The science of mind as it could have been:
About the contingency of the (quasi-)disappearance of introspection in psychology

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1. Introduction

According to a widespread tale[1], the science of mind took four well-defined steps during the past century:

(1) Across the turn of the nineteenth and twentieth centuries, mind was identified with conscious experience, and introspection was accordingly used as a primary tool to explore mental activities.

(2) Around 1913, there occurred a brutal dismissal of introspection as an acceptable method for scientific psychology, and psychologists undertook a systematic study of "overt behavior" instead; the very reference to "internal" events was banished, and "consciousness" was denounced as a pre-scientific term.

(3) From the late 1950's on, the idea that mind involves internal processes became fashionable again, but it first assumed a strictly objectivist form: internal processes were identified with neurological working, information processing, or cognitive functioning. Introspection itself (or some disguised form of it) was given a respectable objectivist status: that of "meta-cognitive access" (Nelson, 1996), "higher-order thoughts" (Rosenthal, 2005), or neural "reentry"(Edelman & Tononi, 2001). Yet, as one of the most celebrated experimental studies about introspection of that period shows[2], it was still suspected of pervasive mistakes.

(4) Finally, during the mid-1980's and 1990's, there was an outburst of "consciousness studies", and systematic introspection arose again from the ashes (Petitmengin, 2009) in close association with the quest for "neural correlates" of experiential events.

This common account is clearly incomplete, in so far as it does not mention momentous disciplines such as psychoanalysis, phenomenology, or *gestalt-psychologie*. It is also distorted, because it posits sharp boundaries and definitive judgments of history usually pronounced by a

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[1] Lyons, 1986 ; Costall2006.
[2] Nisbett &Wilson, 1977; Johansson et al., 2006.

few propagandistic authors, instead of the much more nuanced blend of doctrines and methods, explicit or implicit approaches, and conceptual *strata*, that were actually manipulated by the specialists of the science of mind throughout this period. We shall then try to correct the former picture, by relying on the work of serious historians of introspective psychology.

But, incomplete and distorted as it is, this picture at least expresses a tidal movement of epistemic values in the history of the science of mind. Introspection was credited with the highest potential as a method for psychology, and then scorned as radically misconceived and unreliable. What explains this about-turn? Was the long eclipse of introspection unavoidable? Could the science of mind have directly jumped to the present phase of rebirth of interest for consciousness and first-person experience, without going through the strange episode of self-denial which started with behaviorism and blossomed with eliminativism? Has something important changed between turn-of-century introspection and current introspection, which may account for its capacity to resist usual criticisms? This urge for alternative historical scenarios of the science of mind, and even more for explanations of its actual course, provides us with a promising case study in the contingency of scientific programs[3]. The case we are interested in does not bear on a path which could have been taken by science's history yet has not been taken, but rather on a path that could have been much shorter, thus avoiding a surprising doctrinal eclipse of what is most immediately present to us. It is not only a case of contingency of thought or procedures. It is also a case of contingency of attitudes towards the very source of our knowledge. It may represent a much deeper challenge to scientific realism[4] than the standard contingency arguments, because it bears on the root presuppositions of this thesis rather than on its arguments.

Our roadmap is the following: in section 2, we criticize some aspects of the official history of the science of mind; then, in section 3, we list the major obstacles to a proper use of introspection, and briefly suggest how they could have been overcome.

2. On some amendments of history

As we just mentioned, and as several authors already pointed out[5], the official history (or tale) of introspection is flawed in many respects. Here we shall only focus on three aspects about which the fate of introspection

[3] Sankey, 2008; Hacking, 1999.
[4] Sankey, 2008; Hacking, 1999.
[5] Boring, 1929; Danziger, 1980; Vermersch, 1999; Kroker, , 2003; Danziger, 1994; Brock et al., 2004.

diverged from what is currently believed. They concern: (1) the distinction between the inner and outer domains; (2) the vigilance about the reliability of introspection during the heyday of this method; (3) the persistent use of introspection during the reign of behaviorism.

2.1 *An inner world?*

The word "introspection" is derived from the latin *intra-* (within) and *specere* (to look at). Relying on this etymology, it is tempting to infer that the whole paradigm of introspection relies on a doubtful divide between the internal recesses of the mind and the external world. This divide is a major source of dualist doctrines in epistemology, and one of the chief targets of the twentieth century philosophy of mind, especially Wittgenstein. But was the criticism of the internal/external dichotomy really unknown at the time of the introspectionist wave?

To begin with, the philosophy of mind of the turn of the nineteenth and twentieth century was already buzzing with criticism of methodological and substantial dualism. E. Husserl was one of the most prominent critical thinkers of that time, denouncing (in the appendix to his sixth *Logical Investigation* of 1901) the distinction between inner and outer perception he had inherited from Brentano. The right distinction, he claimed, was rather between *certain* (immediate and complete) and *uncertain* (mediate and incomplete) perception, within an undifferentiated flux of lived experience. To this, the German Neo-Kantian philosopher P. Natorp[6] added a detailed account of how the dual organization of knowledge (object and subject, outer and inner) may arise from this undifferentiated continuum. According to him, this occurs by way of a double-faced process in which objectivation comes first, and subjectivation arises as the byproduct of the former. Objectifying means picking out the component of experience that remains invariable across personal, spatial or temporal situations; or at least the components of experience that vary in the same way (i.e. in a law-like way) irrespective of the personal, spatial or temporal situations. The "subjective" domain is then marked off by contrast and difference from the objectified part of experience. It includes whatever is left in experience after the objective domain has been circumscribed. Accordingly, the subjective domain evolves with the process of objectification, and it receives as many characterizations as there are delineations of objectivity.

Subjectivity can be characterized :

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[6] Natorp, /2007; also : Bitbol,2008a; Bitbol, 2008b.

- As the *entire* content of consciousness, by contrast with the *fragments* retained by the procedure of constituting objectivity[7];
- As what is immediately lived, before any questioning directed towards objects restricts the field of attention;
- As the *variable*, personal, sometimes dreamlike component of experience by contrast with the *invariant*, interpersonal component;
- As a primitive *chaos* of appearances by contrast with the *order* prescribed by reason in its quest for universality;
- As the *manifold* of experience by contrast with the *unity* enforced by categorization and concepts;
- As the concrete *qualities* of experience by contrast with law-like *structures* or, alternatively, as what is ordered by personal *"biographical" structures*, orthogonal to the law-like *interpersonal spatial structures* arrived at by the objectification process.

Thus, accessing the domain of subjectivity is not just a gift, but a *discipline* symmetrical to the discipline of objectification. One can access this domain by reflecting about the (subjective) conditions of possibility of objective knowledge. One can also reach it by relaxing the interest of knowledge initially directed towards restrictive parts of experience, and eventually by suspending the activity of fragmentation of the field of experience.

Husserl's and Natorp's deconstruction of the inner/outer dichotomy was part of the unconventional and anti-dualistic philosophical atmosphere in which psychological introspectionist enquiries developed. But what about psychology itself? There are signs that the philosophical unrest of the turn of the century influenced the development of psychology. William James is a striking example of a synthetic thinker. On the one hand, although somehow diffident, he was very much involved in introspective research[8]. On the other hand, he developed what he called "radical empiricism" (James, 1976), in which he construed the objective and subjective sides, the material and mental domains, as two constructs arising from a single plane of pure experience. He explicitly drew inspiration from E. Mach's *neutral* monism, and anticipated B. Russell's *Analysis of Mind*[9].

Even the two most emblematic users of introspection, W. Wundt and E.B. Titchener, looked somehow unconfortable with the literal consequences of the dualist vocabulary they used. Thus, whereas the

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[7] "Psychology should not be an empirical science (…) but perhaps the science of the empirical itself in general" Natorp, 2007, p. 103
[8] James, 1890, "Introspective observation is what we have to rely on first and foremost and always. I regard th[e] belief [in introspection] as the most fundamental of all the postulates of Psychology".
[9] Mach, 1984; Russell, 1921.

German psychologist Wundt repeatedly characterized introspection as "inner perception", he found himself compelled to describe the diverging interests of natural science and psychology as two modes of "arranging" one and the same continuum of experience, rather than as two mutually exclusive (inner and outer) spheres of being: "After everything else has been arranged, there still remains something which has as yet no place – ourselves : our feeling, willing and thinking" (Wundt, 1901). Just as Natorp did, Wundt considered the domain of subjectivity as what is left in experience when an objectifiable material has been extracted from it, not as some enclosure separated from the objective world.

Even more striking is the case of the American psychologist E.B. Titchener, who (unlike Wundt) saw introspection as the *only* legitimate approach to his field. Despite a thoroughly dualist vocabulary, Titchener told a very different story when he had to orient the reader towards the appropriate techniques of disciplined introspection. He then characterized the difference between introspective psychology and natural science in terms of stances and standpoints, not in terms of directions of some (mental) gaze: "(In introspection) the standpoint of the observer is different; it is the standpoint of human life and human interest, not of detachment and aloofness" (Titchener, 1916). Two attitudes, full commitment and distance, are documented; not two angles of sight. Moreover, the theme of study of introspective psychology is described as dependent on the state of the introspector, and also as "transient, elusive, slippery"; it is contrasted with the theme of study of natural science, which is both independent of the state of the observer and stabilized in invariant structures. Here again, by reading carefully some paragraphs of the work of a leading introspective psychologist, we have the feeling that a remarkable kinship with phenomenology or with Natorp's blend of neokantianism is latent.

This is not surprising in view of one of our recent studies in introspective psychology, which provides fresh arguments against the dualist view (Petitmengin, 2007). In such cases, the reflective attitude, which is conveniently (though inappropriately) described as "turning one's attention inward" helps one contact a dimension of experience in which the very distinction (inward/outward) is seen to vanish.

2.2 *The quest for experimental rigor*

The second point on which the standard history of introspection is flawed is that it underrates the methodological care of the psychologists who used it. Those psychologists of the turn of the nineteenth and twentieth

century were extremely concerned about the possible pitfalls of introspective inquiry, and they designed procedures by means of which they hoped to reach the standards of reliability and reproducibility of experimental science. They hardly fell under the behaviorist reproach of indulging in speculation rather than sound methodology (Watson, 1913). Moreover, with the possible exception of E.B. Titchener and his school, their work did not fit with the behaviorist accusation of having excluded any non-introspective mode of access from psychology.

W. Wundt thus insisted that it is possible, under certain stringent conditions, to found what he called an "*experiential* science" with the help of the tools and laboratories of *experimental* science. These stringent conditions, as he posited them, were aimed at providing the psychologist with truly reproducible data.

Firstly, according to Wundt, only those mental processes which are directly triggered by physical controllable stimuli generated by mechanical apparatuses and timers are to be considered. Indeed, Wundt considered that the experimental method (as opposed to pure observation) is even more indispensible in psychology than in natural science, since psychology must always cope with "transient" phenomena. To compensate for the fleeting character of its phenomena, "the psychological experiment (…) creates external conditions that look towards the production of a determinate mental process at a given moment" (Wundt, 1910, p. 4). The repeatable action of instruments here counterbalances the instability of experiences. The selection of acceptable mental material by Wundt was in fact so restrictive as to exclude anything except elementary discriminative judgments about sensations: "The only assistance which sensation itself renders us in this measurement is that of the ordinary distinction of sensation as that of 'greater','less', and 'equal' intensity" (Wundt, 1901, p. 20). Even less accepted as possible fields of study were elaborate mental processes such as thought or emotion. Thus, under the name of "experiential science", Wundt was committed to an expanded version of G. Fechner's "psychophysics".

Secondly, Wundt insisted that the elementary mental processes triggered by physical stimuli must be studied *ex post facto* (out of short-term memory), in order to avoid direct interference of the introspective inquiry on the processes to be analysed.

These two rules were meant to avoid some of the most widespread theoretical objections to introspection, which Wundt was very familiar with and which we shall document in subsection 3.2.

However, Wundt's almost narrow-minded care, and reliance on technological contraptions, was soon perceived as an unbearable yoke by

many psychologists. Some of them soon discovered how useful unprepared qualitative descriptions of their experience by subjects can be, in order to disentangle the intricacies of mental events which were wrongly construed as "elementary" in Wundt's laboratory (Binet, 1903). This finding generated an outburst of "systematic introspective" studies during the first decade of the twentieth century, in which much more extensive reports of subjective experience were allowed (including about thought processes, emotions, motivations etc.). The two main groups who developed "systematic introspection" were the so-called Würzburg school of psychology (animated by former students of Wundt), in Germany; and the group of Titchener (who had also studied with Wundt), in Cornell University (U.S.A.). Yet, in freeing themselves from Wundt's rules and physiological methods, these psychologists did not renounce the use of a strict methodological rule altogether. They only shifted the burden of method from the physical tools of the laboratory to the training of both psychologists and subjects of experiential inquiry Careful protocols were thus designed by the members of the Würzburg school in their classical studies of mental imagery triggered by words (Watt, 1905). And a complete set of rules, classified and commented below, was formulated by a member of the group of Titchener for the practitioners of introspection (English, 1920):

A-Maximal exhaustivity of description
Rule 1: Describe the constituent features of the experience in terms that resist further analysis.
Rule 2: In addition to analytic description, experiences which are rapidly changing should be characterized or communicated by descriptive appellations.
Rule 5: Ordinarily describe experiences in their temporal order. But sacrifice this if necessary to catch some fleeting and elusive experience.

B-Pondering on the "how" rather than the "why"
Rule 3: Include interpretation sparingly and always label it carefully as such.
Rule 7: Avoid 'putative recollection' [confine yourself strictly to what *in fact* you introspected and avoid any inference to what you *think* you *should* have introspected].

C-Careful refocusing of attention on the plane of experience
Rule 4: Avoid the 'stimulus' error: make no attempt to estimate the stimulus; confine your report to your consciousness, to your experiences.

Rule 6: The experience or part of an experience selected for observation should not be too long, only a few seconds at the most. [Attending to a short-term sample of experience allows one to examine it carefully and repeatedly in order to provide a detailed description].

Of course, application of these rules requires serious training; either training of the subjects, or training of the psychologists (or both). This was stressed by Titchener (1912), and later insisted upon by the users of his method[10]. This was one of the reasons J.B. Watson (1913) provided for rejecting introspection as a legitimate approach in psychology: how can we rely on introspective data, he asked, if each time a divergence occurs we are told that the subjects or the psychologists were not properly trained? And doesn't training amount to prejudice?

As we shall see, the former rules are mostly accepted in contemporary versions of this inquiry, yet sometimes given a different significance. Moreover, the issue of training has been revived in a very different cross-cultural context, with new concern for the efficiency of contemplative disciplines (especially Buddhist) where lineages of experts can transmit their skill by calibrated series of exercises[11].

Here again, we shall have to raise questions about what was (apparently) missing in the strategy of the old schools of introspection despite their methodological precision. This will be done in section 3.

2.3 *The underground life of introspection during the twentieth century*

The third main point on which traditional historical presentations of introspection turn out to be flawed, is nothing less than the truth of its alleged disappearance. That this claim of the extinction of introspective methods is plainly wrong has been repeatedly stressed by psychologists of the mid-twentieth century who noticed that they had never ceased to use introspection (although usually a shy, truncated, almost invisible version of it) (Price & Aydede, 2005). They just could not believe that radical behaviorists were serious when they declared a ban on first-person access to experience in the name of a narrow conception of nature and natural science. After all, these psychologists noticed, "a conscious memory or a dream is as much a natural phenomenon as a star or a starfish"[12]. As a

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[10] Warren & Carmichael, , 1930, p. 58 : "In scientific introspection, great care is necessary in the arrangement and simplification of the experimental setting and in the training of the individual who is to give the report".

[11] Wallace, 2006; Nauriyal et al., 2010; Thompson, 2014 ; Gupta, 2004; Shafii, 1973. The two latter references have been kindly suggested by a referee.

[12] Warren & Carmichael, 1930 p. 58; see also Moore & Gurnee, 1933.

consequence, the myth of the abolition of introspection by behaviorism was soon replaced by a question about what was its "scientifically correct" name: "What became of introspection? One answer would be that introspection was not viable and so gradually became extinct. Another answer, however, is that introspection is still with us, doing its business under various aliases, of which *verbal report* is one" (Boring, 1953). With the exception of some studies in applied psychology and philosophy where concern for first-person experience had never faded away[13], 'verbal report' became the only licit way of evoking introspective access in such a way that no explicit reference to its expressing 'inner life' had to be made. The name had changed, but the real practice of psychology (especially in education and psychotherapy) did not exclude something surprisingly similar to introspection. What subjects could report about the various aspects of their lived experience had never ceased to be taken into account to guide the formulation of hypotheses about mental life (Nigro & Neisser, 1983). Even hard-nosed eliminativists of the end of the twentieth century could not deny that the very meaning they ascribed to the neurological categories by which they wished to replace "folk-psychological" categories, relied on the application of the latter by living human beings reporting about themselves.

One can spot this tendency of using a tamed version of introspection even in the writings of one of the most emblematic supporter of behaviorism: B.F. Skinner. One of his major pieces of work was entitled *Verbal Behavior,* and contained a remarkably accurate study of the so-called 'verbal reports'. Later on, he drew the ultimate consequences of his interest for such a complex and subtle phonetic 'behavior', by founding what he called (with a touch of paradox) "radical behaviorism" (Holland & Skinner, 1961). In this comprehensive version of behaviorism, Skinner went so far as to declare that private processes such as emotions and silent thinking should themselves count as behaviors, on a par with visible and overt behaviors. He thus shattered the original limits of behaviorism by broadening the definition of "behavior" beyond recognition.

More recently, a careful and systematic study of the methodology of introspection has been published under the heading "verbal reports": the celebrated *Protocol Analysis* of Ericsson and Simon (1984). This book deserves to be considered as the true turning point between the long-term behaviorist dismissal of introspection and its recent rebirth. It belongs to the former period by the tribute it pays to the strongly objectivist tendencies of behaviorism, yet it also paves the way for the new epoch by

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[13] Gendlin, 1962; Stern,.

its fine-grained analysis of the way one can obtain reliable reports about first-person experience. Ericsson & Simon thus explicitly criticize what they call the "schizophrenic" attitude of behaviorism towards introspection, between official rejection and unavoidable use of "yes-no" reports. And they undertake a nuanced defense of a fleshed out version of introspection. One major element of this defense is the remark, adduced against Nisbett and Wilson's (1977) devastating criticism of introspection, that since the subject has no complete conscious access to her own cognitive processes, she should not be asked to provide the reason (the "why") of her choices or feelings. Instead, in good agreement with one major prescription of Titchener's introspective school, one should ask the subject questions about the plain facts of her experience, about the "how". As we shall see, a crucial condition for the current revival of introspection is to promote this sort of lucidity about what can and what cannot be expected from a subject's description.

It then appears that there is a component of inevitability in the use of (some variety of) introspection in the science of mind. This component of inevitability is not strictly connected to the object of this science (the mind), since, as we witness in modern cognitive theory, the mind can be redefined so as to exclude any overt reference to consciousness. The inevitability of the use of introspection rather arises from the elementary fact that scientists partake of the same human condition as their subjects endowed with mind; that they live mentality through, instead of merely studying it. If they want to endow their studies of objective processes such as behavior and neural dynamics with meanings that matter for them *qua* conscious human beings, they are bound to connect these processes with reports of lived experience. As for the residual element of contingency, it only concerns the implicit or explicit character of the practice of introspection, and even more the (dismissive or positive) attitude of scientists towards it.

Attitudes in psychology range from (ideally) complete dissociation between the investigator and the domain of her study, to full identification of the investigator with the subject who is reporting her lived experience. In other terms, it ranges between objectifying neutrality and empathy or identification. An ongoing debate about the status of folk-psychology illustrates this difference of attitudes by distinguishing three steps on the scale which goes from distance to coincidence. To begin with, according to eliminativists (Churchland, 1986), introspective folk-psychology is a sort of primitive scientific *theory,* enabling us to predict and explain other persons' behavior from outside, and liable to be falsified (this is the first

step). Reacting to that, various authors[14] have suggested a second, very different conception. Here, folk-psychology is no theory; it is a system of categories helping us to *simulate* other's mental states (this is the second step). Prediction of other's behavior then occurs by figuring out what it would be like if our own first person experience fitted with their mental situation. But one can also think of a third conception of folk-psychology, which is even closer to the empathic pole of the range of attitudes towards introspection than the simulation theory because it does not even take for granted that I and the other are to be construed as mutually exclusive beings and standpoints. This conception is inspired by J.P. Sartre's analysis of "other minds". According to Sartre (1973), it is pointless to ask for a proof of the *existence* of other minds; this demand can only yield skepticism. Instead, one should realize that the existence of the other is just as immediately certain as my own, because I am so to speak woven of the other(s): "I see myself because somebody sees me (…) I have my foundation outside myself. I am for myself only as I am a pure reference to the other". Along with this perspective, the vocabulary and categories of introspective folk-psychology are *more* than a guide towards simulation of what it is like to be the other: they rather offer material for elaborating a common field of shared meaning and shared experience. Moreover, in this role, the categories of introspection are by no means static; they can be enriched at any moment by the use of disciplined metaphors that are validated by the mere fact that they are spontaneously *recognized* by (at least some) other subjects as a faithful description of a shareable experience (Findlay, 1948).

The true question we shall have to address then bears on the contingency or inevitability of the psychologists' diffidence towards the *participative* and *empathic* aspects of introspection, rather than on the contingency or inevitability of the use of introspection in psychology.

3. What was needed to avoid nearly one century of schizophrenic ostracism against introspection

In this section we shall list and discuss some of the main epistemological features that were missing (or poorly understood) in early introspective psychology, and which may explain its vulnerability to criticism as well as its apparent eclipse. We also wish to show, whenever possible, the ability of the new wave of introspective studies to cope with most of these

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[14] Goldman, 1992; Warren, 1999.

deficiencies. The deficiencies of the first wave of introspective psychology are:

(1) Lack of a universally accepted understanding of what exactly the act of introspection *is*;

(2) Correlative lack of a convincing set of answers to a traditional list of in-principle objections against the very possibility of introspection;

(3) Uncertain conception of (and uncertain criteria about) what makes introspective reports reliable, and possibly *true*;

(4) Difficulties about where the regulative ideal of objectivity should be applied;

(5) Lack of understanding of the pragmatic status of scientific research;

(6) Absence of a proper third-person correlate of detailed first-person experiences, and of the possibility of elaborating a triangulated approach by combining them.

The following five subsections will address the above mentioned deficiencies in turn.

3.1 *Introspection without 'intro' and without 'spection'*

So, what *is*, and what should be introspection, exactly? As we have seen in section 2, the introspectionist psychologists of the turn of the nineteenth and twentieth century had some doubts about the dualist picture of inner and outer realms that would fully justify using the term "intro-spection" about a certain mental act of meta-awareness or "reflection". Yet, despite this widespread doubt, most of their overt characterizations of introspection remained in line with dualism. The two-realms and two-directions-of-gaze model was still dominant. Wundt thus wondered "how can our own mental life be made the subject of investigation like the objects of this external world of things about us?" (Wundt, 1901). Similarly, Titchener approved the idea that "introspection is simply the common scientific method of observation, applied from the standpoint of a descriptive psychology" (Titchener, 1912). Titchener accordingly stated the different directions of gaze by which one should characterize the two kinds of "observation": "the method of psychology is observation. To distinguish it from the observation of physical science, which is inspection, or a *looking-at*, psychological observation has been termed introspection, or a *looking-within*" (Titchener, 1910). Later textbooks of psychology usually retained this standard definition of introspection as *observation of some internal occurrence*, e.g. "introspection is most simply defined as the direct observation of one's own mental processes" (Moore & Gurnee, 1930). Such a definition is especially significant in view of etymology. The latin

prefix "ob-" means "facing", and the latin verb "servare" means "to watch over". Observing then means "watching over what is facing us (and is therefore different from us)". The paradigm of detachment here clearly dominates any other view of introspection.

It is on this unsophisticated epistemological ground that nuances, inflections, and even skepticism, grew up. Wundt resisted from the outset the rough definition of introspection as "inner *observation*", and rather referred to "inner *perception*", thus accepting a distinction previously introduced by Brentano (1995). According to Brentano, inner observation cannot be the "true source of psychology", for observing a mental event by fully focusing one's attention towards it would just lead to its disappearance. The true source of psychological inquiry is then inner *perception*, that does not require that attention is focused on some mental object, but only that, when attention is focused on some (usually external) object, it remains broad enough to notice other events such as the mental processes that underly the act of attending. One can thus *perceive* a vibration of the telescope while *observing* a planet. As for Titchener, he was also aware of the paradoxical nature of inner observation, which, together with its description, disturbs the process to be observed : "If you try to report the changes in consciousness, while these changes are in progress, you interfere with consciousness" (Titchener, 1910, p. 22). He then suggested two solutions. The first one, that he did not like very much, consisted in relying on retrospective observations of past experiences. This was a widespread strategy at the time, already advocated by W. James and J.S. Mill. The second solution was tantamount to relying on the "introspective habit" of trained subjects, who were able "not only to take mental notes while the observation is in progress, without interfering with consciousness, but even to jot down written notes" (Titchener, 1910, p. 22). But what is this special ability trained subjects acquire not to interfer with their own consciousness while they are observing it? A reasonable assumption, in line with Brentano's and Wundt's characterization of "inner perception", is that it is the ability to detect occurrences that are not in the main focus of interest, by extending attention (so to speak) laterally.

Notwithstanding several momentous differences between introspective psychology and phenomenology, this description fits well with E. Husserl's characterization of phenomenological reduction, which is the chief method to give access, not of course to the "inner world", but rather to the whole field of pure experience before exclusive intentional focusing has narrowed down the region of our full awareness. Phenomenological reduction, writes Husserl (2002, p.11), helps to reveal the "sides" (or the margins) of our experience that are overlooked as long as exclusive concern for objects

prevails. Husserl insisted on the full openness of the subject to the manifold of lived experience during phenomenological reduction, or on the quality of expansion rather than re-focusing (towards some "internal object") which is given to experience by reduction (Depraz, 2008). Even when (as he often did) Husserl spoke of the metaphoric "splitting" of the subject in reflection, he mentioned that in the phenomenological variety of reflection I become "*at the same time* plainly seeing subject, and subject of pure self-knowledge" (Husserl, 1972, p. 156). The so-called splitting therefore tends to be all-encompassing rather than discriminative; it represents a stretching of the natural attitude rather than a restriction and a redirection of it. Accordingly, the "splitting", if any, is symmetric rather than asymmetric. It does not give any (reflective) priority to the "subject of self-knowledge" over the elementary "seeing subject" (or subject of object-knowledge), but rather puts both of them on the same footing. It does not impose to define the "subject of self-knowledge" as a seer of the "subject of seeing", but rather in co-defining both subjects within the broadened experiential field of an "I" who has undergone the phenomenological "reduction". Later on, this momentous move was confirmed by M. Merleau-Ponty, according to whom the phenomenological attitude means (in terms borrowed from Bergson) that, "instead of wanting to raise ourselves above our perception of things, we plunge into it to dig it out and *enlarge* it"[15].

Of course, this is not meant to neglect Husserl's own forceful denial that the phenomenological enquiry relies on some variety of introspection. He gave three major reasons for this denial: (i) Introspection, he wrote in his *Ideen I*, arises from a state of *positional* consciousness (which means that in this case consciousness *posits* an intentional object, be it in the focus or in the margin of attention); by contrast, in the genuine phenomenological stance, consciousness becomes "non-positional" (Flajoliet, 2006). Whereas the positional reflection of introspection aims at describing mental processes *qua* objects, the non-positional approach of phenomenology tends to reveal the field of transcendental subjectivity which underpins any object-directedness. (ii) Being "positional", and therefore directed towards some sort of transcendent object, introspection remains fallible as any empirical investigation is. By contrast, being non-positional and therefore immerged in immanence, the phenomenological stance is supposed to reach absolute certainty. (iii) Phenomenology is not concerned by single events of mental life, unlike the primary step of introspection; it aims at elucidating the invariants (or "essences") of lived experience.

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[15] Merleau-Ponty, 1953, p. 22; Bergson,1934, p. 148.

Despite these differences, some psychologists have argued that Husserl's characterization of the phenomenological stance supports a new understanding of introspection (Vermersch, 2011). After all, Husserl himself aknowledged that some criticisms of introspection were indirectly aimed at phenomenology, and that they had to be addressed in order to defend the latter discipline (Husserl, 1983, §79). According to this new understanding, intro-spection appears as (or is replaced by) a mental state in its own right, a state of broadened awareness, rather than being taken as a homuncular act of observation of some other mental act or mental state. A new concept of "reflection" is introduced and defined, instead of being squarely rejected in view of its spurious dualist connotations (which imply a mirror and a gaze). As we suggested earlier, "reflection" in a phenomenological sense no longer means a sort of specular (transcendent) observation, but rather a *modification of consciousness*, a *transmutation of lived experience as a whole* (Husserl, 1983, §78). To stress the difference without breaking lexical continuity, we can give a slightly different name to this renewed concept of "reflection": "coreflection". The latter neologism may prove useful to convey two semantic shifts. According to the first shift, we are no longer concerned by a mere asymmetric revelation of the "seeing subject" by the "subject of self-knowledge", but by their symmetric *co*-definition within the experiential field of somebody who has practiced the phenomenological "reduction". According to the second semantic shift, the variety of reflection at stake represents in fact an enlargement of the span of experience, and this can be evoked by the three first letters of the word "coreflection": "cor" for the Greek "khôra" which Plato used in the *Timaeus* to mean space, or interval (Bitbol & Petitmengin, 2011).

Full realization of this alternative status of introspection, in line with the long-term phenomenological and neo-kantian traditions, is commonplace nowadays. G. Ten Elshof (2005) thus claims that introspection can still be considered as a kind of perception, provided one recognizes that the essential act of any perception is redirecting attention or *changing its span*. Similarly, J. Sackur (2009), making a cogent synthesis of Brentano's and Wundt's reflections, defines introspection as a process of perception *expanded* to what is usually neglected or to what is usually at the periphery of the attention field. More radically, we are invited to discard any remnant of the metaphor of vision, and to accept that introspection, far from being like a gaze on some object (be it focused or expanded), is tantamount to (re)establishing an intimate and close *contact* with what is to be explored (to wit, the field of lived experience) (Petitmengin & Bitbol, 2009). The

metaphor of the sense of touch (with closed eyes) here replaces the metaphor of the sense of vision.

Two major developments of our *Weltanschauung* and of the cognitive sciences can explain why this alternative, non-observational and non-visual, conception of introspection is now much easier to accept than it was at the beginning of the twentieth century. One of them, already alluded to in section 2.2, is our growing familiarity with contemplative methods whose aim is to stabilize attention, and then use this stabilization in order to get a precise knowledge *by acquaintance* of the subtlest aspects of mental processes[16]. Along with this perspective, the idea of "non-positional" consciousness, or of intimate contact with experience, as opposed to the old-fashioned observational view of introspection, is no longer problematic. Thus, according to A. Wallace, "Unlike objective knowledge, contemplation does not merely move towards its object; it already rests in it" (Wallace, 2006).

The other development that makes the non-observational conception of introspection easier to accept concerns the cognitive sciences. It is the widespread recognition (Schooler, 2002) of a background short-term cognitive unconscious (Hassin & al., 2006), in addition to the long-term pulsional unconscious delineated by Freud (1976). This allows one to take at face value the image of focus and margin of conscious awareness that sounded so problematic during the first wave of introspective psychology (Bode, 1913). This also opens the possibility of applying some (though not every) feature of the model of perception to introspection. Let us remember that a relevant feature of perception is incompleteness: according to Husserl, the act of perception combines a central profile with a surrounding "horizon" of anticipated or altogether hidden profiles. This feature is connected with both transcendence (because incompleteness can be interpreted in terms of excess of what appears with respect to any appearance) and intentional directedness (because intentional focusing implies leaving vagueness in the periphery). It thus looks like perception must concern external *objects* apprehended through limited aspects. But nothing prevents one from disconnecting transcendence from object-like separation: one can perfectly figure out that some parts of the field to be explored by introspection elude full awareness at a certain moment, and yet that the introspector remains in close contact with this field throughout. After all, when we are in contact with (or immersed in) the field we wish to

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[16] In meditation, stabilizing attention is allowed by long sessions of concentration on a single felt or imagined process (such as breath or pictures); and contact with the manifold processes of mental life is realized not only by broadening the field of attention, but also by dropping "all aim and objective" in full, open, non-directional, mindfulness. See e.g. Genoud, 2009; Wallace, 1998.

explore, we are bound to remain unaware of aspects that would immediately become apparent if we stood back with respect to it. The introspective process is thus likely to require a careful process of unfolding or (to use another metaphor) of crawling across the experiential process to be analyzed.

Recent methods of verbal report and introspection fully take this into account. The elicitation method[17] that we currently practice can be characterized as a strategy for progressively unfolding initially "pre-reflective" aspects of lived experience, by asking subjects to rehearse and even to *re-enact* this experience while broadening their field of attention. Here, *retrospection* is systematically used (as opposed to "thinking-aloud" protocols). But this is not to meet the traditional objection according to which observation disturbs the observed process if it occurs simultaneously to it (an objection automatically inactivated by the rejection of the observation conception of introspection). This is to enable patient expansion of awareness in a selected slice of experience.

Another, very different, method has also been developed to overcome the problem of bringing to awareness as many pre-reflective aspects of experience as possible. Its name is "descriptive experience sampling method"[18]. It consists in interrupting subjects in the course of their tasks by means of a beep triggered by a random timer, and asking them to report on whatever was going on in their minds a few seconds before the beep. This allows something like "tomographies" of moments of experience of which subjects are usually unaware (because if no beeping had occurred, they would immediately have switched to other aspects of their task instead of pondering upon its experiential context).

To sum up, two crucial points on which the current definition of introspection differs from the classical one, and which may offer it a better opportunity of development are: (i) overt cultivation of contact with, immersion in, mindfulness about an all-pervasive experience, rather than narrowly focused observation directed towards some inner sphere of processes; (ii) techniques for encompassing pre-reflective (or cognitively unconscious) parts of experience in successive fields of attention. Both moves might motivate rejection of the word "intro-spection", but it is convenient to keep it with us in order to avoid minimizing a certain amount of historical continuity.

3.2 *In-principle objections and replies: can introspection be impossible yet real ?*

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[17] Vermersch, , 1994; Depraz, Varela, & Vermersch, , 2003; Petitmengin, 2006; Petitmengin, et al., 2009.
[18] Hurlburt & Heavey, 2006.

Introspectionism of the turn of the nineteenth and twentieth century also stumbled on an impressive list of in-principle objections. Although such objections could not have been sufficient by themselves to destroy the very project of an introspective psychology (because practical success usually bypasses in-principle criticism in the history of science), they contributed to its disrepute when problems of method and lack of consensus about results became too obvious. We shall thus list these objections shortly[19], and outline some replies new introspection has in store for them.

A-The most archetypal objection has already been met, by way of a phenomenological-like redefinition of introspection. We shall then just reformulate it in the terms of those authors who first made it. This objection is that it is impossible to observe one's own experience, because this presupposes a split between subject and object while in this case the object is nothing else than the subject itself. A very early form of this objection was formulated by Socrates himself, in the *Charmides* (167 c-d), in order to challenge a widespread conception of wisdom as self-knowledge : "Suppose that there is a kind of vision (…) which in seeing sees no colour, but only itself and other sorts of vision: Do you think that there is such a kind of vision? Certainly not!" (Roustang, 2009, p. 78). According to one of the platonician dialogues that is most likely to express Socrates' position, then, there is no such thing as self-vision, self-hearing, and by extension self-knowledge because the object must be distinct from the mode of access. But the most well-known version of the objection was stated by Auguste Comte (the creator of positivism): "As for observing (…) intellectual phenomena in their process of execution, there is an obvious impossibility. The thinking individual cannot split himself in two parts, one who reasons and the other one who looks at the reasoning. The observed organ and the observing organ being in this case identical, how could observation take place?" (Comte, 2001). W. James, after J.S. Mill, later echoed this objection, although the way he did so paved the way to his reply in terms of retrospection: "The attempt at introspective analysis in these cases is in fact like seizing a spinning top to catch its motion, or trying to turn up the gas quickly enough to see how the darkness looks" (James, 1890, p. 244).

In view of the remarks of section 3.1, we realize that this kind of objection is directed against introspection as prejudice says it *should be*, rather than against introspection as it *is* in fact practiced. The prejudice is that part of the subject engages in second-order observing or monitoring of

[19] For another exposition of the classical objections, see Petitmengin & Bitbol, 2009; Vermersch, 1999

first-order mental processes. Against this prejudice, many results, including from neurophysiology (Overgaard et al., 2006), are consistent with the idea that introspection merely involves a modified version of those very first-order mental processes.

However, we do not want to discard Comte's objection too quickly. Instead, we shall develop this objection and this prejudice one step further, and then compare it with a similar problem in the history of the interpretation of quantum mechanics. Such lateral strategy will substantiate our reply.

An important development of the alleged splitting of subject and object in introspection was stated repeatedly in the history of psychology: "suppose a particularly persistent introspectionist should desire to introspect the reporting or secondary series, would he not have to assume a third series, and so on, *ad infinitum* and *ad nauseam*?" (Ten Hoor, 1932). This threat of infinite regress of "inner observation" had been identified and discussed much earlier by Harald Høffding (1905), a Danish philosopher who was a major inspiration of Niels Bohr. This is how an unsuspected bridge was established between introspection and quantum mechanics, at the deepest epistemological level. Niels Bohr (1934) indeed tended to make a strong analogy between: (i) the situation of an introspector who wishes to observe herself by splitting into a subject part and an object part, and (ii) the situation of an experimenter in quantum mechanics who is (instrumentally and interpretationally) intermingled with microscopic phenomena, yet wants to observe microscopic objects as if they were separated from her. In both cases, one witnesses a kind of dialectic between the actual inseparability and the alleged necessity of separation between subject and object.

De facto inseparability imposes strong constraints on any attempt at enforcing some sort of artificial distinction between subject and object for the sake of knowledge. As soon as some divide between object and subject is conventionally imposed despite actual inseparability, part of the object to be known happens to be cut off (because it has been retained on the side of the subject which is narrowly intermingled with it). Then, full characterization of a micro-object can be obtained only by means of several "complementary" (mutually exclusive and jointly exhaustive) experimental approaches, each one being associated with one given position of the conventional divide. Similarly, according to Bohr, full characterization of oneself can be reached only by means of several "complementary" introspective approaches.

However, this dialectical strategy advocated by Bohr is very disputable. Isn't it possible to do without any artificial separation of subject and object,

yet approaching microphysical and experiential phenomena in a scientific way? As we argued in previous work[20], this can perfectly be done provided one does not attempt to objectify a putative property behind each *token* phenomenon, but only the structure that enables us to anticipate phenomena of each *class* and under each *type* of circumstance[21]. Such an alternative approach will be developed in subsection 3.4, as part of our discussion of the kind of objectivity that can be reached by introspective inquiry.

B-Let's come now to a second set of objections. Essentially the objection that introspection alters the mental process to be known. There are at least three varieties and many subvarieties of this objection which will be documented in turn before being shortly addressed.

B1 *observational distorsion*

The attitude or operation of introspection *disturbs* the mental flux to be known. This objection was already formulated by Hume : "'tis evident this reflection (. . .) would so disturb the operation of my natural principles as must render it impossible to form any just conclusion from the phenomenon" (Hume, 1962, Introduction).

B2 *Temporal distorsion*

This objection comes in two major guises which we shall now list.

B2.1 One problem is a discrepancy between the fluent nature of experience and the request for stability of knowledge contents. Kant (2002) thus claimed that there can be no knowledge of the soul, because the latter develops in time, whereas one should be able to immobilize it somehow in order to extract some knowable invariant. Similarly, Wittgenstein (1980) insisted that language, whose use is extended in time, can by no means catch experience in its present unstable actuality.

B2.2 Another problem (which may be a consequence of the first) is that what can be captured and mastered in experience is only its *past* unfolding. G.H. Mead and J.P. Sartre (2000) thus pointed out that the "I" itself can only be considered as a reconstruction, or that the "I" is always in the past. But if this is the case, isn't there a risk of deformation or oblivion? Can't there be *a posteriori* falsification of the history of lived experience, by the processes that D. Dennett

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[20] Bitbol, 1996, 2000, 2002.

[21] In quantum mechanics, it is well-known (to the dismay of realist philosophers of science) that the project of objectifiying "properties" behind phenomena can hardly be worked out. Yet, one objectifies a universal anticipative structure which is nothing else than the *state vector,* that generates probabilistic predictions by means of the Born's rule.

(1992) calls "Orwellian" and "Stalinesque"[22]? Isn't experience thus replaced with a rational reconstruction made out of prejudice?

B3 *Interpretative distorsion*

The categories that subjects apply when they describe their own experience are theory-laden[23]. This is a real problem since, as showed by Nisbett & Wilson (1977), subjects are very bad at theorizing about their own mental processes.

Moreover, the use of words alters the experience to be described, and they are even likely to be unable to capture anything properly in experience (this is the charge of *ineffability*).

This series of objections is not as threatening as it looks. Indeed, observational, temporal, and interpretative distorsions can only be called "distorsions" with respect to experience *an sich*, previous to any attempt at observing, catching, and interpreting. In other terms, the previous objections rely on some version of the "myth of the given" (Garfield, 1989). But if we distance ourselves from this myth, a very different picture arises.

Let's take the issue of "disturbance" (Jack & Roepstorff, 2002) as a paradigmatic example of the new picture. Speaking of a process *an sich* that is unfortunately disturbed by the coarse instruments we use in order to have access to it, only makes senses if there is a way of accessing it independently of these coarse instruments. In any other case, this is wild speculation. Such a remark is (or should be) a keystone of the interpretation of quantum mechanics. True, the metaphor of an object disturbed by the experimental contraption was usually accepted by physicists in the first years after quantum mechanics was formulated; and it is still in use in popular science books. But it was soon clear that, if taken seriously, it can only lead to the accusation of the "incompleteness" of quantum mechanics (what is this theory that says nothing about the objects as they are *before* instrumental 'disturbances'?). And this accusation in turn feeds the persistent dream of a "hidden variable theory". The metaphor of disturbance was then soon discarded by Bohr, and replaced by the claim that a phenomenon is co-*defined* by the experimental conditions of its manifestation, rather than *disturbed* by them. Here, the phenomenon is taken as inseparable from its experimental context. The new physics as interpreted by Bohr then bears immediately on these technologically

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[22] Retrospective alteration of history can be obtained in two ways, according to Dennett. In the Orwellian way, somebody first makes one conclusion based on partial evidence, and then changes her memory of having made this previous conclusion in order to accommodate further evidence. In the Stalinesque way, somebody does not make any intermediate conclusion but entirely reconstructs the whole sequence *ex post facto,* when all the evidence is available.

[23] Gopnik & Meltzoff, 1994; Robbins, 2004

holistic phenomena, rather than mediately on putative properties at the same time "revealed" and "distorted" by the apparatus. A similar move has been suggested for introspection: the new introspection bears immediately on reflective experiences rather than on the experience the reflection is about. "Even if the products of introspection are not the direct reflections of underlying thoughts, they are still manifestations of the workings of the mind. Thus, to the claim that spontaneous, unsolicited thought sequences are not reliable documentations of thoughts proper, we retort that we simply do not care" (Shanon, 1984). Saying that "we do not care" is certainly provocative, but it has the merit of pointing towards alternative epistemologies and alternative strategies. One such strategy is precisely to emulate (with suitable alterations) the epistemological approach of standard quantum mechanics, and elaborate an overtly non-representational science of experience (see subsection 3.3).

C-The third set of objections claims that one is systematically mistaken (even apart the attempt at formulating it in words) about one's own experience.

Part of this objection is grounded on the observation that it is very easy for subjects to go astray about the *stimulus* that was applied to them in order to trigger a certain experience. Titchener himself was extremely diffident about the ability of subjects to identify a stimulus: "The subject may see what was not there at all, may fail to see much of what was there, and may misrepresent the little that he really perceives; introspection adds, subtracts, and distorts" (Titchener, 1912). More recently, criticisms have been formulated against the propensity subjects have to say that they have seen more than can be evidenced (Cohen & Dennett, 2011), or against their inability to see major parts of what occurs in front of them if their attention is distracted (as shown by experiments of "change blindness" (Silverman & Mack, 2006).

This objection is an amplification of the charge of distorsion or incompleteness against introspection formulated in objections B. However, as we shall soon see (subsection 3.3), this charge might well be excessive or misplaced.

D-The fourth and final group of objections focuses on the purely subjective status of introspective descriptions, and on the fact that the situation it concerns is irreproducible. Thus, according to Wundt's early but harsh criticism, unless it is constrained by a strong experimental environment of control, introspection is doomed to extreme idiosyncrasy: "introspective reports offer no means for independent checks by which they may be evaluated. Indeed, the reports are irreplicable not only by others but even by the particular introspector himself" (Shanon, 1984). If this is so, a

verbal report of introspection only concerns the person who reports at a certain time; it teaches us nothing about other persons and not even about the same person at other times.

This is probably the most serious objection of all, but as we shall see (subsection 3.4), the renewed conception of objectivity that arises from a non-representational view of science similar to the view favored by standard quantum mechanics, also suffices to meet it.

We gather from all these objections and sketchy replies that the most crucial weakness of the introspectionist wave of the turn of the nineteenth and twentieth centuries is likely to be its unconditional acceptance of the classical, representationalist, theory of knowledge. Since, despite so many blows (including from the contemporary cognitive science[24]), this theory still remains very present in our philosophy of science, it is worth insisting on its deficiencies.

3.3 *An inquiry into the meaning and truth of introspective reports*

In a non-representationalist epistemological framework, the issue of the truth or reliability of introspective descriptions is likely to be given a completely new meaning. This subsection is devoted to documenting this change by steps.

The first criterion of truth that comes to mind under the presupposition of a representationalist theory of knowledge, is that introspective descriptions should be faithful to the experimental or environmental input that triggered the experience reported. This (too) simple idea has long been criticized in old introspectionism, and replaced with the criterion that an introspective description should only be faithful to a slice of experience (rather than to what it is an experience *of*). Titchener thus wrote : "The question, (…) so far as the validity of introspection is concerned, is not whether the reports tally with the stimuli, but whether they give accurate descriptions of the observer's experimental consciousness; they might be fantastically wrong in the first regard, and yet absolutely accurate in regard to conscious contents" (Titchener, 1912). Here, it looks like Titchener accepts the correspondence theory of truth which goes along with a representationalist epistemology, although he applies it to "conscious contents" rather than to "stimuli". We shall come back to this point soon, but let us first dig more carefully into what the followers of the American introspectionist school called "the stimulus error" (Boring, 1929), namely

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[24] Varela et al.1991; Thompson, 2007. The enactive theory of knowledge, advocated in these books, has many resources in store to weaken representationalism.

the error of asking introspection for something it cannot give, namely faithfulness to an external stimulus.

This prescription *not* to seek correspondence between introspective data and stimuli might well have been directed against the first German school of introspection, namely Wundt's. But in this case, the criticism is probably excessive. Indeed, with the help of the many instruments of his laboratory, Wundt focused his inquiry on very limited introspective reports having the form of judgments of time-characteristics (duration or simultaneity), number, and intensity of *stimuli*. Moreover, under strict experimental control, his introspecting subjects turned out to be reasonably faithful to the stimuli that were imposed to them. In agreement with Fechner, but with extension to many types of physical excitations, Wundt was able to state with confidence that "The increase of stimulus necessary to produce an equally noticeable difference of sensation bears a constant ratio to the total stimulus-intensity" (Wundt, 1901, p. 31).

A modified version of Wundt-like introspection has been revived recently with considerable success (under the name "quantified introspection" (Corallo et al., 2008), and it also yields a positive outcome about the accuracy of simple reports. In this case, the reports bear not on the stimuli themselves, but on the time spent by subjects to perform a certain task involving simple stimuli. It appears then that there is a very strict correlation between the measured response time and the subjectively assessed response time (although there is a systematic discrepancy between the *absolute* values of these times). However, this good correlation is disrupted when a second tasks interferes with the first, which is interpreted by the authors as the sign of a competition between the two tasks for their access to the global workspace of the brain cortex. So, here again, we have a preliminary indication that some judgments about the inaccuracy of introspective reports which are related to the stimuli that triggered the experience to be reported are too hasty and overrated. In certain cases, and under narrowly controlled conditions, the reports can be accurate. The suspicion of inaccuracy about stimuli, being partly misplaced, is then not sufficient to motivate the rejection of introspection.

Another indication that introspective reports may be less inaccurate about their stimuli than is usually thought, can be found in disguised introspective work of the allegedly behaviorist era. One such research casts doubts on a widespread anti-introspectionist prejudice of cognitive scientists (after Dennett). According to this prejudice, subjects are systematically wrong about their pretending to see a whole scene extended in space, for they are in fact unable to describe most details of this scene when they are asked to do so. But an interesting work by G. Sperling

(1960) showed that things might be much more intricate than this, and less challenging for first-person access. Sperling briefly confronted subjects with a table of letters, and asked them to report the letters they could remember. Subjects usually claimed they had an iconic memory of the whole table, but, irrespective of the size of the table, they could hardly report more than 4 letters from it. Was their claim of being able to *see* the whole table after its presentation completely illusory? Further inquiry ruled out this negative interpretation of the initial reports. Subjects were asked to concentrate on a single line in the table, and to list the letters of *this* line. The outcome is surprising: subjects were able to report about 4 letters of *any* line chosen at random by the experimenter. Although the debate is still raging (Kouider et al., 2010), there are stronger and stronger reasons (Block, 2011) to accept that subjects indeed have a short-term iconic memory of the whole table, with all its details, but that this memory began to fade away as soon as a few letters were mentally attended and listed by them. To sum up, the initial introspective report of the subjects was much more accurate than usually suspected.

The way this accuracy was brought out is also very instructive: (i) put subjects in a situation of success rather than a situation of failure (i.e. choose the task in which subjects display optimal performance, and thereby substantiate their claim of seeing the whole table); (ii) help them by asking focused questions about what they lived, rather than dispersing their attention by questions either too abstract or too broad in scope. Sperling's experiment conveys, by contrast, an important lesson about the way we should interpret Nisbett and Wilson's influential negative result[25] about the accuracy of introspective reports: this negative result was precisely obtained by systematic avoidance of the two former rules. Nisbett & Wilson's subjects were intentionally put in a situation of failure regarding their esthetic choice of a human face, among the two that are briefly presented to them; and their attention was diverted from contact with lived experience by abstract why-questions ("what is the *reason* of your choice" ?). In good agreement with this evaluation, one of us (CP) recently achieved a clear experimental confutation of Nisbett & Wilson's anti-introspectionist claim (Petitmengin et al., 2013). The method consisted in rehearsing their protocol[26] while complementing it with a careful

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[25] Nisbett &Wilson, 1977; Johansson et al., 2005.

[26] Nisbett & Wilson's protocol consists in demanding subjects to choose quickly between two items, and then presenting them with the wrong item while asking to explain why they chose it. The outcome is that 70% of subjects do not detect the cheating, and candidly give a fancy explanation. This seems to justify strong diffidence towards introspecting one's own cognitive processes. In the experiment of Petitmengin et al., a careful explicitation of *how* the subjects initially made their choice is performed before the wrong

intermediate explicitation of the "how" of the experience of subjects, thus automatically bringing into play the two rules of maximal accuracy of reports.

Another *locus classicus* of the criticism of introspection, from which J.B. Watson inferred that a true science of mind could only be grounded on the study of behavior, is the famous unresolved quarrel of "imageless thought"[27]. This time, the threat to introspectionism looks even more serious than before, since the issue no longer bears on the ability of introspective reports to be faithful to the stimulus that triggered experience, but on their faithfulness to experience itself. In the heyday of introspectionism, the researchers of Titchener's school at Cornell University claimed to have brought out the presence of sense elements, kinesthaetic feelings, and images associated to *every* thought process (Titchener, 1909), whereas the researchers of the Würzburg school, such as Külpe, Mayer, Orth, etc. (Humphrey, 1951, p. 30), declared that there exists imageless and even "nonsensory" thought. These stubborn conflicting claims (by two groups of researchers who had been students of Wundt) were associated with mutual methodological criticism. Titchener worried about the incomplete reports of untrained subjects (Nahmias, 2002), whereas the members of the Würzburg school wondered about the effects of theoretical prejudice. As K. Danziger (1980) pointed out, this quarrel was especially distressing, since it showed how "theoretical differences could readily be made to take on the form of differences in the data themselves". However careful examination of the texts in which the debate about imageless thought developed has shown that the nuclear proto-interpreted data could after all be isolated from the school-related theoretical bias, and that in this case, no true divergence persisted[28]. Subjects of both schools indeed reported the existence of "vague and elusive processes, which carry as if in a nutshell the entire meaning of a situation" (Titchener, 1910) and which involve kinaesthetic sensations. But they did not interpret these reports the same way (one school assimilated this to some sort of blurred image, whereas the other one rejected that reading); and both schools probably missed a more faithful description of them in terms of "felt meanings" (Gendlin, 1962).

More than a failure of introspection, the outcome of this controversy clearly indicates what kind of work should be done in order to reach a possibility of intersubjective agreement: stepping down as much as

item is presented to them. In this case, only 20% of the subjects do not detect the cheating. And even these residual mistakes can be provided with an experiential rationale.
[27] Ogden, 1911; Woodworth, 1906.
[28] Hurlburt & Heavey, 2001; Goldman, 2001.

possible on the scale of rational reconstructions, explanations, or generalizations, and, once again, sticking as much as possible to the "how" of experience. Phenomenological-like reduction is a basic requirement, one which relies either on the expertise of subjects or on the expertise of experimenters who, having mastered it in their own experience, can induce it in their subjects by means of a series of basic instructions and carefully selected questions.

In any experimental science, identifying "facts" requires a process of descent along the hierarchy of theory-ladenness; not of course in order to reach a realm of "pure uninterpreted content", but only to pick out a level of interpretation that is beyond discussion in a certain state of culture and research. Consensus on facts can be reached either by relying on a level of theorizing that is unanimously accepted because it is "paradigmatic", or (in revolutionary science) by coming as close as possible to the tacit presuppositions of elementary embodied know-how (in the sense of knowing how to *act*). In introspection, the process of descent must be pushed even further because the level of possible consensus to be reached does not concern our knowing how to *do,* but rather our knowing how to *be* (in order to gain extended access to one's own experience). Just as ordinary know-how-to-act is learned by non-verbal interaction, imitation, and acquisition of a skill, rather than by transmission of ideas, knowing-how-to-be can be learned by direct contact with experts and appropriate training (Wallace, 2000), rather than by transmission of theories about the status of phenomenological-like reduction.

But how exactly can one ascertain the "faithfulness" of first-person reports, independently of any relation with the stimuli that triggered experience? One may distinguish two levels of faithfulness assessment: (a) signs of reliability, and (b) criteria of validity.

(a) As we have just seen, there is at least one index whose presence would lead to strong suspicions against faithfulness of first-person data: lack of consensus about general structures of lived experience. Conversely, one may take consensus about structures as an index of faithfulness, although this consensus might well be partly induced by theoretical (or sub-theoretical) prejudice as in the Würzburg and Cornell schools. To avoid the latter bias as much as possible, we need *individual* signs of reliability that may help us to increase the degree of confidence of each interview taken apart. Such signs are currently in use, and their significance has been carefully discussed[29]. They are detected in the form of bodily attitudes and rythms of speech that indicate actual contact with one's

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[29] Vermersch, 1994; Petitmengin, 2006; Hendricks, 2009.

experience during the process of reporting. However, one must keep in mind that such signs are taken as good ground for reliability only because they are connected with first-person access of the interviewers (and of human beings in general) to the experiential correlates of similar signs within their own bodies. This confirms that faithfulness of first-person reports can be ascertained only by intersubjective criteria; there is no external "absolute" evidence.

(b) The same can be said when criteria of validity, or even *truth*, of these reports are sought. Indeed, there is at least one thing that we can say for sure: there is no way of comparing directly an experience *an sich* and its alleged report; neither for experimenters nor interviewers, nor for the subjects themselves. This is obvious for experimenters, but this is also clear for subjects themselves, since their own act of "comparison" is a new experience in which the former experience to be reported is merged and recast. So, how can we sort out this difficult epistemological situation? By relying on sound epistemology, rather than on the old representationalist and dualist epistemology that was dominant among the psychologists of the turn of the nineteenth and twentieth century.

To take a significant step in this direction, we may conveniently come back to Kant, who was lucid enough to see that the dream of direct comparison and one-one correspondence, far from strengthening ordinary representationalism and dualism in the experimental sciences of nature, undermines it. The age-old objection of skeptics, according to whom we have no "absolute" access to things (no access apart from the causal relations we have with them), and that therefore we can say nothing about what they are *in themselves* apart from the effect they have on us, was addressed by Kant in a very innovative way. He first aknowledged that we indeed have no apprehension of objects apart from our very procedure of access (Kant, 1988, Introduction). Then, instead of trying to prove the correspondence between knowledge contents and some independent object "out there", he *defined* the object as whatever phenomenon is shaped by the class of intellectual operations used in knowing. The appropriate intellectual operations here aim at picking out the component of experience that vary in the same way (i.e. in a law-like way) irrespective of the personal, spatial or temporal situations. This stable component of experience is considered "objective" *by definition*, and not in virtue of its (doubtful) correspondence with some extra-experiential reality. This suggests that skepticism about any region of knowledge cannot be overcome by relying on some external warrant, but only by using *internal criteria*. At most one can attempt to expand the circle of internal consistency by articulating two or more regions of knowledge.

Accordingly, when we look for criteria of validity of first-person reports able to resist skeptical doubts, we completely bypass the fruitless search for their *correspondence* with putative "private objects" and rather try to establish criteria of *self*-validation. We also exploit the opportunities of *mutual* validation offered by articulating the domain of first-person reports with several areas of cognitive science.

This strategy fits remarkably well with current philosophy of science, which is undergoing a major paradigm shift. The traditional debate about whether scientific theories are able (or not) to provide us with a faithful description of an independent reality is fading away. Many philosophers of science now realize that describing science as a passive face to face between the purely mental realm of theories and an extra-mental reality, is a highly implausible picture. The crucial role of experimental and social activities in the elaboration of scientific knowledge is increasingly aknowledged (despite many controversies). So much so that experimental gestures, mathematical practices, and social debates are no longer seen as mere neutral windows opening on "pure" reality. Instead, they are understood as an interfacial matrix of ongoing agency, out of which strategies of theoretical prediction and conceptions of reality able to guide their use coemerge[30]. An alternative way of tackling skeptical doubts follows from this new philosophy of science. Here, as in Kant, answering skeptical doubts no longer amounts to showing that there exists a one-to-one correspondence between theoretical symbols and real properties. It rather requires the displaying of successfully-tested patterns of technological actions that have stabilized, have been adopted collectively, and have then been connected to one another in coherent networks. In other terms, the new kind of answer to skepticism relies on a pragmatical coherentist conception of truth, rather than on a correspondence theory of truth.

The same attitude towards skepticism can be adopted when the validity of first-person reports is at stake. This was already suggested in a pioneering paper by B. Shanon (1986), and in an increasing number of articles since then (Petitmengin & Bitbol, 2009). These authors pointed out that standard critiques just show that introspective data cannot be evaluated on the basis of correspondence; and that this is not to be wondered about or regretted, since after all no other data, not even in experimental science, are *really* evaluated this way. The alternative is then evaluation on the basis of performative coherence, where "coherence" can concern several levels of practice: internal coherence in self-assessment and report[31]; interpersonal

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[30] Pickering, 1995; Gooding et al. (Eds.), 2005; Galison, 1987.
[31] Bitbol & Petitmengin, 2013

coherence in dialogue (see above); and triangulated coherence in a network connecting introspective reports with experimental practice in psychology and neurology (see subsection 3.6). Just as, according to the second Wittgenstein, language must take care of itself (without foundational security in logic), introspection must take care of itself as much as possible (without foundational security in "correspondence" of any kind).

3.4 *The quest for objectivation*

Objection D in section 3.2 appeared to us as the most serious challenge to introspection. Here, we shall address it in the same spirit as the problem of *validity* of introspective reports.

The challenge is expressed as follows: what do these strange tales told by subjects about their own experience teach us about the objective world? Isn't their significance restricted to each one of the subjects who provides them? Can't one understand the reluctance of mid-twentieth-century psychology towards the participative, empathic or idiosyncratic aspects of introspection that only worsen the wandering of the science of mind in the swamp of subjectivity? In order to persuade ourselves that this objection is not as devastating as it seems, we can use once again a certain similitude between introspective psychology and microphysics. The questions just raised indeed remind us of two related questions a Copenhagen quantum physicist might have asked. According to Bohr's analysis, each quantum phenomenon is a unique and irreversible event arising from the interaction between a micro-object and a macroscopic measuring apparatus; moreover, there are few and only very stringent circumstances in which the phenomenon can be reproduced when the measurement is repeated on the same object. What do such isolated micro-phenomena teach us about the object *as it is in itself,* independently of the measuring apparatus and its interaction with it? Isn't their significance restricted to single runs of the micro-experiment? This puzzlement by no means hindered the development of quantum mechanics into one of the most powerful physical theories in history. We then just have to find out what, in the methods of physics, made this overcoming of the (virtual) objection possible even before it was formulated.

To begin with, one must remember the most important consequence of Kant's redefinition of objectivity, as documented in the previous subsection: objectivity (in the only acceptation which is relevant for us knowing subjects) is not something to be found ready-made *out there*, but a project of operational extraction of invariant or covariant structures out of a cluster of appearances. So, the issue of whether or not single events teach

us something objective is to be decided on a methodological, *not* on a metaphysical plane. What should be the method, in order to reach objectivity *qua* invariance?

Extracting invariant or covariant structures relies on a process of ascent in generalization and theoretical abstraction, opposite to the initial process of descent which is necessary to reach a nucleus of discourse taken as "factual" or "data-like" (see subsection 3.3). In other terms, objectivity is generated ("constituted", writes Kant) by selecting an appropriate level of generality or coarseness, such that invariant structures may arise at that level. In the domain of validity of quantum physics, this procedure is implemented thus. One first renounces objectivation at the level of individual phenomena occurring in space-time (this is the reason why the ordinary concept of minute localized bodies is in jeopardy). This being done, one then ascends towards the level of statistical variables. Indeed, as one soon realizes, the strict reproducibility and indifference to order of measurement that is usually missing at the level of individual values is recovered at the level of their statistics. Finally, one ascends a step further, towards the upper level of formal tools able to generate as many statistics as measurement types, and as many probability assessments as measurement tokens. These formal tools are nothing else than the state vectors in a Hilbert space. State vectors are precisely the maximal invariant structures used by quantum physicists; they therefore play the role of objective entities without bearing the smallest resemblance with our archetypal image of the objects of physics, namely material bodies.

The procedure should be the same for introspection: descent and ascent.

(1) Descent towards minimally interpreted descriptions of the subtlest lived events, without any attempt at asking the *subject* to reconstitute her own cognitive processes (which are actually just as little accessible to subjects as to scientists), or to explain her "reasons" *in abstracto,* or to stipulate her intended meaning. In other terms, a very careful process of phenomenological reduction must be asked from, or induced in, the introspecting *subject*. This process can be repeated, and its outcome reproduced, in many subjects.

(2) *A posteriori* ascent of the *scientists* who are analyzing the introspective reports construed as data, towards structures generic enough to be seen as stable and invariant across subjects and circumstances. As B. Shanon cogently pointed out, "structures are less particular than content: they are not associated with the introspector's idiosyncratic experiences, nor are they likely to be affected by the process of data collection itself". One must then look for these structures at a level of number and generality where variations progressively vanish: "While single pieces of data provide

only a limited, haphazard view of the phenomenological domain of interest, the corpus in its totality can reveal regular, systematic patterns. The corpus reaches a state in which an increase in the number of tokens ceases to increase the variety of types" (Shanon, 1986).

This two-step procedure is exactly the one we apply when we practice the method of elicitation of experience by interviews: (i) being very careful in guiding subjects towards exquisite contact with their experience and undoing any rational reconstructions or generalizations that may interfere with their task of description; (ii) retrieving the data extracted from these disciplined descriptions and extracting generic structures out of them. But what must be added at this point is that the extraction of generic structures is *de facto* guided by what might well be a neglected yet pervasive criterion for recognizing that the import of an introspective description is not purely personal: the conviction that we could easily share this description of our fellow human being; the felt certainty that it also concerns *us*. Is this indispensible commitment of the scientist a weakness, or rather the strength and true interest of first-person research? Readers will decide for themselves, hopefully after having engaged in such a research.

3.5 *The science of mind as practice*

An additional reason for the official demise of introspection at the beginning of the twentieth century might be its close association with a grey, cumulative, atomist, narrowly empirical conception of science that was already outmoded. An analogy between the task of the introspectionist psychologist and the task of the chemist who carefully identifies the ultimate elements of matter was often developed. The metaphor of "elements", that may have been inherited from E. Mach's earlier characterization of sensations, was all-pervasive: "introspective study by competent psychologists has led to the general acceptance of certain mental data as the principal *elements* of experience (sensory, imaginal, affective)" (Warren & Carmichael, 1930, p. 59). Accordingly, the explicit reference to chemistry, which shares with introspection an "analytic" attitude, was not rare: "Descriptive data about the constitution of the mental processes ought to be as important to the psychologist as the chemical constitution of physical substances to the chemist (Moore & Gurnee, 1930). Many psychologists of the time complained about the quasi-obsessional lists of rules and limitations which was supposed to promote the analytical attitude in introspection (but which separated schools from one another on methodological ground), and about the boring nomenclatures of results that arose from laboratory work: "Introspection with inference and meaning left

out as much as possible becomes a dull taxonomic account of sensory events which, since they suggest almost no functional value for the organism, are peculiarly uninteresting to the American scientific temper." (Boring, 1953)

Another aspect of the criticism, implied by the former quoted sentence, is the lack of immediate practical impact of these analytical introspective findings. Watson and the behaviorists immediately took advantage of this, and opposed their conception of an applied science to the conception of an exclusively cumulative knowledge. The emphasis was shifted from Baconian empiricism to pragmatism: "The practical end is to determine upon what human capacity depends and, in the light of this knowledge, to discover means of increasing man's efficiency" (Watson, 1913). The true advantage of behaviorism was that it was more immediately *expedient*. Titchener could then only reply, in the name of his school of systematic introspection, by rebuking the behaviorist tendency to mix up pure science with applied "technology" (Titchener, 1914). Here, it looks like behaviorists had a point. Unlike the introspectionists, they did not idealize science, and they were right. True, science does not reduce to any *particular* technology, but converging lines of epistemological research have shown how much scientific theories owe to the project of optimizing and unifying our practical abilities to predict and intervene[32]. Moreover, society as a whole is not very patient with scientists exclusively interested by "pure, disinterested, knowledge"; it is expecting at least long-term benefits (where "long" usually means only a few years). No wonder, then, that Titchener-like introspection only survived as an optional psychotherapic technique (Jacobson, 1934).

Modern introspection seems to fare better in this respect. Firstly, it fully recognizes the uneliminable contribution of mental *procedures* of reflection in the generation of introspective data (Shanon, 1986). Secondly, practical applications of interview-directed introspection in education, ergonomy, management science, have been developed (Vermersch, 1994). Introspective techniques have also been applied with success to various psychiatric or neurological pathologies[33]. And they can in certain cases (such as epileptic seizure) considerably help patients to master their own disease and even tame it[34].

3.6 *Neuro-phenomenology: an extension of the basis of coherence*

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[32] Piaget, 1974; Hacking, 1983; Pickering, 1995; Bitbol, 1998.
[33] Alajouanine & L'Hermitte, 1964; Hurlburt, 1990; Hurlburt, 1993.
[34] Schmid-Schönbein, 1998; Petitmengin et al., 2006.

Some authors have proposed to rely on neurophysiological studies either to discard or to corroborate introspective reports[35]. But this is a lopsided approach that does not take into account the opposite procedure: namely the (explicit or implicit) use of introspective reports to ascribe functional meaning to certain areas or processes in the brain. So, we need a more balanced approach. This was first suggested by O. Flanagan (1993) under the name "triangulation": according to him, we have to study the mind from various angles (phenomenological, psychological, neurological, and even computational), none of which is likely to be reduced to any of the others. The conception of truth that arises from this approach fits well with the idea of performative coherence, yet it paves the way towards an extension of the basis of mutually coherent practices. Instead of seeking internal performative coherence in restrictive areas of research, one undertakes a general interconnection of these areas, posits constraints of mutual consistency, and thereby gains a much stronger ground for the reliability of knowledge.

This program really took off with F. Varela's neurophenomenology (Varela, 1996). In neurophenomenology, one neither tries to reduce the subjective to the objective, nor the other way round; one rather sticks to the experiential realm out of which the subjective-objective dichotomy arises, and then posits *within it* a system of *mutual constraints.* Mutual constraints are enforced between first person statements of phenomenal *structures,* and third person descriptions of those phenomenal *invariants* that are established by the collectively elaborated neurosciences. These mutual constraints between first-person reports and neurological findings indeed have to be imposed, rather than found out there as glaring neuro-experiential correlations. The neuroscientific and experiential categories have to be mutually adjusted in order to become fully comparable and in the end compatible with one another. This requires both formulation of appropriate neurological concepts (such as long-range cortical correlations, or temporal binding of neural activity), and full use of methods of introspective report[36].

The fruitfulness of this method was soon brought out. A. Lutz (2002) probed into the experience of recognizing a 3D geometric shape after staring at an autostereogram, which is an organized dot pattern with binocular disparities. Subjects were first asked to press a button when the shape had completely emerged, while their brain activity (especially the long-range correlations of the cortical electrical activity) was recorded. At this level of minimal introspective reporting, many discrepancies arose in

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[35] Coghill et al., 2003; Klasen et al., 2008.
[36] Bitbol, 2002 Bitbol, 2006; Gallagher & Zahavi, 2007.

neuro-experiential correlation. The usual solution that consists in averaging out the discrepancies was rejected, and the subjects were asked instead (by means of the interview method of elicitation) to describe in exquisite details the state of mind in which they found themselves while being given the task. It then turned out that one could define clusters of subjects according to the level of their preliminary attention, and that in this case virtually no neuro-experiential discrepancy subsisted. This was a clear illustration of the fact that one has to *look for* the proper locus of neuro-experiential correlation, or in Kantian terms that one must *constitute* this correlation by way of mutual ajustments of neurological and introspective procedures, rather than just "discovering" it. Conversely, individual introspective reports gained credibility by comparison with their introspectively interpreted neurological correlates. A new network of performative coherence was established, thereby providing us with an extended basis for ascribing some sort of truth to introspective data. This kind of network, which includes functional neurophysiology, was clearly lacking in the first wave of introspection.

4. Conclusion

So, was the disappearance, or rather concealment, of introspection during the twentieth century inevitable? The question at this point is not whether we could have formulated other successful theories or not, as in many studies of contingency in science; it is whether we could have avoided going astray as we did or not. We believe this misapprehension was virtually inescapable. But this inescapability was not due to some insuperable obstacle that doomed any attempt in this direction, or to an inherent flaw of introspection as such. It was due to contingent historical conditions and epistemological misunderstandings that gave precedence to concurrent methods and paradigms in the science of mind. These circumstances, as we have documented them in the course of this article are : lack of interest and expertise in contemplative disciplines that could have promoted the indispensible phenomenological-like "reduction" (too cryptically) characterized by Husserl; poor understanding of how the regulative ideal of objectivity is pursued (rather than found ready-made out there); dominance of a representationalist view of cognition and science; correlative dominance of a correspondence theory of truth; lack of an extended basis, including functional exploration of neural processes, for establishing the truth-as-coherence of introspective reports; search for immediate and cheap efficiency of psychological practice; lack of understanding and mastery of the way non-behavioral psychotherapic

methods (including psychoanalysis) work and can be improved; etc. Had these historical circumstances been different, the whole development of the science of mind and the resulting philosophies of mind would have been very different.

Here, we witness the effect of a contingency of methods rather than only theories, of which a celebrated example has been given by Peter Galison (1997). This author pointed out that the representation of the micro-world was very much influenced by a methodological bias: according to whether physicists made a predominant use of Geiger-type counters or bubble chambers, they showed theoretical inclination towards the "logic tradition" or the "image tradition" respectively. Similarly, the representations and ontology of the mental domain have been hugely influenced by the long-term dismissal of introspective approaches; and we can hence easily figure out what these representations and ontology would have been if introspection had been given enough credentials. Instead of overdeveloping third-personal inquiry into behaviorism and brain physiology, and pushing aside first-person and second-person research as mere tools for folk-psychotherapy, one would have promoted an advance of both third-person and first-person disciplined research locked to each other in thorough interaction and "mutual constraints" (Bitbol, 2012). Moreover, instead of favoring eliminativist, reductionist, or functionalist views of mind, and over-correcting these views by dualist or mysterianist antidotes, one would have found a dissolution of the well-known problems of the philosophy of mind in a balanced approach of the many facets, third-personal and first-personal, objectifying and participative, of "the world as we found it" which is nothing else than lived experience. Finally, instead of discussing endlessly about the capacity of our theories to hook onto the real world, one would have reconsidered the very concept of reality by exploring the ground wherefrom it first arises, namely the process of generating structures that are invariant across the manifold situations of sentient subjects. This alternative project of development of the science of mind, and of science in general, is exactly what awaits us.

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