

# ***Compte-rendu of Bas van Frassen's, Scientific Representation Paradoxes of Perspective 2008***

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“(…) The main lesson of twentieth-century philosophy of science may well be this: no concept which is essentially language-dependent has any philosophically importance at all (…)”

van Frassen, *The Scientific Image*, 1980, p. 56

“ (….) Un troisième trait des représentations les rattache à l'évidence. *Les représentations sont iconiques.* (...) G.N. Gilbert et M. Mulkay, selon lesquelles les représentations scientifiques seraient des hallucinations conceptuelles opératoires (*working conceptual hallucinations*) (...). Enfin les représentations ont une portée référentielle et souvent auto-référentielle. (...) Les représentations constituent donc un *dispositif d'identification au sens fort*; elles sont virtuellement *géométrisables*, en elles *le sens se trouve inscrit dans le signe* (elles ont une vocation d'évidence) elles sont *combinables* avec d'autres représentations, elles sont *référentielles par essence* (...)”

F. Gil, *De l'Épistémologie à la Philosophie par le Laboratoire*, 1998, pp.181f

## **Resumo**

*Scientific Representations* é uma obra estimulante, robustamente argumentada que culmina, por assim dizer, anos de filosofia da ciência do seu autor, um eminente e “sophisticated empiricist”. van Frassen continua a defender um empirismo radical de estruturas, o estruturalismo dos objectos e conceitos científicos e vai neste trabalho aprofundar a noção de “imagem científica” como instância alucinatória pública. Porque Fernando Gil, como é bem conhecido, levantou a hipótese da existência de um operador alucinatório no “trabalho da evidência” e porque revisitou os mesmos autores que van Frassen (Mach, Weil, Wittgenstein, etc.) pareceu-me bem, nesta nota de leitura, comparar (sem ser exaustivo, naturalmente) as duas obras principais de ambos sobre epistemologia e sobre representação do “objecto” em ciência. Além de aspectos da questão da

medida, o *homúnculo* e a *fibra*, a febre e a temperatura (entre outros *quasi-objects*, imagens ou representações que van Frassen trata com profusa e selectiva documentação histórica), serão aqui focados a pensar mais nas bases categoriais da biomedicina (dada a minha formação) que da física.

## 1. Motivation and disclaimer of authority

Van Frassen's *Scientific Representation: Paradoxes of Perspective* (2008) is a very comprehensive and challenging book, by its scope, argument, and novelty. He still addresses a picture theory of science but asserts from the very beginning that the wording mental representation is an oxymoron. This seminal position seems to agree with, and expand, a Gibsonian proposition: "(...) the term representation is misleading. There is no such thing as a literal representation of an earlier optical array. The scene cannot be established; the array cannot be reconstituted. Some of its invariants can be preserved, but that is all. Even a photograph, a color photograph at its technical best, cannot preserve all the information at a point of observation in a natural environment, for that information is unlimited. (...) A picture is not an imitation of past seeing. It is not a substitute for going back and looking again. What it records, registers, or consolidates is information, not sense data."<sup>1</sup> – and is full of direct intended implications and after-effects. The book has 4 parts: (I) Representation (important points: maps, models, representations, propositional attitudes and the indexical); (II) Windows, Engines and Measurement (main points: the problem of co-ordination; measurement as representation); (III) Structure and Perspective (defence of empiricist structuralism); (IV) Appearance and Reality (rejection of the "appearance from reality criterion") and several small Appendices (the 4<sup>th</sup> being a short reflexion on his path breaking early book, *The Scientific Image*).

Van Frassen does not address, as could be expected, the subjective conditions of human knowledge, namely embodiment, the phenomenological incorporation as a precondition to pre-intentional, pre-predicative and... noematic process (as so many authors have insisted upon, not only at the level of consciousness and the specious present, but also at the level of the many unconscious processes of representation going on, and seemingly able to be tied to propositional representations: the intentional states have as their intent a representation of their conditions of satisfaction, so the cognitivists' asset stands<sup>2</sup>. Arguing, cuttingly, that "rainbows" are not objects, events or processes but images, van Frassen's stance draws the line

1. J.J. Gibson, *The Ecological Approach to Visual Perception*, 1979, pp. 279,280.

2. Marques, 1985/1990, *Modularity, Mind and Brain Theory, An Essay on Fodor's Theory of Mind*, in F Gil (Ed.), *Controvérsias Científicas e Filosóficas*, pp. 159-187.

between observables and non observables<sup>3</sup>.

This reading derives from the pressures of a few “foreclosed” or forgotten clinical problems around the matters of objectivity, sense, intension and intention in the practice, science and philosophy of medicine and from the teachings of the late Professor Fernando Gil (I believe that his theories of evidence, proof, conviction and belief are also very important to medical knowledge’s foundations, both clinical and investigational<sup>4</sup>) and developed through the lessons and works of Sir Geoffrey Lloyd, Richard Zaner, Ian Hacking, Frederick Grinnell, Daniel Rothbart and others on the objects, “quasi-objects” and subjectivity in biomedical research and in clinical practice<sup>5</sup>. The strategic move is to focus on science as it is done, that is, in the material culture of the modern medical research (well beyond Big Pharma) and in the epistemic attitude of the physician with his new tools and artefacts (four centuries after the invention of the thermometer, the microscope, etc.)<sup>6</sup>. So, one main question is about the object, the specimen, the process of validating data, as raised by F. Gil: “As far the foundations are concerned what do we make of lab’s material practice?”<sup>7</sup> and he concludes that the bench practice expresses foundational epistemological choices (“des activités de fondation, déjà à l’oeuvre dans la fixation du fait scientifique”) because the trail projected by the scientist “ne se trouve codifié en aucun manuel d’instructions, il consiste dans ce qu’il faut faire pour satisfaire l’esprit chaque fois qu’il est question d’identifier et de

3. van Frassen, *Scientific Representation*, 2008/2010, pp. 105ff.

4. I am also indebted to D. Mayo’s *Errors and the Growth of Experimental Knowledge*, 1966, to the seminal lessons by Richard Zaner on phenomenology and ethics in medicine, to Rita Charon’s work on clinical narratology, *Narrative Medicine. Honoring the Stories of Illness* (2006) and to Prof. Isabel Fernandes from CEAUL, Lisbon, for the challenges to think the clinical *experience* over... Only an occasional reference will be made here to others books by Bas van Frassen, however articulated with the present argument, namely to his pathbreaking *The Scientific Image*, 1980.

5. Medical science has the difficult mission to conciliate them, as the unity of science demands (but for arguments against see H-G Gadamer, *The Enigma of Health*, 1966 and J. Dupré, *Human Nature and the Limits of Science*, 2001)! And this brings one back to the bedside experience and decision-making: how to renounce the ambition of “holistic” thinking always oscillating between the fusional and cannibalistic (the two extreme narcissistic temptations of the *libido curandi*)?

6. Present trends in clinical research: subgroup analysis “non-inferiority trials” and equivalence trials; extended “trials”; “masquerade trials” (Lagakos, *NEJM*, 2006, 354,16, 1667); end of equipoise (Miller, Brody, *Hastings C. Rep.*, 2003,33,3); bad deal research and lottery options; suppression of classical phases and rules of research; new paradigm of anti-cancer drugs target validation (Benson et al: *Nature*, 2006, 441, 451); worse interest conflicts (& undisclosed payments...); secrecy and anti-scientific contractual norms; exploitation of genomic (and proteomic) data (bio-banks); geographic de-localization and exploitation of developing peoples... and violation of human rights; patients associations; generic ill- or non-tested drugs...; public scrutiny of all current (and previous) RCTs (web); interim analysis; repeated informed consent; reevaluating trust and professionalism in the clinical encounter (Miller, Brody, *Hastings C. Rep.*, 2003, 33,3).

7. F. Gil, 1998, pp. 174, 183f (*De l’Épistémologie à la Philosophie par le Laboratoire*, in- R. Gesnerie, F. Hartog (Eds.) *Des Sciences et des Techniques: un Débat*: pp. 173-184).



reconnaître : il est dans cette mesure **même légitime de parler d'activité de fondation**"<sup>8</sup>. So, referring Kant, Gil, Rothbart, Grinnel and others are in agreement that the lab practice may produce stable and artefactual (and/or inartefactual, F. Gil) kinds of specimens and that the scientific tools may attain a transcendental status as nomological machines, in Cartwright's apt terms. I would like – if possible – to relate this surprising "*spermatik logos*" to the challenges of categorical thinking about scientific theories and representations "within a naturalism revised by the transcendental thinking" and to interrogate the status of scientific representations<sup>9</sup> bearing in mind Peirce's firstness, secondness and thirdness.

Following Zaner, Ricoeur, Bruner and others, Professor Rita Charon, the medical internist and literary scholar from Columbia University, defended the dominance of narrativity over physicality in (her) clinical practice and medical theory<sup>10</sup>. However urgent the call, I will go neither into the hermeneutical queries nor into personal narratives (the clinical encounter is today, after all, also a scientific *locus*) in terms of concretions like (i) the place of the *individuals* and the discourse of subjectivity, (ii) first person authority or (the opposite) anonymity, (iii) meanings or (methodological) absence of them, (iv) nouns and pronouns, temporal wholes, indexicals and quantifiers, clearly still important and foundational items in the agenda of any theory of biomedical sciences, and in the human and social sciences in general<sup>11</sup>.

## 2. The Archimedian lever

Not accidentally both van Frassen and Gil (otherwise with different metaphysical "filiations", van Frassen's empiricism being more "instrumentalist" and Gil's rationalist inspiration being Husserlian and Thomian in spirit) draw a lot on Ernst Mach, Hermann Weil and Nelson Goodman, to mention just three main influences. So, appropriately, van Frassen (2008/2010) chapter 2 "modes of representation" and Gil (1984) chap-

8. F. Gil, *Ibidem*, p. 184

9. F. Gil, *Mimesis e Negação*, 1984, pp. 45 and 95.

10. Charon, *Narrative Medicine*, 2006, p. 48; Marques, 2011 "*Herba non Verba*. Probing the Foundations of Medicine" *Rev.Port.Psicanálise*, 31,1, p. 93-117. A note about clinical meaning (cp clinical versus statistical significance): the diagnosis of a disease - except in most straightforward cases - is almost always an exercise on comparative *interpretations* of the deployment of complains, symptoms and laboratorial data (including images) over time and its projection on a nosographic conventional map of organismic functions and pathologies (Marques, 2012, *Meanings in Medicine*, to be submitted).

11. Compare the Hippocratic criterion: "(...) there is no measure, neither number nor weight, by reference to which knowledge can be made exact, can be found except bodily feeling (...)" Hippocrates, *Ancient Medicine*, IX (transl. Sir Geoffrey Lloyd)



ters 1 (Representar) and 2 (Categorizar) address the same questions about “grounds” and appearances, etc.); both take a scientific representation X – an image, chart, map, graph, document, etc. – as a description that makes visible and fixates the fact, and, collectively plotted, permits the capture of the structure of the “data”, abducted afterwards by operations of transcendental lineage<sup>12</sup>. Transcendental because “there will be, even in the most theoretical sciences an ‘ineliminable residue of the annihilation of the ego’ to provide the conditions for relating the theoretical models to specific empirical situations”, again both in agreement with Weil’s “pragmatics”<sup>13</sup>.

Fernando Gil: “(...) The internal properties – namely the ‘similarity’ between the representation and the represented – are not likely to demarcate the instance of the representation. (...) A distinction should be made between the capacity of representation and the legitimacy to represent (...). The representation is only apprehended from its interior, and translates, at least ideally, into an isomorphism between its components (denotational symbols and compositional rules) and the represented elements (the ‘data’, the ‘facts’) (...)”<sup>14</sup>; finally, a representative system is assumed to be “any system in which a lexicon, a syntax and rules of semantic application are established, by whose means a material order will be changed in an order of signs.”<sup>15</sup>. And, in an analysis of *Tractatus* he goes on to say about the “picturability”: “(...) It is on the representativity of the proposition that all representative systems are established, as well as the metalanguages in which they are defined (...)”, inverting Goodman’s program: what matters is to discern the unconditional and primitive representative ground.<sup>16</sup> It looks like that with few qualifications, van Frassen would accept these premises, given, *a fortiori* that he also stresses that the intensionality of a measurement outcome (meaning function) consists in that it has meaning, that it is indexical<sup>17</sup>. A central question is about the isomorphism’s reference or referential: is it a *de dicto* or *de re* process? Essentialists like

12. F. Gil, 1998, p. 180

13. Quoted by Van Frassen, 2008/2010, p. 87 (also p. 71).

14. F. Gil, 1984, p. 47 (this and the next translations are of mine responsibility with thanks to the help of Dra. Raquel Barroso). Compare van Frassen (op cit, p. 238): “Essential to an *empirical structuralism* is the following core construal of the slogan that *all we know is structure*: (I) Science represents the empirical phenomena as embeddable in certain *abstract structures* (theoretical models); (II) Those abstract structures are describable only up to structural isomorphism”.

15. F. Gil, 1984, pp. 46,47: “The originary possibility of building representative systems *ad libitum*, seems to inhibit any general interrogation about the representation. The bottom line is that the use of denotative symbols in the frame of a representative system as indicated (syntax, semantic, lexicon) would result from a decision; and the representativity would turn out conventional or merely nominal (...). More radically the relation of representation is, in two of its ‘modalities’, absolutely primitive.”

16. Ibidem, p. 51.

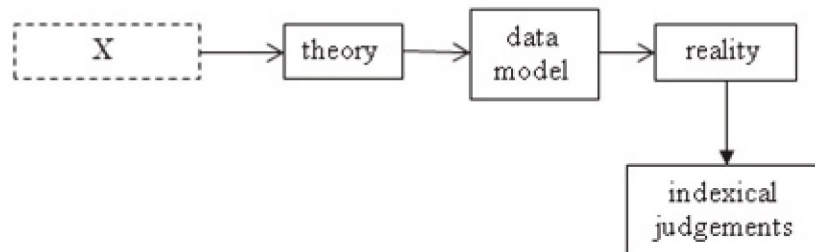
17. Van Frassen, 2008/2010, pp. 181, 235, 257.

Brian Ellis, and, in general, medical practitioners and researchers tend to privilege the latter<sup>18</sup>. If the “(...) structuralism in ‘empiricist structuralism’ refers solely to the thesis that all scientific representation is at the heart mathematical. Empiricist structuralism is a view not of what nature is like, but of what science is. (...)”<sup>19</sup> – but, don’t we then lose all our grip on the real stuff, on the physical things: how do we manage to design and build a house or to diagnose and cure a tuberculosis?

I want to stress, with F.Gil, that the good hallucination (the good evidence) blossoms spontaneously from a “(...) structure non signifiante – l’opérateur-X – est une forme vide et une force nue – ne l’affuble pas d’un coefficient d’illusion, au contraire elle est la condition de son opérativité (...)”<sup>20</sup>. And, keeping in mind Bacon’s *vexatio* of nature and the cutting of nature through its joints (as in Bichat’s program: “C’est la nature, non la science qui a tracé une ligne de démarcation entre les tissus”<sup>21</sup>), my aim here is to relate/cross van Frassen’s ideas on *Scientific Representation* with F. Gil’s works on the same subject, namely *Mimesis e Negação* and his later books on belief, evidence and proof. Let us schematize: X, an act of (scientific) representation implies/includes several conditions of possibility:<sup>22</sup>

### The condition of possibility of the use of a representation

adapted from van Frassen, 2008/2010, p. 257



18. See, for the *de dicto* structural isomorphism, Van Frassen, 2008/2010, pp. 317, 386n8 (*contra* Brian Ellis, *The Philosophy of Nature*, 2002).

19. *ibidem*, p. 239

20. F. Gil, *Traité de l'Évidence/ Tratado da Evidência*, 2003/2005, # 145

21. Dagognet, *Le Catalogue de la Vie*, 1970/2004, p. 205; see the discussion in van Frassen (2008/2010, pp. 244ff), *contra* Lewis's natural classes or kinds as criteria of the *privileged* representations, the ones that carved nature at his joints... because all we know is structure (see also ahead; and Van Frassen, p. 231f)!

22. To be evaluated in the end of the paper.

Gil's approach and some of his main tenets seem to converge with those of van Frassen: "(...) In which sense does the scientific thought remain a description if it resembles the artifactual, which it does indubitably – for as much as it may be a burden to the operationalist idealisms or to the velleities of 'deconstruction' – it is nothing but the autocriticism of science (...). Now, both scientific construction and neutrality are necessary conditions of objectivity – thus reencountering the aporia of representation (...)"<sup>23</sup>, "(...) However, in the facts, only rarely are objects well constructed and the subject is at no time entirely normalized. For that reason, the question regarding the possible choice of solutions will only be clear occasionally and the problems of the meaning – in principle ill posed – are never capable of being completely repressed. Those are the profound causes of controversies (...)." <sup>24</sup>

### 3. Good hallucination, good evidence

Claiming that the microscopic images are simply *not* (just) a window to micro-worlds, but a tool for the creation of new optical phenomena, even new "creatures", like the *homunculi* or the fibres (two important proto-scientific hallucinated "things")<sup>25</sup> and telling us (as mentioned), perhaps surprisingly, that rainbows are *not* objects, events or processes, but images, van Frassen's structural-empiricist position draws a fine line between observables and non observables: "seeing an image is a code for a classification of experiences that refers both to the spontaneous judgement on the experiencer's part, and to what is really happening to that person".<sup>26</sup> How did van Frassen's concept of scientific representations born from *public* hallucinations get its hold?

Take the cell (and its ultrastructure) or the fibre one hundred years before<sup>27</sup>: they are (were) collectively hallucinated as things, as something

23. F Gil, 1984, p. 349.

24. Ibidem, p.359. Some confluence with the human sciences must be pointed out: "(...) processus sémiotiques comme la métonymie, l'indexicalité, et la littéralité – trois façons de refuser la métaphore et la représentation (la métaphore comme essence de la représentation) de privilégier la pragmatique sur la sémantique, et d'avantager la coordination sur la subordination. (...) and towards "(...) Une ontologie plate (...) ou le réel surgit comme une multiplicité dynamique immanente (auquel) vient correspondre une épistémologie 'symétrique' (...)" V. de Castro, *Métaphysiques Cannibales, Lignes d'Anthropologie post-structurelle*, 2009, pp. 73f.

Ibidem, p.359.

25. Van Frassen, 2008/2010, pp. 105,109. Again, I will not address here van Frassen prejudicial decision of taking mental representation as an oxymoron .

26. Ibidem , pp. 107,110.

27. Marques, 2010: *A febre, a fibra e o espasmo* (in AAVV. Arte Médica e Imagem do Corpo. De Hipócrates ao final do Séc. XVIII. BNP, Lisboa, 2010, pp. 137-157). Cp. Boerhaave: "the simplest



tangible (through microscopes with better optics and lesser chromatic aberrations, and so on) – they are typically very small things<sup>28</sup>. Without incurring in the Quine’s indeterminacy but accepting his underdetermination, van Frassen shows that every *bona fide* scientific representation is opaque, having its subject term, a relational predicate and a term for the second *relatum*; indeed, any (scientific) representation is not only contentual and contextual, relational and intensional, but overdetermined by its use, as well as definitionally inexhaustible.<sup>29</sup>

Are pregnant analogy, good form, mimesis, copy, powerful enough for deductive, inductive, abductive architectonic maps, pictures, images or *Gestalts*? Don’t we need first and foremost the negation, subtractive or differentiation (*différance*) operator?<sup>30</sup> Or a cut, an occlusive determination: “pictures are unlike other sorts of representations precisely because there is a way in which they do literally ‘look like’ what they depict” (quoting Dominic Lopes); “the selection of one aspect may *force* the picture not to include certain others” and this is the first kind of *occlusion*.<sup>31</sup>

Where should one draw the line to separate microscopic realities from artefacts, observables from non-observables? I would dare to say that at a certain level of discourse the representation provides its own foundational (implicit) criteria, pre-text or sub-narrative, like Wittgenstein’s old Paris (now in Sèvres) standard metre bar<sup>32</sup>. The radical extension of van Frassen’s own propositions in *The Scientific Image* are presented summarily

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diseases can be reduced to the simplest fibers”; Malebranche : “*Cette délicatesse des fibres se rencontre ordinairement dans les femmes, et c’est ce que leur donne cette grande intelligence, pour tous ce qui frappe les sens. (...)*”; La Mettrie: “each small fiber or piece of the organized body moves according to a self-determined principle”; Haller: “fibre in Physiology equals line in Mathematics” - these three propositions refer primarily to organic or somatic diseases; Esquirol: “*l’esprit comme le cerveau est, qu’on ne passe cette expression, dans un état tétanique, une forte comotion physique ou morale peut seule faire cesser ce spasme*”; Lorry: *spasmo spasmus solvitur* – these two last propositions referring to mental alienation.

28. Van Frassen, 2008/2010, p. 105.

29. Van Frassen, 2008/2010, p. 26f. The “hallucination” or image of a real thing, like a tree reflected in a lake, is (and has) a local invariant (the tree), as opposed to a desert mirage or a rainbow: no two person, in different places see exactly the same coloured arch (idem, p. 105). And typically, incorporating the fine and minute sensibility of Dutch Renaissance artists, van Frassen affirms that for not-copy qualified images (not susceptible to be exactly re-produced), the situation must hold for van Leeuwenhoek with his lenses, as for Newton: “(...) essentially the very same sort of thing as Newton did with his prisms – namely, imitate the ability of nature to create public hallucinations (...)”; however, about a cell, a van Leeuwenhoek’s *homunculi*, a “fibrin” image or fibre model, or any other ‘copy’-qualified image, we can still ask: “is it really of something real or is it not? That is always a question of fact transcending the experience itself.” (ibidem, pp. 105ff; also *The Scientific Image*, 1980, p. 214).

30. F. Gil, 1984, p.154.

31. Van Frassen, op.cit., 36ff

32. Wittgenstein, Phil. Inv. § 50: “There is one thing of which one can say neither that it is one metre long nor that it is not one metre long, and that is the standard metre in Paris”.

in the next table, a hyperrealism or surrealism and “preter-naturalization” that goes much beyond to what a sophisticated realist and internalist like Fernando Gil would be glad to accept: I dare advance this opinion supported also (I believe) by Gil’s very original parallel studies on Aesthetics of musical composition, photography and other visual Arts and on the narratives of the Discoveries and the history of geographical maps (see, in the following sketch, an exhibition of van Frassen’s new typology)<sup>33</sup>:

Image categories			
modif. from Bas van Frassen, <i>Scientific Representations</i> , 2008, p. 104			
Private images	Public hallucinations		Graven Images
After-image	<b>“Copy-qualified”</b>	<b>Not “copy-qualified”</b>	Painting
Dream	Reflection	Rainbow	Photo
Hallucination	Shadow Microscopic image <Fibre?, Tissue, Cell?> <Standard Meter bar ?>	Mirage  <i>Fata Morgana</i>  Fibre (= Glisson’s <i>robur ínsita</i> ) ?	Sculpture  <X-Rays, CT-can, NMR images ?>

What was F. Gil’s telling us when he claimed that one of the operators of evidence (self-evidence, here) is hallucinatory (adopting some of W. R. Bion’s proposals)?<sup>34</sup> How can the hallucination behave as an anchor of... objectivity: “The hallucination fulfils, therefore, the negative conditions of an operator – it amounts to making form with no signification of its own, [a signification] able to order meaning and transform it into reality.(...)”<sup>35</sup>. Again, notice that for F. Gil, the (private) hallucination is not a representation, it is an acting-in, it is numenal<sup>36</sup>.

What, then, can be observational, objective, testimonial (and “*clinical*”), in the process of evidence?<sup>37</sup> For evidence *in general* is a concretion, resting itself on the system perception-language as Fernando Gil suggested. Evidence must not be confused with intuition (and even less with belief, conviction and proof, whose *force* may be justified). Phenomena as

33. “Objects” marked by <—> are of mine composition: <X-Rays, CT-can, NMR images ?> could also belong to the class “copy-qualified” of course (as Filomena Molder, remarked; I prefer here to underline their industrial and reproductive post-photographic nature).

34. F. Gil, 1993/1995, # 142ff.

35. Ibidem, # 143.

36. Ibidem, # 142.

37. See the excellent discussion in Van Frassen, 1980, *The Scientific Image*, p. 13ff.

basic and common as visual *filling-in* and *filling-out*, hypnopompic and hypnompic hallucinations, dreams, the ghost limb or even the affects, favour its psychological reality; evidence is direct but it is not truth pure and simple *per se nota* (here contrasted with Marion saturated phenomena<sup>38</sup>):

An outline of the <i>Map of Evidence</i> and the Saturated Phenomena (very partially from F. Gil, 1993/1995, #42)					
	Language	Perceptible Experience	Feeling (oneself)	Concept	Metaphor
Kant's categories	of relation	of quality (reality)	unity (feeling unity) (quantity)	of necessity (modality)	
<b>Evidence</b> (F.Gil)	Present time <i>Hic et Nunc</i> Reflexive Self	Sight (view) Space Common phenomena Milieu	Point of view Subject Reflexivity First Person	Intuition <i>Index sui</i> Secondness	Pointing out Observing- <i>Claritas</i> Capture
<b>Saturated Phenomena</b> (J-L. Marion)	<i>empty</i> indescribable	Intolerable	incommensurable inordinate	non-figurable	

Now, allow me just an indication of a possible extension to clinical semiotics, on which the determination of Peirce's firstness, secondness and thirdness would be, again, central<sup>39</sup>. For phenomena deprived in intuition (normality: the mental state oriented to people, time and place, the state of euthymia, etc.), as well as for common *symptoms*, or for the saturated phenomena, evidence calls upon and implies *ipseitas* (but *good clinical* evidence, an intersubjective dimension, requires non hallucinatory self-donation, second person minimum distance, non-fusional bonding). Briefly put, F.Gil shows, in his seminal book on *Evidence*, that the hallucination – an operator – transforms sensorial and linguistic data (*un donnée sensorial et linguistique*) into intelligibility and satisfaction of the mind (*satisfaction de l'esprit*),<sup>40</sup> demonstrating the effects of one of the grounds of Freudian theory (and the frailty of tacit knowledge), self-enforcement, self-position: "(...) hallucination is part of the structures of conscience (...)", "(...) the unity of a biography is the fundamental hallucination of temporality (...)"<sup>41</sup>. Note, however, that the intensification or saturation of the phenomenon may create a terrible dead-end... theoretical and practical (clinical)<sup>42</sup>. We are far from the intrinsic grey of neutral, distant, observa-

38. J-L. Marion, 1997, *Étant Donné*, pp.189, 203 e 280, Marion, 2001, *De Surcroît*.

39. Marques, 2006: "A Vida do Fim: uma filosofia do pensamento clínico" in F. Martins, A Cardoso (orgs.), *Felicidade na Fenomenologia da Vida*, Actas do Colóquio Internacional Michel Henry, FL, UL, 2006, pp. 85-150

40. F. Gil, 1993 /1995, # 141.

41. Ibidem, # 142, 234 (respectively).

42. Daniel Stern, 2004, *The Present Moment in Psychotherapy and Everyday Life*.



tion. And, here we encounter, I submit, a possible ground for “testing” van Frassen’s proposal on the role of images and public hallucinations in *bona fide* scientific representations.

In his own words, the core presuppositions of Gil’s early philosophy of knowledge may be summed up in the following thesis: “(...) *La croyance hallucinatoire fait un recours permanent au témoignage indubitable des sens. (...et...) est marquée (index sui), elle s’impose et dispense de la preuve (index veri), elle renvoi intrinséquement au sensible, sous ses différents modalités (...)*. En même temps qu’elle la produit, l’hallucination rassemble la signification de l’évidence (l’attention, l’ostension, etc.) en une vécu unique, à savoir, un sentiment d’intelligibilité dont la satisfaction de l’*esprit* est la pierre de touche. Ce sentiment est l’évidence à proprement parler (...)”<sup>43</sup>.

#### 4. van Frassen on measurement

Let’s introduce a historic example - the theory on the fibrillar structure of the body, a kind of “hallucinatory” private and public (the associated spasms, paroxysms, fevers) bodily experience with known reflexes in medicine and, maybe, in early modern science and baroque culture in Europe. The fibre was a main baroque metaphoric tool to think about the body and its pathology, including mental, or moral pathology, as all the *vesanies* were by then designated (and *felt*: they were diseases of the passions)<sup>44</sup>. It need not be underlined that the theory of (the experience of) the fibrous body for Glisson, Descartes, Leibniz, Boerhaave, Haller, La Mettrie, Cullen, Pinel or Broussais and its role in the so-called *solidism*, was instrumental in debasing humoral theory from medicine, religion and philosophy and delayed the acceptance of cell theory for one hundred years<sup>45</sup>. The fibre was visible, palpable and good to think with (while the molecularized chair, the geneticized body is opaque). Indeed, a forgotten expression of mechanicism was the *filet*, the fibre, a pontifical concept in Descartes’s posthumous *Traité de l’Homme*. Therefore, the patent affordances, the visibility of feverish paroxysms, the spasms and the furors, not to mention emotional tantrums and epileptic fits, were a strong evidence of the fibrous nature of the body-mind. Why? As I hope to have shown elsewhere, the main reason must have

43. F. Gil, 1993/1995, # 140.

44. See for instance Pinel’s *Traité Médico-Philosophique sur l’Aliénation Mentale* (revisited by Marques, 2011, O Carvalho, o mato e a floresta: Das fundações da clínica no *Traité Médico-Philosophique sur l’Aliénation Mentale* de Pinel de 1809, in *Ph. Pinel: Tratado Médico-Filosófico sobre a Alienação Mental*, pp. 22-42).

45. See note 27. Rheinberger, H.-J., 2000 “Cytoplasmic particles. A trajectory of a Scientific Object”, L. Daston (Ed.), 2000 (*Biographies of Scientific Objects*. Chicago. Chicago University Press), pp. 270-294; Pilloud, N., Louis-Courvoisier, M. “The intimate Experience of the Body in the Eighteenth Century: Between Interiority and Exteriority.” *Medical History*, 2003, 47:451-472.

been another one: the *filet* was a very immediate and salient, public and pregnant form of “incarnate knowledge”.<sup>46</sup> Still, these facts bring us back to the epistemic meaning(s) of the baroque experience(s) of the body under the seminal pair visible complexion/invisible innards<sup>47</sup>.

I want now to dig this “case-study” from another perspective, having in the horizon van Frassen’s conception of the measurement as representation. The scepticism of early-modern and modern medicine and naturalism shows a surprising mixture of continuities and discontinuities with Aristotelians and Galenism in several aspects of the epistemic, semantic and imaginary domains: in the field of medicine, the empire of the (clinical) observable, haptic and visible will be replaced by the power of increasingly objective, resolvable and purified optical, corpuscular and metrical tools and theories. My test subject will be the Foucaultian *non pensée des fièvres*.

In the background lies, of course, the one of the four elements (fire, water, air and earth): *pyr*. The context and main clinical problem was the lack of positive signs of absolute life extinction and the central topic was vital heat: a discovery, “(...) Santorio’s thermometer (...) made it explicit that all heat has the same qualities and produces the same effects - dilating bodies (...). Rottenness has been held to be the most infallible sign of absolute death. However, it cannot be used at the beginning because there are so many infirmities similar to rottenness that they are easily taken for it. (...) We can conclude that, so far, not a single positive sign of absolute extinction of life has been well noticed, although electricity offers us some hopes of its recognition.” – so concludes José Pinto de Azeredo, in his medical lectures given in the first (?) Angolan medical school<sup>48</sup>. Fever, of course, once a disease under many disguises, is one of the commonest manifestation of illness. And the febrile syndrome was for millennia a single disease, not a symptom, not a *concursum* of symptoms. Its nature, origin, classifica-

46. Marques, 2010 (A febre, a fibra e o espasmo, in AAVV “Arte Médica e Imagem do Corpo”. De Hipócrates ao final do Séc. XVIII”, BNP, Lisboa, 2010, pp. 137-157); M.S. Marques, A.B. Oliveira, 2011a (*Medicine in the tropics: decoding José Pinto de Azeredo’s Essays on Fevers and other manuscripts*, presented and submitted to *Warburg Institute Colloquia*, Portuguese Physicians in the Early Modern Period, Geographical Expansion and Medical Prudence; The Warburg Institute, University of London; 18-19 February 2011); S.J., Reiser, 1978, *Medicine and the Reign of Technology*.

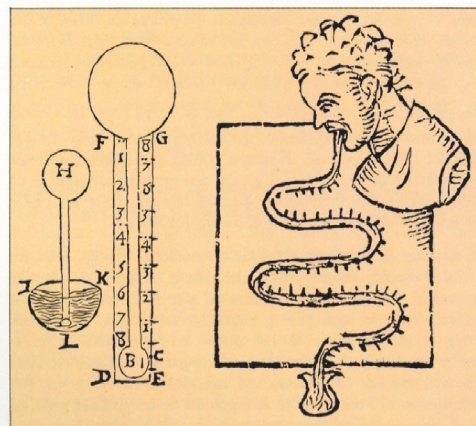
47. And the correlative use and abuse of enemata, etc. The pair sensible/intelligible would be appropriate for a modality-independent designation; another pair would be the dialectic image/data.

48. Azeredo, 1802, pp.197ff, 209 (from: *Isagoge Pathologica do Corpo Humano dedicada a Sua Alteza Real o Príncipe Regente Nosso Senhor* [Ms.].- 1802. [4] f., 409 p. ; BNP: COD. 8482 References suppressed. José Pinto de Azeredo (1763?-1810), born in Rio de Janeiro, was an illustrated physician who studied Medicine in Edinburgh. In 1790 he founded the first Medical School of Angola, in Luanda, where he gave lectures and performed anatomical demonstrations. Two of his works, the *Ensaio sobre Algumas Enfermidades de Angola* (*Essays about Some Infirmities of Angola*) and the *Isagoge Pathologica do Corpo humano* (*Introduction to the Pathology of the Human Body*) are, we believe, among the best and most self-critical Portuguese works on medicine and tropical diseases of his time. The *Essays* is the only book he did publish, in 1799.

tion, mechanism, and measure became a touchstone for early modern and modern pre-bacteriological medicine. For instance, Rina Knoeff showed in a revealing book, that while for Boerhaave – who taught their students from all over Europe to measure the heat of the body – heat was a sort of ether, pure fire, the *spiritus rector*, while for Fahrenheit it was already the universally distributed fire, an ethereal matter<sup>49</sup>. It is a notorious fact that the concept of temperature was defined only after – and because of – the invention of the thermometer.

Allow me, then, a very broad and graphic approach to recapture the meaning of the early measurement of temperature. I'm referring to Santorio Santorio's apparatus, the first gas thermoscope and its *rationale*: the hotter the expired gas, the hotter the vase's water and the *descensus* of the fluid in the thermometer, under higher pressure (see the figure):<sup>50</sup>

«Instrumentum temperamentorum» de Santorio. Dibujo que se encuentra en los «Commentaria in primam Fen primi libri Canonis Avicennae», Venecia, 1646.



As any (new) scientific instrument it is able to generate realities, and was instrumental for finding an answer to the classic questions:

1. how much is one “thing” hotter or colder than the other?;
2. what is heat: an Aristotelian quality, a fluid resulting from mechanical attrition or a *sui generis* substance (*phlogiston*, caloric)?;
3. does the thermometer measure heat and cold or another property (the physical concept of temperature was not yet defined, invented)?;
4. what is the relationship between the experience of heat and cold and the human body's temperature?

49. R. Knoeff, 2002, *Herman Boerhaave (1668-1738): Calvinist Chemist and Physician*, pp. 85f, 136.

50. Van Frassen, 2008/2010, p. 126ff (picture from Lain Entralgo's *Historia Universal de la Medicina*).



When arguing about the diverse roles of experimentation, van Frassen underlines their impact on high-level theories and proposes very clearly that the experimental apparatus writes a number in the blank<sup>51</sup> for “(...) the experiment has shown by actual example that no other number will do; that is the sense in which it has filled in the blank. So regarded, experimentation is the confirmation of theory by other means.”<sup>52</sup> And the philosopher asks: “What counts as measurement of a (physical quantity) X?”, and “What is that (physical quantity) X?”<sup>53</sup> We do have here a hermeneutical circle. The way out is through Ernest Mach’s correspondence theory, which was developed from and about thermometers. The plethora of empirical experiments and the measurements of the temperature of all kinds of animals and with diverse materials, the problems of dimension, of scale, of metrics, of calibration, of the materials and their coefficients of dilatation, not to mention the difficulties in the understanding of the heat and the laws of gas, the upheavals of matter theory, the absence of the kinetic theory, the polemics around atomism, etc., do help us to appreciate the utility of Mach’s theory<sup>54</sup>.

The internal question (inside each normal science period, to borrow Kuhn’s terms), of how science draws the line between observables and non observables will remain non-dogmatic and open. Let’s sketch the main elements of the theory of fever measurement in the following table:<sup>55</sup>

The representation of the measurement (for instance, fever)		
1	representation	(i.e. Santorio’s)
2	quantification	gas thermoscope
3	measurement tool(s); theory of measure	termometers
4	correspondence theory	(Ernst Mach’s, etc.)
5	nomological value of the measurement apparatus and of the experimental procedures, statistical design, etc	(later: water boiling and freezing points, etc.)
6	measurement outcomes: information, intensionality and indexicality (but not subjectivity)	(van Frassen)

To shorten a robust chain of arguments by van Frassen, I’d say that the main message is that the operation of measurement is, first and foremost, an act of self-location in a logical space.<sup>56</sup> Van Frassen demonstrates

51. Van Frassen, 2008/2010, p. 111.

52. Ibidem, p. 112

53. Ibidem, p. 116.

54. Chalmers, 2009, *The Scientist’s Atom and the Philosophers’s Stone*.

55. According to my reading of Bas van Frassen, 2008/2010, c.p. 181.

56. Van Frassen, 2008/2010, p. 156. About this see F. Gil 1993/1995, # 63f (orientation, attention philosophy @ LISBON)

elegantly that any measurement is relational (mappings), intensional, functional and indexical (denotative; the here and now of the apparatus and of the observer/experimenter)<sup>57</sup>. So it is perspectival and generates a semantic space... the bottom-line is the following “symbolic machine” or meaningful structure (see the diagram infra):

In my reading, the pre-romantic fibrillar and “solidist” body and strategy still kept the body’s physicality and the individual’s suffering at the heart of the clinical experience: however, the harmonies, the conjunctions and disjunctions between the invisible and the latent (that is, the organic), the visible and the manifest (that is, the meaningful), were to be hereafter open to question, much beyond the issues of scale, of code, of truth.<sup>58</sup> Nevertheless, we’ve seen that even in medicine, any theory of science must include semantic and pragmatic *thin* structures, and – a fortiori in the medical sciences – for the benefits of reality testing and building, must incorporate *thick* empirical (clinical), dense, contents<sup>59</sup>.

“The hallucination fulfils, therefore, the negative conditions of an operator – it amounts to making form with no signification of its own, [a signification] able to order meaning and transform it into reality. In the hallucination, the representation of the word is the representation of a thing, which is not representation but quite simply thing, pure *aisthesia*. The paring away of meaning is done outwards, in the direction of exteriority. It is not done in the mode of repression – inward-turning – that the wolf man ‘wants to know nothing about’ castration; he un-represses it, the hallucination represents an objectification: in negation, in foreclosure, it was always a matter of ‘outside and inside’.”<sup>60</sup> *Aisthesia* – *tonos*, *robur* or *vis insita* – is one of the powers underlying fibres, fevers and spasms; they have a golden genealogy: “The fibres therefore, being earthy and solid, are turned into so many hot embers in the blood and cause ebullition in the fits of passion. These explain why bulls and boars are so choleric and passionate. For their blood is exceedingly rich in fibres”<sup>61</sup>.

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and the self).

57. Ibidem , p. 181.

58. Dagognet, op. cit., p. 207

59. Here as everywhere, the dialectics thin/thick is hardly transparent and not linear.

60. F. Gil, 1993/1995, p.226.

61. Aristotle, *Parts of Animals*, 651a1 (trad. W. Ogle): “(...) What are called fibres are found in the blood of some animals but not of all. (...) For one part of blood consists mainly of water and therefore does not coagulate, this process occurring only in the other and earthy constituent, that is to say in fibres, while the fluid part is evaporating (II, 650b,15-); The fibres therefore, being earthy and solid, are turned into so many hot embers in the blood and cause ebullition in the fits of passion. These explain why bulls and boars are so choleric and passionate. For their blood is exceedingly rich in fibres (651a1-); The character of the blood affects both the temperament and the sensory faculties of animals in many ways. This is indeed what might reasonably be expected seeing that the blood is the material of which the whole body is made; 651b6-: But the blood as

## 5. Not a conclusion

Unlike the physical sciences, the Humanities, that is the social and “(...) the human sciences are compelled to demonstrate the inherence of the laws to each specific case, that is, to the complex visible which one hopes to make comprehensible in its singularity (...)”.<sup>62</sup> Fernando Gil’s arguments are consistent and robust: “(...) One thing expresses another (...) when there is a constant and regulated relationship between what can be said about one and the other (...). It is along these lines that a perspective projection expresses its geometral. The expression is common to all forms, it is the gender of which natural perception, animal sentiment and intellectual knowledge are the species. (...) Like the representation, the effectiveness of the structure is semiotic (...). It is through the representation that the structure makes itself given, more precisely through inter-expression. The whole does not represents the ensemble but the veiled affinity of things (...)”<sup>63</sup>.

And typically “a measurement is at the same time a physical interaction and a meaningful information gathering. (...) Measurement falls squarely under the heading of representation, and measurement outcomes are at a certain stage to be conceived of as trading on selective resemblances (...)”<sup>64</sup> in just the same way as perspectival picturing does. Fernando Gil, it seems to me, would be pleased with this formulation.

The bottom line, the clinical lesson, is clear: as a heterogeneous non-metrical and qualitative spaces of differentiation, the field of humanities and particularly that of the prudential sciences demands alternative perspectives, as Nietzsche said, and not one viewpoint, a midpoint. The place for the matching of intersubjectivity and objectivity is plural, complex and equivocal. This reflective site is likely to be overdetermined by two operations of opposite directions, which may be accurately labelled in clinical practice, the phenomenological cycle and the hermeneutical cycle. Notwithstanding, at the macroscopic level “(...) we can think of processes that connect two situations separated in time and space. These could be so correlated that it should be possible in principle to get information about

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already stated is not sensitive (...)”. (651a12-); (Marques, M.S., Oliveira, A.B., 2011, p. 237n18 (*José Pinto de Azeredo: a cosmopolitan physician from Rio. Revisiting his Ensaio sobre Algumas Enfermidades de Angola*. in P.F. da Costa, A. Cardoso, Org., *Percursos na História do Livro Médico (1450-1800)*, 2011b, pp. 231-254).

62. F. Gil, 1984, p.86.

63. Ibidem, pp. 223, 222.

64. Van Frassen, op. cit, pp. 91.



the one by inspecting the other – provided, of course, we knew of that correlation. (...)”<sup>65</sup>.

The “health” human body, the normal human senses, are, of course, the best cross-correlators we know: they manage by themselves to produce inner descriptions and to find the algorithm(s) of internal temperature or affective regulation...<sup>66</sup>. It is very telling that our two authors stress the role of intersubjective and endogenous factors: one exemplary domain is, I submit, medicine and its epistemic “pathologies”<sup>67</sup>:

Conditions of medical knowledge and beliefs		
Conditions of epistemic knowledge	Conditions of proof	Epistemological “pathologies” (examples)
Truth	Conditions of objectivity	Humoralism; phlogiston; etc.; dogmatic nosologies
Justification	Anchor(s)	Casuistry; sophistry Critical days; “prognosis”
Assent	Proof effectuation	Post hoc propter hoc; therapeutic “proof”, etc

The *eidos* (in Hippocrates and Plato), the one (in Plotinus), love (in St. Augustine), the *haecceitas* (in Scotus), the infinite (in Descartes), the intuition of the sublime in Kant – are they the humus of pure conscience, the mediating force, the proto-hallucination? Is *philia*, care, *libido curandi*, the primal sentiment, the condition of possibility, of the perception of the other, of *clinical* alterity? Do we not sense here a well hidden infinity operator? A mirror image, a passage from the principle of sufficient reason to the intuition of the absolute? This hallucination of power might explain the ancient sacred aura of all *autoritas*, the emergence of a magical body and even the reciprocal construction of co-operation and morality. Michel Henry sensed that “(...) subjectivity is life, that’s what is serious in existence (...)” and saw that the subjective (experience of the) body “(...) is a state of existence in (...) each one of the intentional objects, for flesh and spirit are not different at the ontological level: and the proof of this is sexuality (...)”<sup>68</sup>. Hints of the Hippocratic tradition... that announces the

65. Ibidem, p. 156.

66. D.S. Stern, op. cit.; C.B Martin, 2008, *The Mind in Nature*.

67. Conditions of knowledge and of proof according F.Gil, 1998, chapters 15 and 16; “pathologies” are mine. The history of medicine, natural philosophy and of biology seems much more in keeping with the latest radical van Frassen ideas than mainstream philosophy and history of science: L. Daston, F. Vidal, F., Eds., 2004 (*The Moral Authority of Nature*); F. Duchesnaud, F., 1998 (*Les Modèles du Vivant de Descartes à Leibniz*); S. Gaukroger, (2010) *The Collapse of Mechanism and the Rise of Sensibility*.

68. M. Henry, *Philosophie et Phénoménologie du Corps*, 1965/1987, pp.274, 288ff (my transl.).

excess (of meaning?), shows the intensification (of the instant?), attests the saturation (of the phenomenon?), something transported, unbound, unconditioned, unpredictable and inscrutable (hallucinated?). The ineffable saturated phenomenon does not violate the principle of sufficient reason, a possible ground for “an” eschatology completely void of representation.

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