phenomena/noumena distinction.

The chapter runs as follows. First, I consider the contrast between representational pictures and signs in Helmholtz (§1). Next, I consider developments of Helmholtz's

[11] Sellars was exposed to this undercurrent via Feigl (see Neuber 2011, p. 167 for Feigl's relationship to Riehl's critical realism and Schlick's early realism). To be sure, Sellars additionally encountered realism via classical pragmatism and Roy Wood Sellars's critical realism. I do not intend to make any specific claims about the proportions of these influences on Sellars.

approach to representation in Riehl, who draws realist lessons from the state-of-the-art sensory physiology, and Hertz, who admits different possible pictures and a range of degrees of resemblance between candidate pictures and reality (§2). I then show how physiological Neo-Kantian approaches to representation intersected with debates over the role of space and spatial structures in physical and mathematical theory, and point out similarities with Sellars's 'counterpart' approach to spatial form in Kant (§3). Finally, in §4 I consider ways in which picturing in Sellars follows and departs from picturing in the Neo-Kantian tradition.

1. Helmholtz: sensory physiology, signs and pictures

A central debate in epistemology or *Erkenntnistheorie* at the end of the 19th and the beginning of the twentieth century concerned the importance of Kantian a priori principles for the foundations of scientific knowledge. Readers of Sellars are, I expect, familiar with this chapter of intellectual history and how it shaped the logical empiricist context in which Sellars found himself when he began his philosophical career. However, as Michael Friedman has argued, this move away from Kantianism was no simple rejection.[2] In addition to adopting modified versions of Kantian a priori principles, philosophers such as Schlick and Feigl formulated their views against a background of existing Neo-Kantian projects. It is relevant, in view of Sellars's philosophical interests, that some of these projects were geared towards naturalizing Kantian epistemology, both to accommodate new developments in mathematics and physics, and the sciences of the mind and the organism. Thus, figures such as

[2] See Coffa (1991) and Friedman (1994) for discussion of this part of the history of logical empiricism.

Helmholtz and Riehl, as already mentioned, and Jakob Friedrich Fries, Kuno Fischer, Otto Liebmann, Jürgen Bona Meyer, Friedrich Albert Lange, aimed to account for the structure of scientific knowledge in broadly Kantian terms, while also recognizing the physiological and biological bases for such knowledge.[3]

One especially influential piece of empirical research in this context was Johannes Müller's doctrine of the 'specific nerve energies', that "the information … obtained by the senses concerning external nature, varies in each sense, having a relation to the qualities or energies of the nerve" (Müller 1833, VIII).[4] According to this theory, the differences in the five sensory modalities are due to differences in the structure of their respective nerves. In his 1855 lecture *On Human Vision*, Helmholtz aligned this doctrine with Kant's claims about the a priori sources of the forms of sense perception. Müller's insight, according to Helmholtz, amounted to the view that what we perceive differently through different sense modalities cannot be counted among the objective features of the world. When we are presented with a ray of sunlight, for example, whether this same stimulus is experienced as heat or light depends on which sensory modality is perceiving it – contrary to the view that the stimulus itself is inherently visual or tactile (Edgar 2015, 107). This insight led Helmholtz to the view that sensations function as 'signs' (*Zeichen*) or 'symbols' for these stimuli, rather than resembling them in any way. And since Helmholtz took resemblance to be a criterion

[3] See Beiser (2014, 35ff, 209, 246ff, 308, 337ff, 381ff, 557) for an overview of these figures. See Pecere (2020) for an account of "physiological" Neo-Kantianism in Helmholtz and Lange.

[4] Translation from Meyering (1989, 134).

for the objectivity of our representations, such signs could not be truly objective representations of the world.[5]

Helmholtz developed this conception of the epistemological status of sensory signs in the following decades, progressively extending his claims about the subjectivity of sensations to spatial and causal representations.[6] Because our ideas of spatial and causal relations, on his view, are assembled through acts of the mind, Helmholtz maintains in the *Treatise on Physiological Optics* (1867) that such representations cannot resemble actual spatial or causal structures in the world (1925 [1867], 34ff). Perceptual pictures are ultimately not realistic, but determined by properties of our sense organs. Nonetheless, we can use them to gain empirical knowledge when we compile them to create models, which enable hypothesis testing:

> The idea of a body in space, of a table, for instance, involves a quantity of separate observations. It comprises the whole series of images which this table would present to me in looking at it from different sides and at different distances; besides the whole series of tactile impressions that would be obtained by touching the surface at various places in succession. (1925 [1867], 23; cf. 21-22).

Helmholtz goes on to affirm that this concept of a table is "correct and exact, provided I can deduce from it correctly the precise sensations I shall have when my eye and my hand are brought into this or that definite relation with respect to the table" (1925 [1867], 23). According to this view, the accuracy of a representation is determined by

[5] See Hatfield (1990, 155, 166-68), Beiser (2014, 199); De Kock (2014), Edgar (2015), Tracz (2018), for discussion of Helmholtz's epistemology.
[6] See Hatfield (1990) and Edgar (2015, 109ff) for detailed accounts of the development of Helmholtz's views on the subjective nature of sensory, spatial and causal representations.

whether the multi-perspectival image correctly models the results of hypothetical interventions.

Such perceptual 'modelling', for Helmholtz, corresponds to the methods used to establish objective relationships through experimental manipulations, giving insights into lawful relations (gravitational laws, chemical laws) between controlled interventions and their results (1925 [1867], 29-30).[7] Perception is like scientific theorizing, as in both cases our conception of objects is put to the test in our practical dealings with the world:

> Each of our voluntary motions by which we modify the manner of appearance of objects, is to be considered as an experiment by which we test whether we have correctly conceived the lawful behavior of the phenomenon in question, that is, its presumed existence in a definite spatial order. (1977 [1878], 358)

However, this approach is limited, Helmholtz thinks, when it comes to hooking perception up with reality. Because scientific laws involve quantitative relations that cannot be directly mapped onto perceptions in this way, spatial appearances still cannot make any claim to know things as they are in themselves.[8]

In a public lecture titled "The Facts in Perception" (1878), Helmholtz comments on the significance of resemblance in scientific representation. He distinguishes perceptual signs (*Zeichen*) from the "popular" conception of pictorial resemblance:

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[7] See Hatfield (1990, 167), Heidelberger (1998, 10) for the parallel in Helmholtz between experimental science and perception.

[8] See Edgar (2015, 111), Schiemann (2009; 1998, 27) for discussion of these aspects of Helmholtz' epistemology.

> a sign needs to have no kind of similarity at all with what it is the sign of. The relation between the two of them is restricted to the fact that like objects exerting an influence under like circumstances evoke like signs, and that therefore unlike signs always correspond to unlike influences.
>
> To popular opinion, which accepts in good faith that the images [*Bilder*] of things given through our senses are wholly true, this residue of similarity acknowledged by us may seem very trivial. In fact it is not trivial. For with it one can still achieve something of the very greatest importance, namely, the picturing [*Abbildung*] of the lawfulness in the processes of the actual world. (Helmholtz 1977 [1878], 122, translation modified)[9]

Helmholtz thus opens the way for a view of representation based on a "residue of similarity" – ultimately, a form of covariance – in lieu of the naïve view of resemblance. The residual similarity alluded to in the first paragraph of the quoted passage, which Meyering (1989) and Schiemann (1998) call "sign-constancy," involves inferences we make, often unconsciously, about the regularities in sensations. While sensory-perceptual 'pictures' (*Bilder*) do not themselves correspond to anything in the world, perceptual signs indirectly contribute to a more perspicuous representational 'picturing' (*Abbildung*). Even with the sign-covariance version of picturing, however, Helmholtz thinks that representational objectivity stands or falls with the degree to which the pictures presented to us in perception are determined by objects themselves, rather than aspects of our perceptual psychology.

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[9] Cf. Friedman (1997, 20, n75). My translation of *Abbildung* as 'picturing' may appear tendentiously Sellarsian, but agrees with Friedman's (1997, 21) translation of this passage. See also Lützen's remark that 'picture' may be a better translation than 'image' for Hertz's *Bild* (2005, 83n).

2. Pictures and second-order resemblance

I now turn to two notable developments of Helmholtz's views for our purposes of setting up a comparison with Sellarsian picturing. Riehl brings in evolutionary considerations and a realist interpretation of the latest perceptual physiology, while Hertz offers a more pluralistic conception of pictures in relation to scientific theories.

According to Riehl, physiologists such as Müller allowed their philosophical predilections to inform the articulation of their results: "Through his doctrine of the specific energies of the sensory nerves, Müller translated Locke's incorrect assumption of the merely secondary (purely subjective) significance of certain sensory properties into the language of physiology" (1879, 50). In a commentary on Helmholtz in his three-volume masterwork *Philosophical Criticism and its Significance for the Positive Sciences* (1876-1887), Riehl points out an alternative way of understanding Müller's findings. Where Helmholtz takes the existence of different sense modalities to point to the subjective status of their contents, Riehl claims that the objective structure of objects is accurately conveyed, regardless of which sensory modality is involved (1879, 50-64; cf. Riehl 1894 [1887], 48-51; 165). He also argues that the fit between sense impressions and objects in the environment should be seen as a product of evolution, an adaptation suited to the "needs and the external relations of a living being" (1894 [1887], 49).[10]

[10] See Beiser (2014, 557), Heidelberger (2006, 240) for the influence of evolutionary biology on Riehl's epistemology.

For Riehl, the fact that objective stimuli and the subjective sensations they elicit "are closely aligned" in this way is consistent with sensory *qualities* resulting from a merely "subjective contribution" (1879, 52). The differences in sensory modalities, Riehl thinks,

> can no longer be sought, as Müller did, in a specific irritability of the sensory nerves themselves. The nerve fibers are only the conduction pathways for excitations, which can neither be produced nor changed in their nature. Anatomically, the nerves differ only insignificantly. Chemically, and in their function as mediators of excitation, their behaviour is everywhere identical. (1879, 52-53)[11]

Focusing on what the sensory nerves all have in common allows Riehl to build a realist position from the sensory physiology: While we indeed have five distinct sense modalities, we do not perceive light, sound or taste as such. Rather than infecting the contents of representations, these modalities are the conduits via which the structure of objects may be straightforwardly conveyed. In support of this view, Riehl points out our ability to attribute modally diverse sensations to the same object. Just as I can feel the varied structure of a tree's bark, I can see this same variation, or even hear it, by running a stick across it (1894 [1887], 57). Differences in subjective quality of the sensory modalities (e.g., taste, touch) are thus orthogonal to the similarities and differences of the things in the world that our sensory representations indicate (1879,

[11] However, parts of Müller's text may be read as supporting Riehl's realist approach to sensory physiology:
"inasmuch as the nerves of the senses are material bodies, and therefore participate in the properties of matter generally occupying space ... they make known to the sensorium, by virtue of the changes thus produced in them by external causes, not merely their own condition, but also properties and changes of condition of external bodies" (Müller 1833, VIII, translation from Meyering (1989, 134-35).

50ff; Cf. Helmholtz 1925 [1867], 20-24). The upshot of these considerations for the picture conception is that sensations need not 'literally' resemble the objects they are sensations of; they may exhibit structural or second-order resemblances to their objects.

The independence of the mind's contributions to the structure of sensations for the objectivity of pictures is also recognized by Hertz in his successor to Helmholtz's sign theory (*Zeichentheorie*).[12] In his *Introduction to Mechanics* (1899 [1894]), speaking from the perspective of the scientist, Hertz cautions that we should not conclude from philosophical models of sense perception that mental pictures cannot serve as adequate models of reality:

> let [philosophers] not make us believe that we have worked in vain when we have made ourselves images [*Bilder*] of the things that are real but do not enter into our mind, images that correspond to those things in some respects, while in other respects they bear the imprint of our imagination. (Hertz 1899 [1894], 36)

The important contribution here for the concept of pictorial representation is that we cannot infer from the existence of 'empty' relations in the picture, which do not correspond to any relations in the object (Hertz 1899 [1894], 2), to the non-objectivity of the picture as a whole.

[12] For detailed discussion of the relationship between Hertz' image or picture theory and Helmholtz' *Zeichentheorie* see Lützen (2005, Ch. 7.1) and Schiemann (1998).

As part of this more relaxed approach to what qualifies as a picture, Hertz recognizes three criteria which allow us to compare candidate pictures: permissibility, correctness, and appropriateness.[13] The third criterion, appropriateness, allows the comparison of different candidate theories. Hertz conceives of the choice of the best theory as that which provides the most predictive success (Hertz 1899 [1894], 2). Hertz's expansion of the concept of picturing to include different eligible 'pictures', as well as their assessment as more or less adequate, prefigures Sellars's conception of theory change as increasingly accurate picturing (Sellars 1SM V, §§74-76). For Hertz, the more appropriate theory "pictures more of the essential relations of the object" (Hertz 1899 [1894], 2). Comparably, Sellars takes the replacement of a theoretical term by its analogical counterpart in a successor theory to involve really discovering something about the postulated entities in question (SM VI, §8).

3. Spatial perception and structural realism in Riehl and Schlick

I now consider how Neo-Kantian debates about the status of space as a form of intuition helped re-define conceptions of scientific representation and its relation to perception. As we just saw, the existence in a picture of what Hertz called 'empty relations' – the relations in the representations that do not have correspondence value – does not obviously have anti-realist consequences for the picture conception as such. Alongside the epistemological concern to distinguish space as a feature of our intuition from space as a mathematical object and a feature of physical reality, a non-

[13] See Lützen (2005, Ch. 8), and Schiemann (1998, 31-35) for discussion of Hertz's three criteria.

resemblance conception of representation could more easily be viewed as compatible with – and even congenial to – scientific realism. We will see that against this background, and influenced by Riehl's structural realist reading of Kant, Schlick could reject even attenuated forms of pictorial resemblance in his realist account of reference.

The main contrast in approaches to the role of spatial perception in mathematics and physical theory around the turn of the century was between positivism, represented by Mach, and Neo-Kantianism, represented by Poincaré.[14] While the Marburg Neo-Kantians defended an important role for Euclidean space,[15] a significant third option was Schlick's epistemology in his *General Theory of Knowledge* (1974 [1925]), which has been read as fusing the conventional approach of Hilbert and Poincaré on one side, and strands of Neo-Kantianism on the other side. According to Friedman, Schlick, like Reichenbach and Carnap, was "neither strictly Kantian nor strictly empiricist" (1994, 23). And as Michael Heidelberger (2006; 2007) has argued, the realistic spirit of the early Schlick's epistemology, which set it apart from positivism, was informed by Riehl's idiosyncratic Neo-Kantianism which stressed the role of things in themselves as the cause of appearances (Heidelberger 2006, 235).

According to Riehl, in addition to the space of mathematics and the subjective space of sensation, there is the objective space of objects studied by science, a "true, or indeed, real space" (1894 [1887], 59-60). Riehl accounts for the coexistence of

[14] See Coffa (1991) and Gower (2010, 87) for description of this debate.
[15] For example, Natorp, in *Die Logische Grundlagen der exakten Wissenschaften* (1910). See Howard (1994) for an account of the Marburg approach and Einstein's contrasting philosophical views.

different spaces in terms of the structural properties of objects and arrangements thereof:

> The factual or objective correlate of all our spatial intuition lies in the coexistence of the objects. The special, measurable relations in which the objects coexist are the correlates of our special spatial perceptions. My claim … is that objects and processes are grasped in full adequacy and that these relations are constituents of a purely objective world. (Riehl 1879, 165, quoted in and translation from Heidelberger 2007, 33)

The form of perception, Riehl stresses, is not only attributable to a priori forms of intuition, but also the empirical relations among sensations: "the relations of sensations, their determinate coexistence and succession, make an impression on consciousness, just like the sensations themselves; we feel this impression in the constraint that the determinacy of the empirical manifold imposes on the perceiving consciousness" (Riehl 1879, 104). Because relations among sensations, for Riehl, convey knowledge of the relations of things, Heidelberger attributes to Riehl a form of structural realism (2006, 236).

While Schlick was not a student of Riehl's, the intellectual influence of Riehl on Schlick was significant.[16] The question of the objective purport of sensations was taken up by Schlick, in the course of setting up a similar distinction between subjective space and scientific space, in his 1916 paper "Ideality of Space, Introjection and the Psycho-Physical Problem":

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[16] See Heidelberger (2006, 232-33) for Riehl's philosophical influence on Schlick.

> sensations, which are certainly mental, can undoubtedly possess spatial determinations; the content of a colour-perception, for example, is not unspatial but extended and at a certain place. … the contradictions that emerge from the relation between mental and physical do really have their source in the *spatial* relation of the two realms to one another, in the difficulty of satisfying the claims that both of them make, as it were, upon space. (Schlick 1979 [1916], 193)

and

> The white of the paper in front of me has never been in my head. Any attempt to locate it anywhere but right out there at the place where I see it, invariably comes to grief. … We see that with Mach and Avenarius the sensory qualities carry off victory in the battle for the possession of space. … It is they in their motley variety that fill space and congregate into bodies …. (197)

Schlick notes that the claims that "physical objects, electrons and so on" make to space "have not, indeed, been examined by positivism with the same acuteness and energy that it has given to establishing the irremovability of the latter, and hence it has not yet explained the whole situation completely" (1916, 197). Following Riehl, Schlick rejects what he calls the positivistic "notion of immanence" (196) and defends the objective priority of scientific objects which he takes to stand in a transcendent spatial ordering vis-à-vis subjective spatial and temporal orders (1974 [1925], §25). Thus, for Schlick, the spatiality of scientific objects takes ontological priority over ordinary objects of experience.

We find a similar line of thought in Sellars' reading of Kant, starting with the claim that manifest objects are essentially colored:

> reflection on the nature of empirical Space and spatial attributes (if he had not confused them with ideal Space and spatial attributes, and had not taken the subjectivity of colour for granted) would surely have convinced Kant that the objects of perception are as essentially coloured as they are extended; indeed, that their spatial characteristics essentially involve the contrast of colour with colour. (Sellars SM II, ¶74)

The theme of the 'battle for space', in a similar way, ends up being significant for Sellars's 'transcendental realist' reading of spatial relations in Kant. Because science refers to entities that are not colored objects, Sellars thinks, we have to regard their 'spatiality' along the lines of an order of things in themselves beyond spatiotemporal appearances:

> The transcendental realist … interprets the obtainability of intuitions of spatial structures as grounded in the *an sich* existence of such structures. But while Kant agrees that this obtainability is grounded in the in itself, he denies that this grounding requires that the in-itself be the spatio-temporal structure we conceptually represent. The strongest interpretation of this claim would be that existence in itself is in no sense akin to the spatio-temporal structures we represent. I see no reason to ascribe this view to Kant, nor does it seem to have any intrinsic merit. A less negative interpretation would be that it is not only possible for the in-itself to be, in an interesting sense, *analogous in structure* to the spatio-temporal world

> but that it is reasonable to think of it as having such a structure. (SM II, §47, my ital.)

Thus for Sellars in *Science and Metaphysics*, there is: (i) an "Ideal space"; (ii) "Empirical space"; and (iii) the postulated 'spatial analogue' of the in-itself. Sellars thus outlines a form of spatial transcendental realism, which might be best described as Neo-Kantian, on the basis of the primacy of relations in a real or objective space which systematically correspond to perceived spatial relations in appearances: "it would still have been open to Kant to say that things-in-themselves, in so far as they affect our sensibility, have, like sense impressions, attributes and relations which are in their own way analogous to those of perceptible things" (SM II, §72).[17]

In Schlick's Neo-Kantian view, however, the intuitive spatial relations involved in perception are denied representational purport. Instead, Schlick follows Helmholtz in attributing a purely symbolic representational function to perceptual experiences. In another passage from Schlick's paper on the ideality of space, we see (in the first half of the passage) how phenomenal, intuitive space connects to the space of physics via "coordination" (*Zuordnung*):

> coordination and correspondence between all the spatial experiences of the different senses and individuals … hence is a symbol for the order of things-in-themselves, which (even in Kant's view) we must hold responsible for the spatial order of experiential objects, though we may not describe it as itself a spatial order. But if this is the meaning of physical space, there

[17] See O'Shea (2018) for critical discussion of Sellars's reading of Kant on space.

> follows at once from it the meaning of physical spatial objects, the objects of natural science: their world is not, as Kant wanted, to be put on a level with that of the 'appearances', the manifold of intuition, but has to be regarded as a conceptual symbol, a sign-system for the world of things-in-themselves. …one may confidently say that the truths of science are in fact just so many cognitions of things-in-themselves. (1979 [1916], 201)

Schlick would fully decouple the intuitive dimension of representational signs from their objective purport, in *General Theory of Knowledge*. There, Schlick attributes this realistic coordination with the objects of science to the unique or univocal coordination of judgments with facts (1974 [1925], §§10, 21). He thus explicitly rejects the picture conception of representation inasmuch as he rejects the idea that conceptual judgments contain relations that are counterparts to their designata: "A judgment pictures the nature of what is judged as little as a musical note pictures a tone, or the name of a man pictures his personality" (1974 [1925], §10, 61).[18]

4. Picturing in Sellars

With Hertz's account of theories as pictures, the concept of representational picturing was released from the requirement of exact metaphysical resemblance which

[18] In this context, Feigl's account of his relationship to Schlick and to Sellars is worth noting: "I was acutely distressed to witness Schlick's conversion to positivism in the late twenties. This conversion was largely due to Carnap and Wittgenstein.. … My own emancipation began in the middle thirties and was stabilized in the forties. Studies and teaching in the field of the philosophy of science helped me regain, refine and buttress my earlier realistic position. I was also greatly encouraged by the scientific realism of Hans Reichenbach and the realistic epistemologies of my steadfast dear friends Roy W. Sellars and Wilfrid Sellars (Feigl 1981, 39, quoted in Neuber 2011, 167).

had made Helmholtz prefer to call anything that did not meet this condition a 'sign'. This development cleared the way for the second-order resemblance conceptions of picturing in the early Wittgenstein and, in turn, Sellars.[19] In the previous section I suggested that this development was aided by a structural realist approach to Kant's epistemology, because this offered a way of upholding scientific realism that recognizes both a 'subjective space' given in sensations, and the systematic connection of relations presented in this form with relations of scientific objects ('real space'). While I do not want to suggest that Sellars' transcendental realist reading of Kant is owed to his conception of picturing, or vice-versa, I hope to bring out here some ways in which these elements of his scientific realism are complementary.

In a similar spirit to Riehl, Sellars would consider the structure of sensory states to be epistemologically relevant (SM I §78) – and not merely negatively, as a sensory-neurological 'veil of perception'. However, like Schlick, Sellars holds that the concepts that linguistically signify scientific entities are symbolic representations. In line with these commitments, Sellars' appeal to the concept of picturing, in my view, aims (i) to explain the epistemic role of the perceptual impressions that Helmholtz would have called 'pictures'; and (ii) to spell out how symbolic-linguistic structures earn and retain their realistic epistemological status across changes in concepts and theories.

In contrast to Helmholtz's view, which associated pictures more closely with the perceptual experience of the epistemic agent, Sellars considers picturing first and

[19] For the relationship between Hertz and Wittgenstein on pictures, see Grasshoff (1998), Barker (1979), Baker (1988), Kjaergaard (2002), and Hyder (2002, Ch. 6).

foremost as a (very complex) relation between perceptual and conceptual states of subjects, on the one hand, and scientific reality, on the other. For Sellars *qua* Neo-Kantian, this use of the notion of picturing overcomes what he takes to be Kant's inability to give sensation its proper explanatory significance (SM II § 39n). The role of picturing, here, is to explain how representation works in the manifest image (MI), from the perspective of the scientific image (SI). It is in this way that we gain a more adequate philosophical understanding of how sense impressions picture physical objects and events (SM I, §65). As O'Shea puts it,

> the sensory states or 'sense impressions' of the perceiver must be reconceived (and will be, in a future, more adequate SI-neurophysiological theory) to have corresponding intrinsic qualities and geometrical relationships that are analogous to and systematically represent the qualities and relations that we conceive (within MI) as their standard physical causes. (O'Shea 2018, 81; cf. 87)

Thus in MEV, Sellars emphasizes the continuity, regarding picturing relations, between our neural 'representational systems' and those of other animals.

However, Sellars also develops the concept of picturing the sense of (ii) mentioned above, geared towards the language-based epistemic activity that is in full force in our scientific theorizing. According to Sellars's discussion of the epistemological significance of picturing in *Science and Metaphysics*, Picturing is a 'real' relation, but a relation one of the relata of which is a 'conventional' representational structure, which Sellars calls 'basic singular statements': "pictures, like maps, can be more or less adequate. This adequacy concerns the 'method of projection'" (SM V, § 56),

which Sellars equates with the notion of "a conceptual framework" (ibid.). The notion of pictorial adequacy raises difficult questions which I cannot address here, about what perspective allows us to evaluate and compare different candidate pictures for adequacy – a question which is important for issues of theory choice, but also for the explanatory relevance of picturing as a concept of correctness.[20]

For Wittgenstein, good or accurate pictures succeed in representing in that their logical form matches the logical form of the facts: "[w]hat every picture, of whatever form, must have in common with reality in order to be able to represent it at all – rightly or falsely – is logical form, that is, the form of reality" (Wittgenstein 1961, 2.18). For Sellars, however, even though the basic semantic units of pictures are ultimately "atomic statements", picturing is not "an isomorphism in the logical order", but "an isomorphism in the real order" (BBK §§31-32). In the way atomic statements combine, Sellars distinguishes between logical complexity and pictorial complexity (SM V, §15). In *Naturalism and Ontology*, he makes clear that pictorial complexity is due to relations existing in the "natural order":

> the linguistic objects in question must belong to the natural order. And this means that we must be considering them in terms of empirical properties and matter-of-factual relations, though these may, indeed must, be very complex, involving all kinds of constant conjunctions or uniformities pertaining to the language user and his environment. (NAO, Ch. 5 §85/ p. 115)

[20] See Rosenberg (2007b) and deVries (2019) for the 'increasing approximation to truth' that Sellars ascribes to picturing.

Sellars goes on to sketch the view that both Tractarian logical correspondence between linguistic facts and non-linguistic facts, on the one hand, and the way maps spatially picture spatial facts, on the other, are special cases of a more general notion of picturing, which Sellars presents as the "schema" that

> [natural-linguistic objects] O1N, O2N,...,OnN make up a picture of [objects] O1,
>
> O2,...,On by virtue of such and such facts about O1N, O2N,...,OnN (NAO, Ch. 5 §92).

As I understand Sellars, this generalized notion of pictorial correctness still bottoms out in the "manner" or respect in which a given conceptual framework gives rules of projection: "the manner in which the names occur in the picture is a projection, in accordance with a fantastically complex system of rules of projection, of the manner in which the objects occur in the world" (NAO, Ch 5, §93). The notable feature of this view of picturing is that it makes the difference between linguistic, conventional representational formats, and map-like representational formats, a difference in degree rather than in kind. From this perspective, whether our scientific theories picture their objects in terms of impressions linked to intuitive spatial structures, or with conventional symbols, appears much less decisive for the realist purport of pictures as it was in the debates discussed above.

While Sellars does not explicitly connect his reading of Kant to picturing in this way, it seems that he regards things in themselves as theoretical entities which, like sense impressions, bear counterpart relations to perceptible qualities and relations, relations which may only be fully understood from the perspective of future science.

What accounts for the representationality of these noumenal pictures? According to one of Sellars's Kantian suggestions, it is "new ways of schematizing categories":

> the use of analogy in theoretical science, unlike that in theology, 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. (SM II, §49)

According to Johannes Haag, "Unlike Kant, Sellars believes that we *can determinately think* of (though not intuit) alternative ways of intuiting the objects of our experience. What we need is the input of receptivity together with a method of analogical concept formation that gives this input a new conceptual form" (Haag 2017, 163). I think this is compelling as an interpretation of the 'new schematization' suggestion.

The connection between Sellars's reference to 'new schematizations' and the epistemologies of Riehl and Schlick becomes clearer when we consider that the schematism of the categories, for Kant, provides rules for structuring and ordering time (one of the forms of intuition) so as to make the form of appearances 'homogeneous' with the pure concepts of the understanding (A137-47/B176-87). In the above 'new schematization' passage, I read Sellars as proposing that the new determinate concepts introduced by science are new empirical concepts, and that they suggest new ways of schematizing or mapping the pure categories (including cause and substance, which Sellars would attribute to the manifest image) to our forms of intuition.

1. Conclusion

Many commentators agree that Sellars' account of picturing is a key part of his scientific realism, as well as being somewhat in tension with his commitment to a broadly Kantian theory of knowledge. In this chapter I have offered a historical perspective which, I hope, permits a more nuanced understanding of how these aspects of Sellars's thought are interrelated.

While it is clear for Sellars that consideration of the relationship between neurological states of the knower and the world underwrites realism about cognitive pictures, Helmholtz's attention to the physiological basis of perception was linked to his anti-realist conception of pictures. The story I have roughly sketched shows how this barrier to a realistic conception of pictures was gradually overcome. Hertz prefigured the well-known Wittgensteinian and Sellarsian 'isomorphic' conception of picturing relations by recognizing that pictures need only partially resemble their objects, a development which in Hertz is linked to the notion of a picture as a scientific theory. Several theories can be pictures, and they can be compared for the degree to which they picture relations in the object. Riehl similarly challenges Helmholtz's anti-realist take on perceptual pictures, bringing in evolutionary considerations that support sensations accurately conveying real relations in the environment. As it would also do for Sellars, a 'transcendental realist' or 'structural realist' approach to the Kantian thing in itself encouraged Riehl and Schlick to maintain scientific realism in the face of the diminished importance of intuitive spatial relations in mathematics and physics.

Schlick's contribution was to affirm that the symbolic (non-resembling) nature of conceptual judgments is entirely compatible with their having a realist referential function. However, Sellarsian picturing differs from Schlick's theory of knowledge inasmuch as for Sellars, the *explanation* for the referentiality of referring expressions cannot ultimately be conventional (NAO, Ch 5, §89).

According to this selective genealogy of picture theories, and accompanying perspective on Sellarsian picturing, Sellars's distinctive conception of picturing may be viewed as an iteration of the Neo-Kantian project of conceiving new ways of linking the structure of perception and the structure of scientific theories, as part of a wider commitment to bringing broadly Kantian epistemological insights to bear on post-Kantian scientific developments.

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