

Field Nocturne 33

Seeing Neuroscience chapters 9,10.

We move on to some elementary puttering with the basic text, **Neuroscience**, or some equivalent of it that you happen to have. In Neuroscience we have two chapters, chapter 9, "The Eye" (pp. 281 - 312) and chapter 10, "The Central Visual System" (pp.313 - 348), so 68 pages in all. A couple of hours reading? Or is it not rather a couple of months thinking, or even a millennium's inheritance to ingest, a billion years of glimpsing glimpsing to anticipate? But that is the heavy question meriting doctrinal musings as we move through this short essay.

We move towards some first musings by pausing over the enterprise of studying **seeing** that is faced either in highschool or in an undergraduate programme. We pause, with some odd seriousness, over the listed contents of the two chapter (chapter 9: page 280; chapter 10: page 313) and, as well, over the first three pages of chapter 9, which are one page (281) of Introduction and 2 pages (282-3) on "Properties of Light". As I said, you may have the equivalent of these pages, but a photocopy of the actual pages would help you **whathere**: make do as best you can.

So, I arrive at my first doctrinal distraction. It focuses on the "we move we pause" of the last paragraph. In the brutal reality of present patterns of study, we scarcely move or pause. My invitation, then, goes out to the heroic in an ethic and an ethos that invites you **whathere** to at least pause long enough to notice that, without serious pausing, we are just skimming along.

This, as I have noted here and there in the journey round **study**, has become an increasingly luminous element in my mapping of the journey. The culture invites you not to take the mapping seriously. The teacher of **Neuroscience** invites you to skim along: "read chapters 9 and 10 before Monday".

The cute way of slowing down your reading would be to spread out chapters 9 and 10 so that they each become, say, one thousand pages: that, indeed, is the function

of problems and exercises that make you go back to a text, especially in that simplest of sciences, physics. But now we may pause over that page and half (**Neuroscience**, 282-3) on “Properties of Light”. If you have already done some serious physics then you recognize the words as pointers to your hard-won understanding of light. If you have not done the serious physics, then you are skimming through namings, namings that will pass away during the day. Its like naming animals: but you keep meeting the animals so the names stick.¹ What sticks from reading the stuff in **Neuroscience** about light? What you already have from common sense chat: as the footnote says, you wander in the woods of daily living and name colours. “Teaching physics without the students knowing the relevant mathematics is not teaching physics. If they know the mathematics, there is nothing difficult about the physics. If they do not know the mathematics, then what they are learning is not physics.”² Perhaps what is learn is names - which could be the beginning of science, of understanding.

So much, then, for that piece of the book. Might we not reach a similar conclusion about the rest of chapters 9 and 10? Hold that question in your pause!

Were I to move into the treatment of vision as I had originally intended I would have spent some space on the Introductory page, quite elaborately marked by me. But at this stage in our musings you should be able to take that page in and up and round your psychic space: round up, for instance, what is meant and what should be meant by the concluding words of that page: “visual information ascends to the cerebral context, where it is interpreted and remembered.”³

And were I to move into the treatment of vision as I had originally intended I

¹“We arrive at Aristotle’s categories most simply by going into the woods, meeting animals, and asking, What kind of an animal is this? How big is it? What is its color? What relations does it have? And so on descriptive knowledge entirely different from science.” (Lonergan, *Understanding and Being*, 199).

²Lonergan, *Topics in Education*, 145.

³**Neuroscience**, 281.

would not just halt at the first short paragraph of the treatment, coming after the sketch of “Properties of Light”. The Heading of the new section is a capital blue:

THE STRUCTURE OF THE EYE, and there follows the paragraph of interest:

“The eye is an organ specialized for the detection, localization, and analysis of light. Here we introduce the structure of this remarkable organ in terms of its gross anatomy, ophthalmoscopic appearance, and cross-sectional anatomy.”⁴

Does it not, at least in the second sentence, sound like being on our **study** track, of the preliminary effort of “dissection or anatomy”? So off we go: or ...? Off we go seems good: the stuff that follows in the two chapters is pretty accurate, seems to be a decent sorting out of the data, and a lead towards some sort of shift to physiology.

Yet I am not going there, but rather I go back to the first four words of our paragraph **study**. “Study of the organism”, taking us to a fresh, flesh, focus on the two key variables involved: you and the organism. The shift our focus is related to a parallel shift of focus, oddly enough, in my recent change of focus in the presentation of Lonergan’s economic theory. For decades I continued to handle the entire mess: you can see the handling in the different articles and books since the mid-1970s. But now I am quite clear on the need to focus simply on the problem of the two variables involved in any part of the analysis: sort that out at the beginning, and the rest follows, very very slowly, but relentlessly. The problem in present economic non-theory is that it misses out on the starting point, the two variable flows. When the economic community comes to grip with that, there emerges a need for a fresh viewing and a fresh ordering of all the data.

Here, in the study of the organism, plant, animal or human, we have the two variables, the human student and the organism, or in the present corner of our effort the organ. We pause first with “this remarkable organ,” an organ within an organism, animal or human. Let us not lose sight - what a curious phrase! - of the organ in the

⁴**Neuroscience**, 283.

organism. Let us, then, not lose the context, “the actual set of answers and questions”. We start, either spontaneously or with a serious thematic, with an answer: the organism “is an intelligible solution to a problem of living in a given environment.”⁵ There are “the immemorial convictions of common sense”⁶ backing us up, but we need to hold to them in a way that lifts us to a relevant understanding. That holding is a centrally a stewing over the meaning we have, or should reach, of the word “solution”. What do you mean by a *solution*? Are you at home, by now, in a difficult and strange meaning of that word? After all you, are more than half-way through the book *Insight*. Unless, of course, the culture gripped you firmly and you read so far like you would....

Neuroscience? The book is a series of named solutions, and the primary name is yours. You however, are a source of solutions and so able to ask what are these solutions. The question puts you in odd ballpark of self-discovery. But are we not on familiar ground here?

What sort of a solution is an animal? It is - pardon the pun - a chemical solution. It is a chemical solution to the problem of “self”-preservation. It is a balanced achievement of negentropic activity, like water managing to do a Moses stunt: leaving a non-water space down the middle of the bath. Quite a trick. But there is nothing supernatural about the goings-on of the animal, or the plant. Either is a solution reached and maintained by the collaboration of a massively large population of chemical (and physical) reactions. The environment in which the reactions occur is one of light and heat, one in which all creatures grunt and smell. The problem of having or being the right physico-chemical solution is a problem of the presence of the right network of patterns of chemical and physical reactions. I am not going to complexify this or the image you have: the network, to be effective, has to be strangely loose and varied: not a

⁵*Insight*, 265[290].

⁶*Insight*, 441[467].

hierarchy of reactions but what is called a heterarchy.⁷ But let us simply think now of an interlocked set of reactions to environmental nudgings of air and light and heat and bigger “bumpings into”. The bumpings, whether electrons or elephants, are from all about in the environment, whereas the organism is a local, a space-time-compact, response-structure. So the response structure, if it is to work, has to somehow microsize the environmental spread but still hold a sufficient isomorph of the macro-patterns in its micro-structuring to macro-respond. Quite a tricky business of invention: think of, or at least vaguely imagine, the technological subtlety of robo-soccer. The technology has to coordinate loose aggregates of a spread of different inputs.

Inputs of differing characteristics are best coordinated from the surface inwards, so patterned surface variations are a way to go. Am I talking here about robots playing soccer, or rabbits running from dogs? Keep the two in tandem as best you can. So, you need e.g. a sound-response system and a light-response system, conveniently located: bilateral is good, but quadrilateral is a possibility. Furthermore, the response system cannot just be surface, since the effective response must be somehow integral: the robot or the organism need to perform integrally.. Surface reception has to be, to some convenient extent, centralized.

How are you doing so far with this? Nothing magical is suggested. There may be problems in the physics of the activities that add in oddities of non-locality, but there goes on here are very local. The bumping ball is reacted to, so to speak, on the spot: robo-player does not reach out to ball or striker. So, with the organism, reaction and action are mainly central twist, with convenient peripheral short-circuitings.

If you are with me, then you are in fact shaking off magical thinking, but it is a very slow job. Bring back in the word “seeing”. Have you shaken off its magic? I doubt

⁷Contemporary neurodynamics considers the brain as a modular distributed system, a complex non-linear hierarchy for which W.S.McCulloch invented the name *heterarchy* in “A heterarchy of values determined by the topology of nervous nets”, *Bulletin of Mathematics and Biophysics*,(1945) 7, 89-93. More on this in the later essays of *Field Nocturnes*.

it very much: unless you are taking a month to get from sentence to sentence here. Did I manage in the past couple of paragraphs to lead you away from the names, “seeing, hearing, touching, smelling, tasting”?⁸

⁸*Method in Theology*, 6.