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Visual hallucinations: history and context of current research

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1.1 Introduction

‘Visual hallucination’ is the name of a class of heterogeneous phenomena which share as a common feature the report that a subject (the ‘hallucinator’) is entertaining a putative ‘visual’ image of something placed in the public space that others cannot see. Hence ‘absence of an object to be seen’ has become part of its conventional definition. ‘Images’ may range from simple dots to complex forms in movement. This chapter will deal only with the latter. The hallucinator’s report can be interpreted as meaning that he is entertaining a visual image or that he only believes that he is so doing, as it might well be the case with psychotic or obsessional hallucinations (Castilla del Pino, 1984; Gimenez, 2000; Fuentenebro and Berrios, 2000).

Disambiguating such reports is not always straightforward. On occasions, it can be reasonably claimed that proxy representations of the image in question can be ascertained by technical means (e.g. neuroimaging) as may well be the case in regard to so-called ‘organic’ or ‘provoked’ visual hallucinations (Berrios, 1985; Manford and Andermann, 1998; ffytche, 2007). However, when the proxy representations are counter-intuitive and merely correlational, that is, when changes do not seem to be related to those brain regions obviously associated with visual perception (as it seems to be the case with some visual obsessional or psychotic hallucinations) (Boksa, 2009) then disambiguation becomes problematic. The possibility that the hallucinator is only expressing the belief that he is entertaining a visual image cannot be easily dismissed (Castilla del Pino, 1984; Gimenez, 2000).

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Therefore, it is likely that the class ‘visual hallucinations’ is but a mixture of clinical phenomena which are different from each other, both from the phenomenological and aetiological point of view. Indeed, this was the way they were perceived until the ‘unitary’ view was first proposed during the early nineteenth century (Berrios, 1996). Historical accuracy requires that two ‘unitary views’ are distinguished: UV1 refers to the view that ALL hallucinations, regardless of their sense modality, are structurally the same phenomenon; and UV2 refers to the view that all visual hallucinations, regardless of the disease in which they appear, are the same phenomenon. Ever since UV1 and UV2 became the official view, voices have been raised against them (for a detailed analysis of this literature see: Ey, 1957, 1973; Lanteri-Laura, 1991).

Before the nineteenth century there was no unitarian view of visual hallucinations (UV2). Visions, apparitions, phantoms, fantasies, imaginings, contemplations, supernatural insights and so on were all conceptualized as different phenomena in their own right (Tyrrell, 1943; Green and McCreery, 1975; Berrios, 2007). Some of them were considered to be pregnant with meaning to represent forms of communication between god, unknown forces and man or between men themselves. By the early nineteenth century, in what became the scientific approach to hallucinations, these experiences were shelled out of all semantic content, lumped together and treated as mechanical ‘disorders’ of the brain. Although the semantic view of hallucinations still lingers on, both in folkloric Western psychology and in some non-Western cultures, it cannot be said to have the force of the scientific view.

The current general concept of hallucination and that of visual hallucination were both constructed during the early nineteenth century (Ey, 1939; Berrios, 1996). Although there have since been debates on their aetiology, the conventional assumption remains that hallucinations in general are a disorder of perception (Berrios and Marková, 2012), and the same applies, *mutatis mutandi*, to visual hallucinations. This has made debates on the nature of visual hallucination dependent upon changing theories of visual perception (Hamlyn, 1961).

It remains to be seen whether UV2 should be considered epistemologically superior to earlier views, that is, whether it is more helpful both to the understanding and management of these phenomena. This can only be decided by empirical research. Unfortunately, no one seems interested in carrying out studies comparing UV2 against earlier taxonomic and aetiological views of visual hallucinations.

By the end of the nineteenth century, the current ‘operational’ definition had been put together (Berrios, 2005). Visual hallucinations: (i) were to be defined as reports of real visual images of unascertainable public objects – not of the belief that the person was experiencing an image and (ii) which regardless of their phenomenology or clinical associations resulted from pathological changes in the visual system. Agencies external to the body (such as spirits or ghosts) were no longer to be considered as part of the explanatory model. ‘Personality’ and ‘culture’ were allowed within the explanatory model but only to account for the ‘content’ of the visual hallucination (i.e. thus according to their ‘culture’, hallucinators may see a devil, a dragon or whatever).

From the above, at least three conclusions can be drawn:

1. The phenomena currently called 'visual hallucinations' do not seem to be ontologically stable 'natural kinds' but will-o'-the-wisp phenomena, which in each historical period have been configured in a different way.
2. To 'understand' these phenomena properly (and hence to manage them) a set of tools is required, which may be more complex than any offered by the neurosciences and,
3. To discharge their brief, we will need to sketch the history and epistemology of: (i) visual hallucinations and (ii) the social activity called 'research' and explore their historical interactions.

Historical analysis shows that UV2 has become a hindrance to the understanding of visual hallucinations. Exploring their neuro-mechanics or mapping them in the current language of cognitive neuropsychology is bound to be insufficient. Per contra, this chapter will put forward the view that: (i) before empirical research starts in earnest much work on the clinical phenomenology and taxonomy of visual hallucinations needs to be done and (ii) a new taxonomic approach will show that 'visual hallucinations' names a rag bag of heterogeneous phenomena, each of which will require a different aetiological account. Lastly, because subjects suffering from these clinical afflictions may need direct clinical intervention, conceptual and ethical auditing become particularly important in this type of research.

1.2 The construction of visual hallucinations

1.2.1 History

The history of visual hallucinations can be broken up into four periods. The first period extends from Classical times to the beginning of the nineteenth century (Berrios, 1996). At that point, a physiological period started in the work of Johannes Müller (Berrios, 2005). A hermeneutic period developed after the 1850s and is characterized by work on dreams, parapsychology and the reappearance of the moot question of 'hallucinations in the sane' (James, 1995). The organicist period starts with the work of Tamburini (Berrios, 1990a, 1990b) and can be said to continue to this day. To some extent, these four periods run into each other (Géraud, 1989).

1.2.2 Classical period

Reports of visions and apparitions can be found very early in history (Calmet, 1641; Dufresnoy, 1752; Amat, 1885). Often considered as epiphanic occurrences, that is,

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as divine revelations, these phenomena were explored with tools borrowed from the theological analysis of the soul and its relationship with the deity (Bona, 1676). The resulting taxonomy, metalanguage and hermeneutic approach provided the model for the later philosophical analysis of visual hallucinations.

St. Augustine wrote: “Three kinds of visions take place; one with the eyes, when you see the actual letters; another with the human spirit, by which you think of your neighbour even though he is not there; a third with the attention of the mind, by which you understand and look at love itself ... let us call the first vision ‘bodily’ ... the second ‘spiritual’ ... the third one, finally, ‘intellectual’” (Lit. Meaning. Genesis. 6. Book XII, 6.15,16). This analysis was to be repeated many times in the history of Christian theology until its culmination in the great works of Calmet (1641) and Bona (1672).

That apparitions and other ‘visual’ experiences could be empirically studied was first suggested by Augustin Calmet (1641), a Benedictine monk who proposed that: (i) apparitions of angels, demons and souls were real enough, (ii) the mechanisms involved remained obscure and (iii) God had left to humans the task of finding out the said mechanisms.

Cardinal Bona (1676) in turn differentiated visions from apparitions: the former were images of subjects known, the latter of subjects unknown. There were three types of apparitions: corporeal, imaginative and intellectual. Corporeal apparitions were a supernatural manifestation of an object to the eyes of the body. It could consist in an actual figure striking the retina and triggering a normal act of vision or in a change in the eye caused by a superior agent (in this case there was no need for the actual figure to be present in front of the eye). Imaginative apparitions consisted of the representation of an object by the act of imagination alone without the aid of the visual organ. The difference between a normal imagining and the apparition was that in the former the imagination was stirred only by a natural agent, the will of the subject, or some force, whereas in the supernatural imaginative apparition, it was a supernatural agent that directly acted either on the imagination itself or on those forces known to stir the imagination.

Intellectual apparitions perceive the object without a sensible (sense-data) image; they take place in the pure understanding, and not in the reasoning faculty. Intellectual visions are of a supernatural order when the object (content of the ‘vision’) is of a depth or extension that exceeds the natural range of human understanding (e.g. the essence of the soul, or the nature of God or the Trinity). These visions can be long-lasting and are often accompanied by other signals and effects such as a persistent light, feelings of Divine love, peace of soul, and so on (as was the case with some of the intellectual visions of St. Theresa of Avila). These views can still be found well into the twentieth century (Bonniot, 1879; Vinaver, 1955).

It would not be a historical anachronism to recognize the tripartite analysis reported above in the conceptual structure of nineteenth century models of visual hallucinations: organic hallucinations, accompanied by a clear sensory image, which could be related either to peripheral or central changes in the visual system; psychical hallucinations where the visual image was no longer related to a primary

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change in the visual system but in the faculty of imagination that elicited such vivid images; and hallucinations reporting not a sensory image but the belief that the subject was entertaining one.

As the history of visual hallucinations unfolded into the early twentieth century, the first group were to become neurological hallucinations, the second group pseudo-hallucinations and the third psychiatric or psychotic hallucinations or 'perceptual delusions'. This classification implied that each group needed a different type of research approach. The subtlety of this taxonomy was to be lost in the wake of the biological approach which dictated that all visual hallucinations were the same and were due to the same brain mechanisms.

In clinical psychology and psychiatry, specific individual cases can become conceptual paragons for clinical analysis and classification (e.g. 'HM' in memory research). This also applies to visual hallucinations. At the beginning of the nineteenth century, alienists were presented with two clinical cases, one German and the other French, which offered the criteria in terms of which organic and psychotic visual hallucinations were to be differentiated for the rest of the century.

On 28th February, 1799, at the Royal Society of Berlin, a well-known German bookseller called Christoph Friedrich Nicolai (1733–1811) read an autobiographical paper entitled '*Memoir on the Appearance of Spectres or Phantoms occasioned by disease; with Psychological Remarks*' (Nicolai, 1799). He reported that one morning of the year 1790 (a particularly stressful one for him) he '*suddenly observed, at the distance of ten paces, the figure of a deceased person. I pointed at it, and asked my wife [who was sitting by him at the time] whether she saw it. She saw nothing but being much alarmed, endeavoured to compose me, and sent for the physician. The figure remained some seven or eight minutes, and at length I became a little more calm*'. '*In the afternoon the figure which I had seen in the morning again appeared. I was alone when this happened. I went therefore to the apartment of my wife, to whom I related it. But thither also the figure pursued me. Sometimes it was present, sometimes it vanished; but it was always the same standing figure.*' '*The figure of the deceased person never appeared to me after the first dreadful day, but several other figures showed themselves afterwards very distinctly - sometimes some I knew - mostly, however, of persons I did not know*'.

Nicolai reported that he tried in vain to elicit these visions but they were beyond his control. He soon learnt to differentiate his visions from real people. Eventually, the phantoms began to speak to him. He was by then used to the visions and they caused him little anxiety. Nonetheless, he sought help to get rid of them, and they went after a few months. Basically, Nicolai seemed to be describing episodes of visual hallucinosis with preservation of insight. Many years later, whilst commenting on this case, Brierre de Boismont included it under the category 'hallucinations compatible with reason'.

Twenty years later, Alexis Vincent Charles Berbiguier de Terre-Neuve du Thym (1775–1841) published a three-volume book entitled '*Les Farfadets, ou tous les demons ne son pas de l'autre monde*' (Berbiguier (1821); describing in exquisite detail his complex visual and auditory hallucinatory and delusional experiences.

For example, in Chapter IX he describes his long and complete vision of Paradise: *'The strange feeling of joy I felt was difficult to describe when before me I saw an extraordinary long building surrounded by enormous green fields. The entrance gate, which I could already see from the distance, was lit by a large number of torches adorned by flowery garlands. The left wing of the building projected forward and this gave me a special joy. Upon arriving I was very surprised to find no one who might ask me where I was going and what did I want. There were no guards or servants at all. I could have walked right in without impediment. I did not on account of the fear I had to be considered an interloper ...'* (Vol. 1, pp 28–29).

During the nineteenth century, Berbiguier's case was to become the paragon of 'insane hallucinations' and successive generations of French alienists felt obliged to re-diagnose it at regular intervals. In the same book, Berbiguier went on to record his interview with Pinel on 24th April, 1816: *'After listening with great attention, this doctor told me that he knew of the type of disease affecting me, and that he had successfully treated people with it'*. After failing to respond to treatment and continuing to feel persecuted by monsters and bad spirits, Berbiguier accused Pinel of having made false promises.

The central question is whether, regardless of the presence of insight and other different features, the experiences reported by these two men should be considered as basically the same. Alienists in the nineteenth century decided that they were not. During the second half of the twentieth century, with the advent of biological psychiatry and the development of an Occamistic view of visual hallucinations, it was decided that they were the same. Were these two decisions based on different grounds: say the former on speculation, and the latter on hard science? Historical analysis shows that this is not the case and that both were a priori or conceptual decisions, inspired less on scientific evidence than in the ideological needs of their time.

1.2.3 Physiological period

The end of the classical period is marked by the work of Johannes Müller (1801–1858) (Koller, 1958). His work offers an insight into the early stage of the process of naturalization of visual hallucinations. This started with a new manner of talking about the phenomena, that is, with a shift in the foundational assumptions of their description (Hagner and Wahrig-Schmidt, 1992). For example, by claiming that visions were 'fantastic' Müller meant that they were the result of overactivity of a putative faculty or power of 'imagination' or 'fantasy' (Müller, 1826). Since each sense modality must have its own *Eigenleben*, that is, specific energy or power, and such power must be wired into the brain, then visions, sounds or tactile feelings could actually result from internal stimulation. Irrespective of the type and source of the stimulus, a sense modality will respond in the only way it can. Whatever way the eye is stimulated, whether pressure, stroke, electricity (Galvanismus) or other stimuli, it will respond by seeing light even if it is in absolute darkness. The type of stimuli (Reize) is therefore irrelevant to its seeing light. Given this specific

response, Müller concludes that when a phenomenon of vision is experienced, and there is no evidence of an external stimulus for it, then it must be concluded that something internal is stimulating the deep substance of the eye (Berrios, 2007).

Müller thus developed a speculative physiology based on two assumptions, namely, that (i) each sensory modality is equipped with a specific power to express its function (a reflection of his vitalistic beliefs) and (ii) there is a one-to-one correlation between subjective sensation and brain 'substance' (a reflection of his effort to overcome Cartesian dualism). After setting out his model of specific powers and energies, Müller proceeds to list credible illustrations borrowed from well-known sources such as the reports by Nicolai, Cardan and Goethe; then he adds a report of his own experiences.

Years after Müller's death, in a classical compendium of knowledge on hallucinations, Brierre (1862) echoed approvingly Müller's definition: '*When talking about hallucinatory images Burdach has said that we do not see them really . . . Müller, based on self-observation remains convinced that what is experienced are not simple ideas but the sensations themselves . . .*'. In other words, during the physiological period the view that visual hallucinations are actual pathological perceptions, in that they consist in a sensory image which is not caused by an external object, became firmly established.

1.2.4 Hermeneutic period

During the middle of the nineteenth century, the efforts by some alienists and basic scientists to reduce all visual hallucinations to brain events started to meet resistance both within and outside the profession. Within alienism the target of the resistance was mainly the view that all hallucinations were similar phenomena. For example, in 1855 there was a memorable debate at the Société Médico-Psychologique in Paris during which efforts were made to differentiate organic from psychological hallucinations (Ey, 1935). Outside the profession the resistance came from philosophers, and gifted amateurs who rued the fact that hallucinations were to be considered as meaningless, mechanistic phenomena (Maury, 1848, 1878). The view that dreams and hallucinations may be related is as old as it is complex. It reappeared during the middle of the nineteenth century in the work of Maury and others in France.

The literature on hallucinations until the middle of the nineteenth century was based on single case studies mostly collected from hospital practice. Little was known about their nature and prevalence in non-hospitalized patients or sane subjects. Help came from unlikely quarters. Three great amateurs, Gurney, Myers and Sidgwick, founded the Cambridge Society for Psychical Research (Gauld, 1968). Their interest centred on apparitions, hallucinations and their communicatory function and on this Gurney (1885) published an important review in the newly created journal, 'Mind'.

Given that one of the research interests of the Society was in the reality and frequency of apparitions in the general population (Haynes, 1982), under the direction

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of Gurney a ‘statistical inquiry’ was carried out and its results reported in ‘Phantasms of the Living’ (Gurney *et al.*, 1886). In 1889, a year after Gurney’s suicide (motivated, it has been speculated, by his becoming aware that the survey had been compromised by fabricated data), it was approved at the Paris Congress of Psychophysiology that a further inquiry be carried out with the participation of the Society. The earlier results were reported to the 1892 London Congress for Experimental Psychology. Parallel surveys had been carried out under the direction of W. James in the United States, L. Marillier in France and Von Schrenck-Notzing in Germany.

The question put to the (normal) subjects included in the survey was: *‘Have you ever, when believing yourself to be completely awake, had a vivid impression of seeing or being touched by a living being or inanimate object, or of hearing a voice; which impression, so far as you could discover, was not due to any external physical cause?’* 27 329 answers were received, of which 24 058 were negative and 3271 positive (11.96%). Women reported a higher percentage than men (15% vs 10%) and subjects from Brazil and Russia showed a higher percentage of affirmative answers than subjects from English-speaking countries. Children seemed specially liable to hallucinations; visual hallucinations were more frequent than auditory ones and the latter more than the rest; combined hallucinations were the rarest. Only percentages and means were extracted from these enormous amounts of data and hence it is difficult to make any real sense of the results (Parish, 1897).

The general conclusion was that hallucinatory experiences seem far more common amongst the sane than was suspected. This finding was to trigger a second debate on the issue of hallucinations in the sane. However, the structure of the survey, the phrasing of the questions, and the manner in which the sample was constituted were later to be criticized and unfortunately some of the interesting information gathered by the survey became discredited. The research, however, was defended from a conceptual point of view by the Cambridge philosopher C D Broad (1949).

1.2.5 Naturalization period

Tamburini’s proposal that visual hallucinations were a form of sensory epilepsy, effectively discouraged any research into their meaning and encouraged their full reduction to brain events (Berrios 1990a, 1990b). This trend has continued until today (e.g. Manford and Andermann, 1998; ffytche, 2007). Although in Esquirol’s language, hallucinations were medical complaints and hence did not provide any information about the world, they could still tell something about the hallucinator himself. To understand hallucinations, questions such as the severity and duration of disease, the cause of the insanity, insight and of the state of other faculties of the mind remained important. Indeed, the 1855–1856 Paris debate on hallucinations covered these issues in detail (Ey, 1935). With Tamburini, hallucinations were to lose all semantic link to the individual. They were but mechanical events whose content (imagery) was determined by the random stimulation of a brain site. Even loss of insight (as for example marked by the presence of an accompanying delusion)

depended on whether an additional 'centre of ideation' was compromised. This extra element was too much even for Soury (1891), the historian of the brain, who commented: '*Tamburini has needlessly complicated the picture by invoking, in addition to the sensory centres, the so-called ideation centres ...*' (p 202).

1.3 Epistemology: dichotomies

Since the time of Esquirol, both the general concept of hallucination and that of visual hallucination have been inscribed in a multidimensional space formed by a number of polarities. Three will be briefly discussed here. Their history is the chronicle of shifts and migrations along the dimensions existing in that space.

1.3.1 Perception versus non-perception

This first dimension concerns the question of whether hallucinations are, or are not, a disorder of perception. For example, the current assumption is the belief that reports by visual hallucinators must be accepted as evidence that they are entertaining a 'visual image', and that this rogue image is the result of a change in their visual perceptual system. Thus, in regards to this dimension, the current definitional position is close to the perception polarity.

As mentioned above, the difficulty here is that the statement: (i) 'S is experiencing an image' cannot be meaningfully differentiated from the statement, (ii) 'S believes that he is experiencing an image' (i.e. S is having a perceptual delusion). Evidence for the belief that interpretation (i) is the correct one remains circumstantial: acceptance of autobiographical data (e.g. Kandinsky, 1885), correlational data from provoked 'organic' hallucinations (by drugs, electrodes, sensory deprivation, etc.) (Keup, 1970; Siegel and West, 1975), and some neuroimaging work (Aleman and Larøi, 2008; Boksa, 2009). Evidence of this type is much thinner in the case of 'psychiatric' visual hallucinations as they may be seen in schizophrenia, bipolar disorder or obsessive compulsive disorder.

The perception dimension cannot be fully understood without a minimum of information on the philosophy of perception (Hamlyn, 1961; Pastore, 1971; Yolton, 1996; Clark, 2007). The first point to remember is that in Western culture the meaning of 'perception' (catalepsis in Greek) has repeatedly changed. Originally used to refer to concrete actions such as grabbing, collecting or bringing things into oneself, the term then started to be used in a metaphorical sense to refer to 'learning', that is, to capturing knowledge from the external world. Even at this stage of evolution, the concept of perception did not specify that the knowledge in question needed to be sensorial.

In historical terms, some have traced the narrowing down of the concept of perception to sensation to Descartes. Although it is the case that in the work of the French philosopher these concepts often are seen to overlap, it is also the case that

he distinguished them by using *sentir* and *sentire* for the acquisition of information via the senses, and *percipere* for the broader mental apprehension of the intellect (Descartes, 1993; Arbini, 1983). This is why ‘perception’ kept its general meaning of knowing the world by whatever means (including intuition – which clearly obviates intermediaries and representations) well into the eighteenth century. The overlap between perception and sensation, however, is also seen in the work of Locke (Yolton, 1984) and Condillac (Hamlyn, 1961). So, until the early nineteenth century any claims that may have been made that visual hallucinations were ‘disorders of perception’ should be open to two interpretations. The same claim made nowadays would only be understood in the sensorial way.

After the 1780s, as the meaning of perception became firmly redefined by Thomas Reid in terms of sense perception (Nichols, 2007), hallucinations gradually changed their meaning and, in the hands of those who constructed their final paradigm during the early nineteenth century, hallucinations became a disorder of sense perception (Berrios, 1996). From then on the attention of researchers would only concentrate on those parts of the brain that relate to visual perception. One little-noticed consequence of this view is that thereafter it became meaningless to talk about hallucinations of ‘emotion’ or ‘volition’ or ‘thought’ as these mental faculties fell outwith the semantic field of sense perception.

The history of the construction of hallucinations has been studied in detail and there is no need to iterate this information. Suffice it to say that, until 1817, hallucinations were mainly considered as adjectival, that is, were considered as ‘hallucinatory experiences’ and hence were not considered as constituting exemplars of a class or natural kind called ‘hallucination’.

This is the class that Esquirol (1817) was successfully to construct when he wrote: *‘If a man has the intimate conviction of actually perceiving a sensation for which there is no external object, he is in a hallucinated state: he is a visionary (visionnaire) ... Hallucinations of vision ... have been called visions but this term is appropriate only for one perceptual mode. Who would want to talk about auditory visions, taste visions, olfactory visions? ... However, the functional alterations, brain mechanisms and the clinical context involved in these three senses is the same as in visions. A generic term is needed. I propose the word hallucination.’* It is at this moment that hallucinations in general were to become natural kinds: that is, stable and biological objects assumed to share the same internal structure regardless of their sense modality (UV1). In turn, visual hallucinations were to lose their ‘specificity’, become disconnected from apparitions and visions, and could be entirely explained in terms of pathological changes in regions of the brain related to vision.

1.3.2 Representation versus non-representation

The second antinomy reflects the dilemma built into the concept of perception itself: Do humans perceive just a ‘representation’ (an image) of the world or do they perceive it without any intermediaries? Since the nineteenth century

‘representationalism’ has had the upper hand and become the foundation of the neuroscience of vision (Wade, 1998; Marr, 1982). Hence, visual hallucinations have been redefined as rogue representations, as interloping images which should not be there in the first place.

Representationalism has been successful because: (i) it makes the ‘sensation manqué’ or false representation the locus of research; (ii) it shares the same epistemological assumptions with the neuroscience of vision and (iii) it keeps the explanatory story always at the mechanistic level of the brain. However, in philosophical terms, representationalism is weak for it fails to explain how the perception of the inner image of representation takes place and rapidly sinks into infinite regress (Hirst, 1959).

There have also been non-representationalist writers, such as J J Gibson (1954, 1966) and M Merleau-Ponty (1945), who have offered viable and defensible models of perception without the help of representations.

Gibson attempted to release perception from the classical epistemological model of subject versus object by conceiving of perception as a dynamic encounter during which reality, which is defined as a set of complex surfaces, penetrates or floods the mind with information which offers not only data but also affordances, that is, invitations to be used and configured in particular ways. (Gibson (1979) defined affordances as ‘*action possibilities latent in the environment*’.) In his model, the idea of mediating representations disappears. Gibson sought support from the epistemology of perception of Thomas Reid (Nichols, 2007) but it has also been claimed that his anti-representationalist stance resulted from the influence of his teacher E B Holt (Costall, 2012).

Merleau Ponty’s theory of perception is not easy to explain in a few words for there are some differences between his earlier and later views. In the ‘Phenomenology of Perception’ (1945), the term named a primordial, naïve contact of human body and reality; it was a bodily insertion into the world that at the same time was sensorial, affective and motor. Hence it was not an isolated mental capacity, but provided the epistemological model for knowledge, the very basis upon which getting to know the truth of the world was founded. Influenced as much by Husserl and Heidegger as by Gestalt psychology (particularly Goldstein’s), he conceived of perception as a holistic act, as a situation in which the traditional dichotomies of mind–body, subject–object, spirituality–corporality, thinking–matter, were replaced as a multiple folding of the corporality of the world, of which the body of man is just another fold (Dillon, 1988; Langer, 1898). In the case of visual perception, light came to play an important role in the way in which Merleau-Ponty explained the multiple folding of the flesh (Vasseleu, 1998). Later in his work, perception and language became intertwined as the latter gained more and more importance in his philosophy (Nebreda, 1981; Froman, 1982).

Although accounts of visual hallucinations based on non-representational theories of visual perception are likely to be harder to put together, they may be required to explain the complex visual hallucinations seen in the context of the psychoses or in obsessive compulsive disorders.

1.3.3 Unitary versus multiple

The third antinomy concerns the question of whether hallucinations in general (UV1) and visual ones in particular (UV2) are to be considered as: (i) similar events that simply occur in different sense modalities (similar that is in their symmetry, mechanisms, neurobiological basis) or (ii) as differentiable in terms of aetiology, content, disease-context and so on. In the particular case of visual hallucinations, the unitary view regards all of these phenomena as the same, regardless of the disorder to which they are related. Defended in terms of an Ockhamian economy of thought, the unitary view has in this case been put forward as an explanatory hypothesis for psychotic or psychiatric visual hallucinations.

Popular since the nineteenth century, the 'unitary' view has rarely been challenged. And yet on purely conceptual and definitional grounds, differences can be found between at least three groups: (i) hallucinations related to objects in the public space (visual, audition); (ii) hallucinations related to objects in the private space (taste, touch) and (iii) hallucinations appearing in counter-intuitive situations (e.g. negative hallucinations, extra-campine hallucinations; bizarre proprioceptive hallucinations such as 'feeling a cathedral inside one's abdomen'). Given that perceptual confirmation by others is the crucial definitional border between a normal perception and a hallucination (in the latter others cannot ascertain the voice or the object seen), it is clearly the case that, in the case of gustatory and tactile hallucinations, the rule cannot apply in principle (how is a hallucinated itch to be differentiated from a real itch?). *Mutatis mutandi*, a similar argument can be made to separate counter-intuitive hallucinations that violate space-time or other perceptual rules (like seeing something behind one's head). Given these conceptual differences, it would be most unlikely that all hallucinations are to be considered as resulting from the same neurobiological mechanism. Indeed, evidence exists that they do not. For example, whilst musical hallucinations in the deaf elderly (organic hallucinations) are related to changes in the Heschl circumvolution on the non-dominant temporal lobe, musical hallucinations seen in younger subjects with melancholia or schizophrenia do not show that relationship (Berrios, 1990a, 1990b).

The unitary view of visual hallucinations (UV2) remains popular (e.g. Collerton *et al.*, 2005). And yet the conceptual structure of these phenomena remains varied and heterogeneous. Conceptually it is not even possible strictly to differentiate visual illusions from hallucinations. According to the DSM-IV glossary: '*Hallucination is a sensory perception that has the compelling sense of reality of a true perception but that occurs without external stimulation of the relevant sensory organ*'. The conventional distinction with illusion is that the latter is a perceptual distortion of a real object. Now, clinical practice shows that visual hallucinations rarely if ever occur in a vacuum or replace completely the ongoing perceptual horizon or background. Image superposition, semi-transparency, floating over a steady background and so on, are only some of the phenomenic presentations of complex visual hallucinations.

Although it remains a common view that misperceiving an object should be defined as an illusion, simpliciter, voices have of late been raised against such categorical differentiations (Collerton and Taylor, 2013).

But if visual hallucinations almost always overlap with a given objectual background, then the issue seems to be not that in the hallucination there is no object to be perceived but that the conceptual or figurative distance between the hallucination and the background object is too wide to be considered a stimulus. For example, the misperception of a coat hanging behind the door as a man is the classical example of an illusion. Seeing my grandmother sitting on what to others is just an empty chair is a hallucination. Conceptually, it would be wrong to say that the difference is given by the presence or absence of a background object, the difference is that the background object does not seem to be relevant (this is a decision taken by the clinician) to the perception in the sense that whilst a coat can plausibly be confused with a man, the chair cannot be plausibly confused with my grandmother sitting on it. The problem with this distinction is that it entirely depends upon the clinician and such a criterion cannot do as a definitional difference on which a different aetiological approach is going to be based.

Whether conceptual and phenomenological groupings have aetiological relevance or not is an empirical question. During the nineteenth century, UV2 was to be subject to challenge, particularly by clinical reports of phenomena such as unilateral hallucinations, extraordinary variations in the colour or size of the hallucinatory content, composite hallucinations, hallucinations in the sane, negative hallucinations, extra-campine hallucinations and so on, which were too complex to be explained in terms of Tamburini's epilepsy model. There is no space to list these clinical phenomena in any detail but they can be found in a number of publications (Quericy, 1930; Morsier, 1932, 1938; Ey, 1973; Berrios, 1985).

1.4 Research and its vicissitudes

The historical and epistemological changes undergone by the phenomenon now called 'visual hallucinations' having been presented in some detail, it is time now to examine how such changes interacted with contemporaneous cultures of inquiry. Research is currently defined as: '*A search or investigation directed to the discovery of some fact by careful consideration or study of a subject; a course of critical or scientific inquiry ...*' (OED, 2002). Like all dictionary definitions, the above reflects predominant beliefs, for example, that 'facts' in the world are 'discovered' rather than constructed and hence exist independently of all methodologies of capture. Things, however, are more complicated. Each historical period has had its own methods to describe, capture and manage its objects of interest. These can be concrete (like plants, horses or rocks), abstract (such as mind, desire, visions) or artifactual

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(gods, virtues, beauty). Research should be classed as one of the many cultures of inquiry developed in the West (Hall, 2004).

Therefore, research is a social, not a 'scientific' concept. What goes on under the name of research in our own time has little to do with the amateur inquiries of the gentleman naturalist of earlier times. Currently, it names a collective, legally and ethically regulated enterprise, whose contents include experts, belief in a certain epistemological creed (of which many researchers may not be even aware), a favoured 'scientific method', tools and technologies. Each of these components has been added at a given time in history. For example, the ideal 'scientific method' currently in use has been borrowed from the natural sciences on account of their 'truth-making' success. And the most popular epistemological creed is little more than a description and philosophical justification of the accepted scientific method. In this scenario, scientific truth as such is defined as the strict correspondence between scientific claims and reality.

The debate starts as to what may be the best way to achieve such a correspondence with the truth. One of the earliest methods was 'Deduction'. Modelled on Euclidian geometry, this epistemological technique goes from the general to the particular, the abstract to the concrete, from the top to the bottom. It 'deduces' the truth from general claims via logical algorithms. Another method is 'Induction'. Although it is also discussed by Plato and Aristotle, the method achieved broad epistemological popularity only after Bacon and Newton. Induction is a form of achieving knowledge by going from the particular to the general, from the concrete to the abstract, from the bottom to the top. Real knowledge about the world, therefore, can only be obtained by 'inducing' general conclusions from a collection of exemplars. At the height of empiricism, Inductivism was a very popular way of interpreting the 'scientific method'. In England it lasted until the famous debate between Mill and Whewell during the nineteenth century (Forster, 2009).

Many have argued that the scientific method is successful for it combines both inductivism and deductivism. During the nineteenth century, the scientific method was further divided into a context of discovery and a context of justification and inductivism and deductivism were considered as providing the logical structure to the context of justification. The context of discovery remained up for grabs and accounts such as serendipity, intuition, genius, creativity, insight, social factors and so on were proposed to explain how things and their rules were discovered by man. Once discovered, so the narrative went, candidate truths have to pass the strict roster of logic and mathematics demanded by the context of justification (Schickore and Steinle, 2006).

This cosy account of the scientific method started to be challenged during the early twentieth century, but it was only after the Second World War that constructivism epistemologies started to be taken seriously. It was soon agreed that the distinction between the context of discovery and justification is simplistic, that the hypothetic-deductive model ('*If some hypothesis (H) is true, then certain observable facts (O) can be expected; if the facts (O) are found to be as predicted, H is confirmed to some degree ...*' (p 123, Durbin, 1988)) rarely if ever applied to any

1.5 BRINGING THE HISTORY OF VISUAL HALLUCINATIONS AND RESEARCH TOGETHER 17

scientific discipline, that the model of ‘scientific method’ distilled out the complex epistemological activities that are carried out by the natural sciences (and often offered as the ideal to all disciplines, including the social sciences, philosophy, theology, aesthetics, and others) was wishful thinking and a caricature of reality. More and more, the idea that theory itself moulds the facts, that there is a ‘self-fulfilling prophecy’ in the way in which reality responds to theories, started to gain attention (Merton, 1968). These challenges were partly based on the debates of the 1930s on the principle of uncertainty and possibility within quantum physics to fix a position in space–time (Plotnitsky, 2010), and partly on the renaissance of views about the constructive interaction between social factors, language and reality (Bloor, 1976).

1.5 Bringing the history of visual hallucinations and research together

Now, how have these changes and fashions operating within the concept of research interacted with what we know about visual hallucinations? It is possible to establish a rough correlation. During the Classical period, the approach to hallucinations, apparitions and so on was deductive. A general scheme was created according to which hallucinations could result from external objects stimulating a normal perceptual system, or resulted from changes in the perceptual system itself, or in the belief system governing the perceptual system. In the case of apparitions, it was within the divine power to cause them by means of all three methods: an angel could actually be made to appear to the individual in which case he was having a normal perception; or changes could be induced in his eyes or visual system so that he perceived an angel or his belief system could be affected so that he believed that he saw an angel.

When the Baconian model of induction–deduction kicked in, visual hallucinations started to be considered as all resulting from disturbances of imagination, a mental faculty that since Classical times had been central first to epistemological and then to psychological accounts of the cognitive capacities of man. The idea in this case was that observation of many cases of hallucinators suggested that it was their imagination that was playing tricks upon them.

This inductivist account also inspired the research undertaken by 19th century parapsychologists. For example, the surveys undertaken in Europe at the time were based on the idea that the higher the number of people questioned, the stronger would the inference be as to the nature and reality of such hallucinatory experiences.

During the twentieth century, experimentalism entered as a third form of methodology in the study of visual hallucinations. Experimentalism, that is, the interrogation of nature by means of laboratory situations mimicking reality and hence tricking nature into revealing her secrets, has a long and distinguished history in the West, from the medieval experiments carried out by Grossteste, to those of Newton in the seventeenth century, to the rich experimentalism of the 18th and 19th centuries. As technological advances improved, laboratory situations could be set that not only

tricked nature to show her hand but also to behave in extreme or unusual conditions that could bring into the open rules and laws which could not be seen in 'normal' everyday phenomena. These new forms of challenging experimentalism were used in relation to visual hallucinations. For example, although it had been suspected for years that the visual hallucinations seen in some forms of epilepsy were caused by electrical stimulation of the brain, it was only in the 1930s that technological advances allowed Penfield and Porot to undertake stimulations in situ and actually trigger hallucinatory experiences. The same can be said of the controlled use of psychopharmacological substances and of techniques such as sleep or sensory deprivation, all of which could regularly trigger visual hallucinations.

New technologies such as neuroimaging have since developed and they are being used to ascertain the imaginal content of hallucinations. The problem with these new techniques is that they are epistemologically dependent upon the correlation of proxy variables representing changes in the brain (e.g. blood flow) and proxy variable representing changes in the subjectivity of man (reports of the simultaneous entertaining of an image). Whatever the sophistication of the mathematical models controlling the physics of neuroimaging, the epistemological structure of these techniques is very simple: it depends upon the quality of the variables and their power (proxyhood) to represent what they are supposed to represent (brain and subjectivity). This is not the place to discuss these issues in more depth (Berrios and Marková, 2002).

1.6 Conclusions

It seems clear that there is an interaction between the manner in which visual hallucinations have been conceptualized throughout history and the various epistemological models that have been developed in the West to legitimize knowledge. Definitions of objects, including hallucinations, are always constrained by contemporary beliefs as to how much can be known and how. During the classical period, conceptual systems were developed to deal with apparitions and visions and these had to follow the logic and psychological and theological strictures set by what was believed at the time. Once views changed as to what can be known and how, accounts of visual hallucinations changed and the same reports by hallucinators were interpreted differently. Interestingly enough, the original conceptual structure created to deal with apparitions remained and to this day it is possible to understand visual hallucinations result from changes in the perceptual system or in the belief systems that control the perceptual system. The assumption by current researchers that visual hallucinations are homogeneous phenomena has led to the loss of important phenomenic clues, many of which are likely to have neurobiological significance. As has again and again been emphasized in this chapter, returning to a heterogeneity model of visual hallucinations may be the only way forward. Emphasizing the separation between organic and psychotic

hallucinations, calling into question the fact that the latter are related at all to pathologies in the perceptual systems and interpreting organic visual hallucinations according to the different theories of perception in existence (and not only to those which are representational) may lead to developing new ways of understanding these complex phenomena, thereby helping those hallucinators who feel unhappy with their experiences to be rid of them.

1.7 References

- Aleman, A. and Larøi, F. (2008) *Hallucinations. The Science of Idiosyncratic Perception*, American Psychological Association, Washington.
- Amat, J. (1885) *Songes et Visions: l'au-delà dans la Littérature Latine Tardive*, Brepols, Paris.
- Arbini, R. (1983) Did descartes have a philosophical theory of sense perception? *Journal of the History of Philosophy*, **21**, 317–337.
- Augustine. 2002 *On the Literal Meaning of Genesis*. 6. Book XII, 6.15,16.
- Berbiguier, A.V.C. (1821) *Les Farfadets ou tous les démons ne sont pas de l'autre monde*. 2 Vols, L'Auteur et P Gueffier, Paris.
- Berrios, G.E. (1985) Hallucinosi, in *Neurobehavioural Disorders, Handbook of Clinical Neurology*, vol. 2 (46), (ed J.A.M. Frederiks), Amsterdam, Elsevier, pp. 561–572.
- Berrios, G.E. (1990a) Musical hallucinations. A historical and clinical study. *British Journal of Psychiatry*, **156**, 188–194.
- Berrios, G.E. (1990b) Tamburini and his theory of hallucinations. *History of Psychiatry*, **1**, 145–156.
- Berrios, G.E. (1996) *The History of Mental Symptoms*, Cambridge University Press, Cambridge.
- Berrios, G.E. (2005) On the fantastic apparitions of vision by Johannes Müller. *History of Psychiatry*, **16**, 229–246.
- Berrios, G.E. (2007) 'The varieties of effects resulting from such morbid causes as are capable of rendering more vivid the feelings of the mind' by S. Hibbert (1825). *History of Psychiatry*, **18**, 103–121.
- Berrios, G.E. and Marková, I.S. (2002) Biological psychiatry: conceptual issues, in *Biological Psychiatry* (eds H. D'Haenen, J.A. den Boer and P. Willner), John Willey, New York, pp. 3–24.
- Berrios, G.E. and Marková, I.S. (2012) The construction of hallucination: history and epistemology, in *Hallucinations: Research and Practice* (eds J.D. Blom and J.E.C. Sommer), Springer, Heidelberg, pp. 55–71.
- Bloor, D. (1976) *Knowledge and Social Imagery*, Routledge, London.
- Boksa, P. (2009) On the neurobiology of hallucinations. *Journal of Psychiatry and Neurosciences*, **34**, 260–262.
- Bona G. (1676). *Traité du discernement des esprits*. Translated from the Latin by M.L.A.D.H. Brussels, Pierre Vleugart and sons
- Bonriot, d.P. (1879) *Le miracle et les Sciences Médicales: Hallucination, Apparitions, Extase, Fausse Extase*, Didier, Paris.

20 CH01 VISUAL HALLUCINATIONS: HISTORY AND CONTEXT OF CURRENT RESEARCH

- Brierre, B.d.A. (1862) *Des Hallucinations ou Histoire Raisonnée des Apparitions, des Visions, des Songes, de l'extase, des Rêves, du Magnétisme et du Somnambulisme*, Baillière, Paris.
- Broad, C.D. (1949) The relevance of psychical research to philosophy. *Philosophy*, **24**, 291–309.
- Calmet A. (1641). *Dissertations sur les Apparitions des Anges, des Démons & des Esprits*. Paris, De Bure.
- Castilla del Pino, C. (1984) *Teoría de la Alucinación*, Alianza Editorial, Madrid.
- Clark, S. (2007) *Vanities of the Eye. Vision in Early Modern European Culture*, Oxford University Press, Oxford.
- Collerton, D., Perry, E. and Mckeith, I. (2005) Why people see things that are not there: a novel perception and attention deficit model for recurrent complex visual hallucinations. *Behavioral and Brain Science*, **28**, 737–794.
- Collerton, D. and Taylor, J.P. (2013) Advances in the treatment of visual hallucinations in neurodegenerative disorders. *Future Neurology*, **8**, 433–444.
- Costall, A. (2012) Against representationalism. James Gibson's secret debt to E.B. Holt, in *A New Look at New Realism. The Psychology and Philosophy of E.B. Holt* (ed E.P. Charles), Transaction Publishers, New Brunswick, pp. 243–262.
- Descartes, R. (1993) *Meditations on First Philosophy: in Which the Existence of God and the Distinction of the Soul from the Body are Demonstrated*. Trans. Donald A. Cress. , Hackett Publishing, Indianapolis.
- Dillon, M.C. (1988) *Merleau Ponty's Ontology*, Indiana University Press, Bloomington.
- Dufresnoy, L. (1752) *Recueil de Dissertations Anciennes et Nouvelles sur les Apparitions, les visions & les Songes*. 3 Vols, Jean-Noel Leloup, Avignon.
- Durbin, P.T. (1988) *Dictionary of Concepts in the Philosophy of Science*, Greenwood Press, New York.
- Esquirol, E. (1817) Hallucinations. *Dictionnaire des Sciences Médicales, par une Société de Médecins et de Chirurgiens*, Panckoucke, Paris.
- Ey, H. (1935) La Discussion de 1855 a la Société Médico-Psychologique sur L'Hallucination et L'État Actuel du Problème de L'Activité Hallucinatoire. *Annales Médico-Psychologiques*, **93**, 584–613.
- Ey, H. (1939) Esquirol et le problème des hallucinations. *L'Evolution Psychiatrique*, **1**, 21–44.
- Ey, H. (1957) Les Hallucinoses. *L'Encéphale*, **46**, 564–573.
- Ey, H. (1973) *Traité des Hallucinations*. 2 Vols, Masson, Paris.
- Ffytche, D.H. (2007) Visual hallucinatory syndromes. *Dialogues in Clinical Neuroscience*, **9**, 173–189.
- Forster, M. (2009) The debate between Whewell and Mill on the nature of scientific induction, in *Handbook of the History of Logic. Inductive Logic*, vol. 10 (eds M. Gabbay, Hartmann and J. Woods), Elsevier, New York, pp. 93–115.
- Froman, W.J. (1982) *Merleau-Ponty: Language and the Act of Speech*, Bucknell University Press, Lewisburg.
- Fuentenebro, F. and Berrios, G.E. (2000) Jules Séglas and hallucinatory obsessions. *History of Psychiatry*, **11**, 107–112.
- Gauld, A. (1968) *The Founders of Psychical Research*, Routledge & Kegan Paul, London.

1.7 REFERENCES

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- Géraud M. (1989) Histoire de la doctrine des hallucinations chez les psychiatres classiques français d'Esquirol à Ey. Doctoral Thesis. University of Bordeaux.
- Gibson, J.J. (1954) *The Perception of the Visual World*, George Allen & Unwin, London.
- Gibson, J.J. (1966) *The Senses Considered as Perceptual Systems*, George Allen & Unwin, London.
- Gibson, J.J. (1979) *The Ecological Approach to Visual Perception*, Mass, Houghton Mifflin, Boston.
- Gimenez, G. (2000) *Clinique de l'hallucination Psychotique*, Dunon, Paris.
- Green, C. and McCreery, C. (1975) *Apparitions*, Institute of Psychical Research, Oxford.
- Gurney, E. (1885) Hallucinations. *Mind*, **10**, 161–199.
- Gurney, E., Myers, F.W.H. and Podmore, E. (1886) *Phantasms of the Living*. 2 Vols, London.
- Hagner, M. and Wahrig-Schmidt, B. (eds) (1992) *Johannes Müller und die Philosophie*, Akademie Verlag, Berlin.
- Hall, J.R. (2004) *Cultures of Inquiry. From Epistemology to Discourse in Sociohistorical Research*, Cambridge University Press, Cambridge.
- Hamlyn, D.W. (1961) *Sensation and Perception: A History of the Philosophy of Perception*, Routledge & Kegan Paul, London.
- Haynes, R. (1982) *The Society for Psychical Research 1882–1982: A History*, MacDonald & Co., London.
- Hirst, R.J. (1959) *The Problems of Perception*, Allen and Unwin, London.
- James, T. (1995) *Dream, Creativity, and Madness in Nineteenth Century France*, Clarendon Press, Oxford.
- Kandinsky, V. (1885) *Kritische und Klinische Betrachtungen im gebiete der Sinnestäuschungen*, Verlag von Friedländer and Sohn, Berlin.
- Keup, W. (ed) (1970) *Origin and Mechanisms of Hallucinations*, Plenum Press, New York.
- Koller, G. (1958) *Johannes Müller*, Wissenschaftliche Verlagsgesellschaft M.B.H., Berlin.
- Langer, M.M. (1898) *Merleau-Ponty's Phenomenology of Perception*, Florida State University Press, Tallahassee.
- Lanteri-Laura, G. (1991) *Les Hallucinations*, Masson, Paris.
- Manford, M. and Andermann, F. (1998) Complex Visual Hallucinations. *Brain*, **121**, 1819–1840.
- Marr, D. (1882) *Vision*, Freeman, New York.
- Maury, L.F.A. (1878) *Le Sommeil et les Rêves. Études Psychologiques sur ces Phénomènes et les divers états qui s'y rattachent*, 4th edn, Didier, Paris.
- Maury, L.F.A. (1848) Des Hallucinations Hypnagogiques. *Annales Médico-Psychologiques*, **11**, 26–40.
- Merleau-Ponty, M. (1945) *Phénoménologie de la Perception*, Gallimard, Paris.
- Merton, R.K. (1968) *Social Theory and Social Structure*, Free Press, New York.
- Morsier, R. (1932) *Neurobiologie de l'Hallucination*, Brussels, Lamertin.
- Morsier, R. (1938) Les Hallucinations. *Revue D'Oto-Neuro-Ophthalmologie*, **16**, 241–352.
- Müller, J. (1826) *Über die Phantastischen Gesichterscheinungen*, Koblenz, Jakob Hölscher.

22 CH01 VISUAL HALLUCINATIONS: HISTORY AND CONTEXT OF CURRENT RESEARCH

- Nebreda, J.J. (1981) *La fenomenología del lenguaje de Maurice Merleau-Ponty*, Publicaciones de la Universidad Pontificia Comillas, Madrid.
- Nichols, R. (2007) *Thomas Reid's Theory of Perception*, Press, Oxford Clarendon.
- Nicolaï, F. (1799) Beispiel einer Erscheinung mehrerer Phantasmen; nebst einigen erläuternden Anmerkungen. *Neue berlinische Monatsschrift*, **2**, 321–359.
- OED (2002) *Oxford English Dictionary*, 2nd edn, Oxford University Press, Oxford.
- Parish, E. (1897) *Hallucinations and Illusions*, Walter Scott, London.
- Pastore, N. (1971) *Selective History of Theories of Visual Perception 1650–1950*, Oxford University Press, Oxford.
- Plotnitsky, A. (2010) *Epistemology and Probability*, Springer, New York.
- Quercy, P. (1930) *Études sur l'Hallucination*. 2 Vols, Alcan, Paris.
- Schickore, J. and Steinle, F. (2006) *Revisiting Discovery and Justification*, Springer, Heidelberg.
- Siegel, R.K. and West, L.J. (eds) (1975) *Hallucinations*, John Wiley, New York.
- Soury, J. (1891) *Les Fonctions du Cerveau*, Lecrosnier et Labé, Paris.
- Tyrrell, G.N.M. (1943) *Apparitions*, Duckworth, London.
- Vasseleu, C. (1998) *Textures of Light. Vision and Touch in Irigaray, Levinas and Merleau Ponty*, Routledge, London.
- Vinaver, B. (1955) *Les Hallucinations n'existent Pas (il n'y a pas de Perception sans Objet)*, Amiens, Yvert.
- Wade, N.J. (1998) *A Natural History of Vision*, MIT Press, Cambridge Mass.
- Yolton, J.W. (1984) *Perceptual Acquaintance from Descartes to Reid*, Blackwell, Oxford.
- Yolton, J.W. (1996) *Perception and Reality. A History of Descartes to Kant*, Cornell University Press, Ithaca.