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Seeing as We Cannot

Ver como no podemos

Carlos A. Postlethwaite
The Graduate Center at City University of New York
Estados Unidos
Carlos.Postlethwaite@asu.edu
https://orcid.org/0000-0001-5967-4446

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Abstract

The belief that Jastrow's duck-rabbit (J) is both a duck-head and a rabbit-head drawing violates the Law of Non-Contradiction (LNC), as does the belief that J seems to be something independent of all the ways J can seem. Call the former belief *B1* and the latter *B2*. I argue that *B1* and *B2* are rational, though contradictory beliefs, and conclude that we must reassess the LNC's status of being a fundamental requirement for rationality. In contrast with *B1* and *B2*, our experiences that correspond to said beliefs do comply with the LNC. That is: we cannot see J as both duck and rabbit at the same time (*E1*), nor does J seem something independent of the ways J can seem (*E2*). Since there is no satisfactory explanation for why we are not able to see J as the contradictions E1 or E2—even though our corresponding beliefs about J are the contradictions B1 and B2—I propose that the LNC is merely an empirical hypothesis concerning the limits of our perception.

Keywords: perception; cognition; true contradictions; law of non-contradiction; cognitive penetrability of perception; perceptual restrictions.

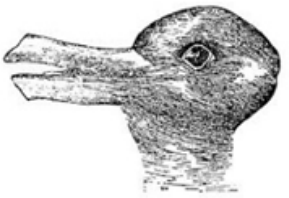
Resumen

La creencia de que el pato-conejo de Jastrow (J) es un dibujo tanto de la cabeza de un pato como un dibujo de la cabeza de un conejo viola el principio de no contradicción (LNC), como lo hace también la creencia de que J parece algo distinto de todo lo que J pueda parecer. Llamemos *B1* a la primera creencia y *B2* a la segunda. Yo argumento que *B1* y *B2* son creencias racionales, aunque contradictorias, y concluyo que debemos reconsiderar el estatus del LNC como requisito fundamental para la racionalidad. En contraste con *B1* y *B2*, nuestras experiencias correspondientes de J sí cumplen con el LNC. Es decir, no podemos ver J como un pato y como un conejo al mismo tiempo (*E1*), ni J parece algo distinto de lo que J nos pueda parecer (*E2*). Puesto que no hay una explicación satisfactoria respecto de por qué no podemos ver J como las contradicciones E1 o E2 (a pesar de que nuestras creencias correspondientes sobre J son las contradicciones B1 y B2), yo propongo que el LNC es tan sólo una hipótesis empírica acerca de los límites de nuestra percepción.

Palabres clave: percepción; cognición; contradicciones verdaderas; principio de no contradicción; penetrabilidad cognitiva de la percepción; restricciones perceptuales.

But the impression is not simultaneously
of a picture-duck and a picture-rabbit.

Ludwig Wittgenstein



Jastrow's drawing: 'J'

0 Overview[1]

There are at least two experiences that we cannot consciously have when looking at Jastrow's drawing (J). The first—in which we would see J simultaneously as both a duck-head and rabbit-head drawing—is an unavailable experience of the type I call *experience pile-up*. The second—in which we would consciously see J as devoid of any and absolutely all impressions—[2]is an unavailable experience that I call *experience strip-down*. Since we cannot experience pile-ups or strip-downs, we do not know what it is like to see J simultaneously as both rabbit[3] and duck nor do we know what it is like to see J as devoid of any and all impressions.

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[1] I am deeply grateful to Jeffrey J. Watson at ASU for his unwavering support and guidance and to Graham Priest for adopting and fostering me as a Visiting Scholar at the CUNY Graduate Center.

[2] The term 'impression' throughout this paper is used to describe any particular way-it-is-like to have a visual experience. When I say "the impression is of a duck-head image", I am referring to the way-it-is-like to see J as a duck-head image regardless of whether one is in possession of any concept, idea, notion, etc., of 'duck-head' or 'duck-head image'.

[3] For ease of exposition I sometimes reduce precise expressions such as 'image of a rabbit-head' to simpler expressions, such as 'rabbit-head' or 'rabbit'. Every time the expression is simplified, it is a stand-in for the more precise description. For example, I always mean 'an image of rabbit-head' when I say 'rabbit', and so on.

In contrast to an experience pile-up, we may rationally believe that J is a duck-head drawing and a rabbit-head drawing at the same time.[4] In contrast to an experience strip-down, we may rationally believe that J is something completely independent of any and all available impressions.

So, experience pile-ups and strip-downs are *not* available to us, but belief pile-ups and strip-downs are indeed available to us, and said beliefs, I argue, are rationally held.

A belief pile-up can be phrased so that the belief has contradictory content. If rationally believing that J is a drawing of a duck-head entails believing that J is not a rabbit-head drawing, then our rational belief that J is duck and rabbit has contradictory content. Since in believing J is both, we believe that J is simultaneously *a rabbit* and *not a rabbit* drawing.

Now, a belief pile-up can also be phrased in a different manner. Instead of saying that we believe J to be simultaneously duck and not-duck when we believe J is duck and rabbit, we could state alternatively that we *believe and not believe* simultaneously that J is a drawing of a duck-head. Under this phrasing, our *belief* is contradictory when we believe that J is both a duck and a rabbit drawing.

In summary, when we believe that J is both duck and rabbit (i.e. when we have a belief pile-up), it could be said that our belief has contradictory content or that our belief itself is contradictory. This depends on what is negated by each conjunct. For example, rationally believing that J *is a duck* entails that we *do not believe J is a rabbit*; it also entails that we *believe J is not a rabbit*.

By following an analogous procedure, similar conclusions are reached concerning the issue of belief strip-downs. That is, our belief that J is something independent of any and all impressions (i.e. a belief strip-down) is a contradictory belief or a belief with contradictory content.

If the belief pile-up of the *contradictory content* variety, as stated above, is a true belief, then J violates the Law of Non-Contradiction (LNC) by being a subject to whom the attribute of being a drawing of a duck-head belongs and does not belong at the same time and under the same perspective. On the other hand, if we are actually correct to hold the pile-up of the *contradictory belief* sort, as stated above, then the observer (O) herself is in violation the LNC by being a subject who has

[4] The ambiguity of either *believing at the same time* that J is both duck and rabbit or believing that J *is at the same time* duck and rabbit, is addressed two paragraphs below and is the focus of Section 4.

the attribute of *believing and not believing* that J is a drawing of a duck-head at the same time and under the same perspective.

In analyzing experiences that we cannot have of J and beliefs that we indeed can rationally have of J, I arrive at the conclusion that we must reassess the LNC. I notice that we cannot experience J in ways that violate the LNC, but that we may indeed hold rational beliefs that are in said violation. I additionally argue that we are correct to hold such contradictory beliefs. I argue that contradictory states of affairs do, in fact, obtain.

My proposal is that the LNC is best understood as an empirical theory or perhaps merely as a hypothesis about the limits of our experience. The LNC describes, for example, our inability to *see* J as both a rabbit and a duck at the same time. Yet J can be both rabbit and duck simultaneously, and we can rationally hold such a belief. So we are wrong to take the orthodox philosophical stance that the LNC governs over—or accurately describes—what can or cannot be, or what we can or cannot believe.

1 Introduction

Belief pile-ups have contradictory content if we are correct in believing that J is simultaneously both a drawing of a rabbit-head and a drawing of a duck-head. This is because believing J is a drawing of a duck-head entails believing J is not a drawing of a rabbit-head. So in believing that J is a duck-head drawing *and* a rabbit-head drawing, we believe that J is a rabbit[5] and that J is not a rabbit. If our belief turns out to be true, then J actually is and is not a rabbit-head drawing at the same time. The contradictory state of affairs obtains in the world.

Belief strip-downs have contradictory content if we are correct in believing that J is a drawing that is independent of any and all of the impressions we can have of J. In such a case, J is neither duck, nor rabbit, nor striated-lines, nor any other impression that we can have. So in believing that J is something different than the impressions we can have, we have an impression of J. If our belief about J is true, J is and is not something we can have an impression of. This state of affairs is not

[5] Again, every time the expression is simplified, it is a stand-in for the more precise description. See footnote 3.

a contradiction, although the belief that it obtains is a contradiction, as would be the experience if it were available to us.

Pile-ups and strip-downs can also be contradictory experiences instead of having contradictory content because pile-ups and strip-downs describe that we *see and don´t see* J in a certain way. Technically, a negation may affect the content of our experience (O sees both duck and *not*-duck) or our experience itself (O sees and does *not*-see a duck). Strip-downs have an analogous situation. All these analyses are detailed in Section 3 and in Section 4 below.

Regardless of the phrasing, our correct belief concerning J involves contradictions, though we can never in a given moment consciously experience J as we are correct to believe. The point is that we cannot perceive a pile-up or a strip-down, yet we are correct in believing that J is a pile-up or a strip-down.

Notice that it is quite commonsensical to believe that J is both duck and rabbit at the same time, as it is also commonsensical to believe that J is something beyond our impressions. I defend these commonsensical beliefs even if they, or their content, violate the LNC.

One good reason to defend belief pile-ups and strip-downs is that there is no in-principle reason for us not being able to experience them. Standard views in science and philosophy face difficulties in providing a good explanation for why pile-ups and strip-downs are unavailable to us as experiences.

It is curious that these unavailable experiences have gone largely without mention in the literature. I expected to find some discussion concerning why we cannot consciously conjoin alternating impressions, especially since the research states that the same retinal stimulation is what results in us experiencing rabbit or else duck. Given that an observer receives one and the same stimulus for impressions that alternate, it seems a natural question to ask why the observer is not able to experience both impressions at the same time. But such a question was not found in the literature.

Similarly, I would expect to be able to experience J as void of any impression, given that I can see J as not a duck (when I see it as a rabbit), and I also see J as not a rabbit (when I see it as a duck), etc. This question

in some sense *is* confronted in the literature.[6] Surely there was a moment as an infant when I, putatively, could not consciously see J as 'duck' or 'rabbit' or as any other impression that I am now able to experience. Perhaps I saw J as devoid of any and all impressions. Also, if there is *something-it-feels-like* to, say, a cat when the cat sees J, we can speculate that the cat could see J as some sort of strip-down: i.e., as not a rabbit-head, nor duck-head, etc. Regardless of the controversies that these admittedly ridiculous speculations provoke, my point is that there is no intuitive in-principle reason for us not being able to see strip-downs. A better example concerns auditory experience. Hearing an unfamiliar language produces an experience that is void of the appropriate meaning, but once the language is known it is hard, even impossible, to strip meaning from it when hearing it. This intuition suggests that in the case of vision, it is hard for us to experience visual stimuli in a way that appropriately corresponds to an unfamiliar perspective. Intuitively, it seems we would experience J as two things simultaneosly, once we are sufficiently familiar with a perspective that allows for J to represent two things at the same time.

But even if intuition succesfully offers a satisfactory explanation for our inability to see pile-ups and strip-downs, the literature fails to provide a viable explanation for why pile-ups and strip-downs are off-limits to us. Empirical studies in the field of multi-stable (and bi-stable) perception[7] do not agree on what causes our visual impressions to alternate between two or more impressions given a single, stable, visual stimulus, such as in the case of J.

The point of dissent is broadly between the view that visual alternating occurs top-down (i.e. there is some cognitive impingement on visual functions) and the view that shifting occurs bottom-up (i.e. an

[6] For reading on whether a perception may feel, like something even without possessing the corresponding concepts, see: Macpherson (2006, 2015), Orlandi (2011) and Siegel (2016).

[7] Bi-stable, or multi-stable perception, occurs when the stimulus is only one, yet our impressions switch voluntarily or spontaneously; between two impressions in 'bi-stable' and more than two impressions in 'multi-stable' cases. The literature concurs that switching cannot be halted. See: Addis (2010), Blake (2009), De Graaf *et al*. (2015), De Jong *et al.* (2011), He (2010), Ilg *et al.* (2008), Koch (2004), Leopold & Logothetis (1999), Maier & Leopold (2009), Palmer (1999), Pettigrew (2001), Sterzer *et al*. (2009), Vernet *et al.* (2015), and Wilson (2003).

issue in the visual system is responsible for the result in consciousness). And even though the research does not address the question about the unavailable perceptions that pertain to this paper, I argue that empirical findings favor the view that there is no physiological obstacle for brain states correlating with (or causing, or being identical to) pile-ups and strip-downs. It is probable that the sciences will not find an obstacle for brain states being able to correspond to experiences of pile-ups or strip-downs.

But even if the cognitive sciences were to find a physiological impediment for the brain being in such states, said explanation would not dissuade us from believing that J is both a drawing of a rabbit and of a duck. So, in the worst scenario for my position, the verdict of the sciences would be reduced to stating that we are physiologically incapable of perceiving J as we rationally believe J to be. Ultimately, the cognitive sciences cannot conclude that J is not a pile-up or a strip-down, but only that we are not able to perceive J as such.

The strongest objection to my case comes from the other end, as it were. The standard philosophical stance for why pile-ups and strip-downs are unavailable invokes the impossibility of J being a pile-up or a strip-down in the first place. Under this view, J (along with everything else in the world) cannot be such that it entails a contradiction, so our rational beliefs about J must comply with this restriction. According to the standard view, our inability to experience J as a pile-up or a strip-down aligns with a fundamental principle that prohibits J being both duck and not-duck at the same time and under the same respect. According to the view that I challenge, J cannot be both duck and rabbit at the same time, so we cannot rationally believe that J is simultaneously both.

The standard view is weakened when we notice that our belief that J is both rabbit and duck entails the belief that J is duck and not-duck, or the belief and not-belief that J is a duck. My view is that the standard answer briefly outlined in the paragraph above is wrong. In the first place, it is wrong to invoke the LNC in ambiguous cases such as pertains to J. Purportedly, in the case of an actual, real-life duck, the duck cannot be a duck and a rabbit (i.e. not a duck) at the same time. According to Aristotle, "The LNC is the most certain principle of all. It states that the same attribute cannot belong and not belong to the same subject at the same time and from the same perspective" (*Met*., 1005b 18-20). I argue that such an explanation fails for the cases at hand. I propose that we

are correct in believing that J is a duck and a rabbit (i.e. not a duck) at the same time and under the same perspective. I also make the similar argument that we are correct in believing J to be something independent of all the ways J can seem to us. The problem is merely that we cannot experience said perspectives, though we can certainly believe that they obtain despite our perceptual limitations. We can rationally believe that J is both duck and not-duck (i.e. rabbit) at the same time. We can also rationally believe that J is something beyond the way it can seem to us. The right trick to contradicting Aristotle is to realize that we can believe that there may be true perspectives even if we currently cannot access them. Thus, I can believe that it may be true that a circle is also not a circle, even though said perspective is currently off-limits to me.

When an observer is looking at J, the content of her experience or else her actual experience alternates. O's experience goes from an *impression* of duck to *not-an-impression* of duck (her experience alternates); or from an impression of *duck* to an impression of *not-duck* (the content of her experience alternates). Either the experience goes back and forth, or the contents of her experience go back and forth.

But neither the *contents* of O's belief nor her *belief* can be said to go back and forth. Rabbit and duck are the united content included in one stable belief. We believe J is simultaneously a duck and a rabbit. It is a quite straightforward belief that J is both. It can also be said that the *belief* that J is a rabbit coincides with the *belief* that J is a duck.

It is also quite unproblematic that the drawing itself, like the beliefs, does not alternate either. J is not something that is physically changing to match an observer's alternating impressions. But if I am right, J simultaneously possesses and does not possess certain attributes. Namely, J is and is not a duck, and this contradictory state of affairs obtains in the world.

My ultimate conclusion is that we must reassess the LNC. That is, the LNC should be considered an empirical theory concerning cases of experience. Here are two suggestions to tweak Aristotle's view: (1) The LNC is a principle that describes the limits of our experiences. It states that the same attribute cannot be experienced and not be experienced at the same time and from the same perspective, even for some attributes that belong and do not belong to the same subject at the same time. Or else, (2) the LNC is a principle that limits the contents of some of our experiences. It states that an attribute and its absence cannot be experienced at the same time and from the same perspective, even for

some attributes that belong and do not belong to the same subject at the same time.

It is important to note that the scope of my conclusions affect most, if not all, cases of ordinary vision. For any given visual stimulus (even the case of a real duck) there is always more than one available impression. Think for example, that at any time in ordinary cases of vision, what we see as depth can be seen instead as width or length. (Realist painters do this all the time.) This experience is perhaps difficult to achieve subjectively, though if one achieves the experience, it is very pervasive. I leave it to the reader to think of other ordinary cases where what constitutes one stimulus may produce more than one impression on the observer. With different degrees of effort, we may alternate impressions when seeing what appears to be only one thing, although I concede that quotidian alternating impressions are never as obvious as they are in cases of multi-stable images, such as J.

2 What J is not seen as, and why it's puzzling

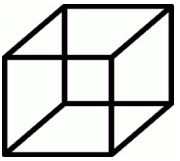
Ordinarily, human observers report that they consciously, visually experience J[8] as alternating between a rabbit-head drawing and a duck-head drawing, or else as a drawing of striated-lines, or even perhaps something else. And although each impression we experience of J (be it rabbit, or duck, or striated-lines, etc.) are all available for an observer, said observer cannot superimpose, or *pile-up*, more than one of the impressions in a single, conscious, visual experience. Stated simply, J is never reported as being seen as a rabbit *and* a duck at the same time. J is also never reported to be seen simultaneously as a rabbit and a duck *and* a drawing of striated-lines. Our experience is never a pile-up of more than one of the alternating impressions. At least no mention of this type of experience is found in the literature.[9] To be clear, a pile-up refers to the

[8] My focus is on the phenomenal character (the 'what it feels like') of perception, which is not necessarily the content (the accuracy condition) of a perception. I assume that an observer's report of her experience accurately describes her experience.

[9] The search was extensive. After looking in literature across disciplines I wrote to people immersed in the topic. Tyler Burge (UCLA) in correspondence suggested that I search for cases of perceptual pathologies, deriving from neural damage. Burge declared that he did not know of any cases where a person conjointly sees the "incompatible impressions"; or whether the "constraint is

simultaneous overlap of alternating impressions concerning what we believe to be one thing. For simplicity's sake I will limit my discussion to rabbit and duck impressions only.

Of course, some impressions that are available to us do overlap in experience, such as when we see that a ball is red, round and shiny. We can forthrightly report that we see it as red and round and shiny, all at the same time. The pile-ups that are of interest for this paper concern solely impressions that we cannot overlap in experience. For example, if an observer acquires the ability to see J as both rabbit and duck at the same time, she must look for other cases that meet the requirements of an unavailable pile-up. Another readily available example is that an observer cannot see a Necker-Cube (N) with its front being both the upper-right and the lower-left square.



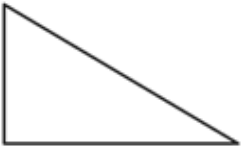
Necker-Cube: 'N'

A different way that our ordinary observations of J could be reported is that they alternate between not being a rabbit-head drawing (when we are seeing J as a duck-head) and not being a duck-head drawing (when seeing the rabbit), and not being striated-lines (when not seeing, say, a basketball, etc.). And even though we can annul impressions in our experience of J at distinct moments, we cannot devoid, or *strip-down*, all available impressions for a single, conscious, visual experience. Stated

breakable". Also in correspondence, Randolph Blake (Vanderbilt University) expressed that the experience of alternating impressions in these cases "cannot be overridden through force of will power". This is the consensus position; cfr. He (2010). Of course, I also informally introspected and asked others for informal, personal reports. None declared to have such an experience. That said, the literature does report transient cases between alternating impressions. This occurs when subjects are exposed to two distinct images. Each image is registered in the retina of only one of the subject's eyes. The experience of the observer alternates between these two images. Sometimes the experience is reported as a fusion of incomplete versions of both; cfr. Hohwy (2008).

simply, J is never reported as being seen simultaneously as not-rabbit *and* not-duck *and* not-striated-lines, *and* not-basketball, *ad infinitum*. No clinical report of this type of experience is found in the literature. To be clear, a strip-down refers to the simultaneous absence of any and all impressions concerning what we believe to be one thing.

I will not be exhaustive in formulating the necessary and sufficient conditions for pile-ups and for strip-downs in order to avoid counterexamples. I assume that it is obvious that alternating, non-overlapping impressions are available to ordinary observers under certain conditions. I am not interested in impressions that are available to an observer only through special equipment such as microscopes, infrared glasses, etc. I am also not interested in what happens in a dark room, under distinct lighting, etc. I am confident that the reader will identify situations where something she takes to be a single object produces distinct, alternating, mutually exclusive impressions which cannot overlap in her experience. Take the simple example provided by Wittgenstein (T).



Wittgenstein's Triangle: 'T'

Wittgenstein (2001, p. 171) suggests that T "can be seen as a triangular hole, as a solid, as a geometrical drawing; as standing on its base, as hanging from its apex; as a mountain, as a wedge, as an arrow or pointer, as an overturned object which is meant to stand on the shorter side of the right angle, as a half parallelogram, and as various other things." To my point: we cannot pile-up some of the impressions when seeing T, nor can we have an experience of T devoid of all impressions. A quick aside: it is interesting to try and pile-up distinct impressions, for example, I *can* see T as both a wedge and a tipped triangle. But again, my focus is on the pile-ups we cannot have.

I now offer information in the literature that can help get a better understanding on multi-stable phenomena. My purpose is to stress that the available research does not provide a satisfactory explanation for

why we cannot experience pile-ups and strip-downs. If anything, the literature places the mystery in sharper relief.

All studies on multi-stable perception agree that for such cases there is only one stimulus for the alternating impressions. Some may prefer to state that the stimulus *correlates with* different conscious experiences. For others, the stimulus *just is* the available conscious experiences. And yet others may insist that the stimulus is epiphenomenal or *independent-yet-in-harmony-with*[10] the distinct conscious experiences. In any case, the stimulus is stable, yet our experience is not. This means that an observer that looks at J is simultaneously receiving the stimulus that corresponds[11] to *both* seeing J as a rabbit and seeing J as a duck. The literature concurs that the stimulus does not alternate, even if the report of the perceptual experience does.

The pile-ups and strip-downs that are the focus of this paper are those that we cannot experience yet we can and do rationally believe. I submit that we can rationally believe that J is simultaneously both a drawing of a rabbit and a duck. Additionally, I submit that we can rationally believe that whatever J is, it is independent of all the way J can seem to us.

The fact that we are capable of believing J is a pile-up or a strip-down, together with the fact that the impressions involved are readily available upon seeing J, compels us to ask why we cannot experience J as we believe J to be. We cannot stare our way to seeing J in the way suggested, even when everything we need is available to us. It is extremely odd that we are not intuitively puzzled by the fact that we cannot see J in a way which is right there to be seen and which is also the way that we take J to be.

But not only are the impressions of J conjointly accessible to our belief. It also seems to be the case that our best belief of J is that it is indeed a pile-up or a strip-down. The most straightforward argument in favor of this conclusion is by process of elimination. The view that J is a pile-up or a strip-down is a better judgment than all other available beliefs. For example, the view that J is only one of the impressions all of

[10] By "independent-yet-in-harmony-with" I mean something along the lines of epiphenomena, following the line of Leibniz's idea of pre-established harmony; cfr. Leibniz (1989).

[11] In my usage 'correspond' may mean 'just-is' or 'correlates to' or even 'is independent-yet-in-harmony-with'.

the time is an inferior position to the belief that J is simultaneously both. I presume no one will seriously defend the view that J is only a rabbit-head drawing all of the time. That J is both impressions simultaneously or that J is actually neither impression outranks the belief that J is always only one of the impressions. Also, the view that J is both impressions simultaneously, or that J is actually neither impression, outranks the belief that J is actually alternating every time it alternates for the observer. The rational belief to espouse is that J is independent of our impressions, or that J is simultaneously the alternating impressions. These are contradictory and yet still rational beliefs.

We can easily see J as rabbit. We can also easily see J as duck. Both impressions are always available and nothing impedes our experiential access to either impression. It seems that no obstacle in the environment or in the observer ever blocks one impression when the other impression is being experienced. We rationally and correctly believe that J is simultaneously both rabbit and duck, yet we cannot see simultaneously as both, and there is no viable reason for why we cannot see J simultaneously as both.

Similarly, for the case of strip-downs, we can see J as not-rabbit and we can see J as not-duck, etc. Nothing impedes our experiential exclusion of any impression. We can correctly believe that J is devoid of all our impressions, yet we cannot see J as such.

In synthesis, a good reason to demand an explanation for why we cannot experience pile-ups and strip-downs is that we can rationally believe that something is a pile-up or a strip-down and all that is needed to experience the corresponding belief is within our reach.

Another reason to demand an explanation for why we cannot experience pile-ups and strip-downs arises when we consider that the stimulus-experience relation is not deterministic. The experience of seeing rabbit or else duck seems capable of being controlled to a certain extent by the observer who is given the same input. Our available experiences are dirigible. If the observer can focus on the ears of the rabbit and see them as either the rabbit-ears or else a duck-bill and alternate back and forth between impressions, then why can't she focus her attention on some spot on J and experience both impressions simultaneously?

Again, we find no obstacle to seeing J as both duck and rabbit. Although, it is true that particular areas on the drawing where O places her sight (say she focuses on the ears instead of the eye) will favor one

impression over another.[12] Still, O may focus on the spot that favors the duck impression and see the feature as belonging to the rabbit. It is important to consider that even if focusing on the duck-bill favors the duck impression, an observer can still see the same feature as rabbit-ears.

But more to the point, no spot on J favors O having the experience of seeing both the rabbit and the duck feature at the same time. If the focusing of our attention does not determine our experience, why can't we bring forth a pile-up or a strip-down, if the features are available to us?

In a related discussion Dennett (2002, p. 486) points out that "we are equipped to make sequence judgments about events in our experience". So, it is reasonable that perceiving J as 'rabbit-drawing only at time t_1', and 'duck-drawing only at time t_2' leads to inferring 'J is both rabbit-and-duck-drawing at t_1, and t_2'. Similarly, perceiving 'not-rabbit at time t_1', and 'not-duck at time t_2' leads to inferring 'J is neither rabbit-or-duck at t_1, and t_2'. Most likely, this occurs by way of conscious or unconscious inference (or something other than strict perception).[13] The strategy of invoking sequence judgment is made to suggest that we do not need to see pile-ups and strip-downs because we can infer our correct belief about J. So perhaps Dennett's argument supports the view that we may believe J to be a strip-down or a pile-up by way of sequence judgment. Perhaps the trick is to consider pile-ups and strip-downs as events. That we can arrive at the correct belief via inference still does not explain why we cannot directly experience J as a pile-up or a strip-down in a given moment.

If I am right, and it is rational to believe that J is simultaneously both duck and rabbit, or no impression at all, then our rational beliefs about J correspond to visual experiences that we cannot have of J. We cannot experience J as we believe J to be, yet there is no convincing reason for why we are unable to do so.

Oddly, our *actual visual experiences of J* (the way that we do, in fact, see J) do not match what we straightforwardly believe J to be. After all, it is not correct to believe that J is actually shifting from duck to rabbit

12 Cfr. Stokes (2015 p. 80).

13 Even if strict perception is a sort of 'unconscious inference', as Helmholtz (2013) would have it, some other inference is involved in producing the belief that is so distinct from our actual experience.

(as our direct experience suggests)! It is also incorrect to believe that J is always one and only one of the two impressions. We in fact believe that both impressions are present at the same time even if we cannot see them at the same time! It seems that what requires adjustment concerns not our beliefs, but what we visually experience.

As stated earlier, there is no consensus in the scientific literature for why we cannot have pile-ups or strip-downs in experience. The question has not been addressed directly, though one can identify related topics that may indirectly point to an answer. For instance, some researchers find that cognitive circuits are involved in perceptual switching.[14] These findings are not incompatible with the view that we could learn how to see pile-ups or strip-downs. Other findings do not go as far, but insist that switches are not purely visual.[15] Still others report that non-cognitive vision procedures are involved in spontaneous switches.[16] In some investigations spontaneous and willed switches are deemed to involve distinct biological areas.[17] There are investigations that conclude that it is unknown whether cognitive aspects are involved in switches,[18] while others, such as Koch (2004), argue that multi-stable research may lead to identifying neural correlates of consciousness. Despite all the empirical investigations being done on multi-stable perception and ambiguous figures, there is no consensus on the reasons for visual alternations, or 'switches', occuring.

It is very important to note that the issue that I am raising is distinct. Namely, I notice that all of the alternating impressions (duck, rabbit, lines, etc.) cannot be totally absent in our experience (i.e. we do not have an experience of a complete impression strip-down), and that some impressions (for example, duck and rabbit) cannot be experienced simultaneously (i.e. we do not have experience of pile-ups).

Although a scientific verdict is absent concerning the question of shifting impressions, the majority of the research establishes cognitive

[14] Cfr. Andersen & Buneo (2002), Berman & Colby (2009), Blake & Logothetis (2002), Chen *et. al*. (2008), Churchland (1988), Heekeren *et. al.* (2008), Helmholtz (2013), Leopold & Logothetis (1999), Maier & Leopold (2009), Vernet *et. al*. (2015).

[15] Cfr. Pettigrew (2001).

[16] Cfr. Ilg *et. al*. (2008).

[17] Cfr. De Graaf *et. al.* (2011).

[18] Cfr. Wilson (2003) and Wohlschläger (2000).

areas of the brain—in opposition to visual areas of the brain—as playing the major role in alternating impressions.

This means that brain states that would correspond to alternating impressions are in extremely plastic and complex areas of the brain. It may be that the neural circuits involved for one impression (say duck) will not necessarily suppress the neural circuits for the other impression (rabbit). It would indeed be surprising if there are not distinct and independent neural circuits available to correspond, on one hand, to a pile-up and on another, to a strip-down. All of this, of course, is purely speculative. I build on my quite common understanding of plasticity to lay out this scenario.

But more caution is not required, since I am content to accept the less probable competing view. Even if the neural circuit for the impression of duck must necessarily suppress (or be the same as) the neural circuit for the impression of rabbit, this would not dissuade us from believing that J is both. Similarly, the speculated neural circuit required for a strip-down or a pile-up, if impossible to activate, will not dissuade us from our belief that J is a strip-down or a pile-up.

What I have done up to now is pinpoint two types of experiences that we cannot have and argue that there is no viable reason for us not being able to have them. I have also given reasons for why it is odd that we cannot have these types of experiences. Chief among these reasons is the fact that our rational beliefs correspond to the experiences that are unavailable to us, and that when looking at J we are always in possession of the stimulus that corresponds to both impressions. Additionally, the empirical research leans towards the conclusion that cognitive areas of the brain are protagonists in alternating impressions, which means that it is possible to learn to see J as we currently cannot.

3 Sudden contradictions

There are two crucial argumentative moves which quickly turn innocuous statements into controversial ones. The first move, in its basic formulation, concerns noticing that we rationally believe conjunctions whose conjuncts are mutually exclusive. In particular, these conjunctions have '*duck-head drawing*' as one (or as part of one) conjunct and '*rabbit-head drawing*' as the other (or part of the other) conjunct. Whether the conjunction describes J directly (as in the conjunction 'J is a *duck-head drawing* and J is a *rabbit-head drawing'*) or whether the conjunction describes a belief (as in 'O believes that J is a *duck-head drawing* and O

believes J is a *rabbit-head drawing*') or whether the conjunction describes an experience (as in 'O sees J as a *duck-head drawing* and O sees J as a *rabbit-head drawing*') the issue is that each of the conjuncts are mutually exclusive and so each conjunct entails the other conjunct's negation.

For example, 'J is a duck-head drawing' entails 'it is not the case that J is a rabbit-head drawing'. This is because a duck-head drawing is a natural kind that is incompatible with a rabbit-head drawing. Fundamentally, when we assert that an attribute belongs to some object, what we are doing is excluding other attributes. In the cases at hand, each of the impressions that alternate in experience for us indubitably excludes the other alternating impression.

So, it follows that the proposition 'J is a rabbit-head drawing and J is a duck-head drawing' entails 'J is a rabbit-head drawing and it is not the case that J is a rabbit-head drawing'. What seems to be the safest, most straightforward belief (i.e. that J is both a drawing of a duck and a rabbit) suddenly entails a contradiction. This first crucial argumentative move is so sudden that it is barely a move at all. It simply consists in realizing that we are asserting what we are excluding. Yet what we say is still rational for belief. Again, the basic example is that 'J is a duck and rabbit' entails 'J is a duck and not-duck', 'J is and is not a duck', 'J is a rabbit and not-rabbit' and 'J is and is not a rabbit'. I offer a logical template that demonstrates these entailments ahead.

The second crucial move concerns propositions that have an implicit contradiction. Consider this description: 'J is some-thing which is not any of the things J can seem to be'. The attribute that J is said to have is being in no way that J can seem to be. But J is in a certain way. Concretely, J is in a way that J cannot seem to be. This is contradictory when uttered. The contradiction shows up not only in the utterance about J, but more evidently in our belief of J (as in 'O believes J is some-thing which is not any of the things J can seem to be') and in descriptions of our experiences of J (as in 'O sees J as some-thing which is not any of the things J can seem to be').

This contradiction does not show up in the case were J does not seem to be at all. J can be such that it is beyond identification. If no one is there to identify J, there is no contradiction. Yet when identifying J as unidentifiable the contradiction is clear. At this moment, I will not follow the complexities of an idealist-realist debate. We can rationally believe that J is some-thing which it cannot seem to be. This does not mean that J is nothing if it is not perceived, nor does it mean that J is

something only if it is perceived; as an idealist or antirealist argument would state. What does follow is that, if J is some-thing independent of all the ways it can seem, then J may seem to us in a way that J cannot seem. The issue is that it is quite rational to believe J is something other than how it can seem, so we expect said experience to be available to us.

It is mainly because of the two crucial argumentative moves presented in this section that pile-ups and strip-downs are contradictory.

4 Phrasings

As I argued in Section 1 and 2, it is rational to believe that J is both duck and rabbit or that J is something independent of the ways J can seem. These beliefs are rational on account of them being superior to all other beliefs concerning J. But, as I have also stated above, pile-ups and strip-downs concerning J have two sorts of entailments each. The question comes down to what is excluded in the pile-up and strip-down assertions. The pattern is that whatever is excluded is also asserted.

For example, the case of believing J is a duck excludes believing J is not a duck, but it also excludes not-believing J is a duck. In other words, the case where O does not believe J is a duck cannot coincide with the case where O believes J is a duck. Also, the case where O believes J is something that is not a duck cannot possibly coincide with the case where O believes J is a duck. The issue is that in our rational beliefs, like believing J is both duck and rabbit, the conjuncts do coincide even though they are mutually exclusive.

The comments of the previous paragraph apply for cases of belief and of being. For these cases, the propositions are contradictory, yet rationally believed and available. The corresponding propositions about our experience are also contradictions, but they are *not available*, i.e. we *cannot* see J as both rabbit and duck.

In a similar fashion, strip-down cases—where *J is believed to be something independent of any and all ways J can seem*—exclude J being dependent on ways that J seems. But in believing that J is some way it cannot seem both asserts and excludes the content of the belief. Also, believing that J is some way it cannot seem asserts and excludes the belief itself, i.e. we believe and not believe that J is some way it cannot seem.

I now present pile-ups and strip-downs and what they entail. I employ non-technical, imprecise terms in order to offer a simplified, graspable list of what has been said so far. For example: I refrain from

using 'simultaneous', though it is implied; I do not indicate that J is a diagram or a drawing; correct grammatical usage is not necessarily practiced; I keep the entailments down to propositions about 'rabbit', though propositions concerning 'duck' are also entailed, etc. The idea is to sacrifice precision for parsimony and ease of understanding. The following six clusters of propositions are cashed-out and fully understood in Section 5 below.

Being-pile-up (Being-PU): J is rabbit and duck.
Being-PU-Entailment: J *is* rabbit and J *is not* rabbit.
Being-PU-Content-Entailment: J is *rabbit* and also is *not rabbit*.

Belief-pile-up (Belief-PU): O believes J is rabbit and duck.
Belief-PU-Entailment: O *believes* J is rabbit and *does not believe* J is rabbit.
Belief-PU-Content-Entailment: O believes J is *rabbit* and believes J is *not rabbit*.

Experience-pile-up (EPU): O sees J as both rabbit and duck.
EPU-Entailment: O *sees* J as rabbit and *does not see* J as rabbit.
EPU-Content-Entailment: O sees J as *rabbit* and sees J as *not rabbit*.

Being-strip-down (Being-SD): J is some way J cannot seem.
Being-SD-Entailment: J *is not* some way J cannot seem.
Being-SD-Content-Entailment: J is *no way* J cannot seem.

Belief-strip-down (Belief-SD): O believes J is some way J cannot seem.
Belief-SD-Entailment: O does *not believe* J is some way J cannot seem.
Belief-Content-Entailment: O believes J is *no way* J cannot seem.

Experience-strip-down (ESD): O sees J in some way J cannot seem.
ESD-Entailment: O does *not see* J in some way J cannot seem.
ESD-Content-Entailment: O sees J in *no way* J cannot seem.

As stated before, all pile-up entailments are constructed around 'rabbit' but they can also be constructed around 'duck'. This adds two propositions for every cluster of propositions above.

In the case of each strip-down cluster, the entailments contradict their premises; the entailments are not internally contradictory. In the cases of the pile-up entailments, they are internally contradictory as well as contradictory to the original proposition.

The main thing to notice is that we cannot give up the view that J is simultaneously both rabbit and duck and so it is rational to believe that J is such. In the same manner, we cannot give up the view that J is something independent of what it can seem and so it is rational to believe that J is such. We rationally hold these contradictory beliefs and they seem to describe J accurately. (Note that the strip-down description of J is not necessarily a contradiction, as mentioned before, though the belief strip-down of J is contradictory.) Still, we cannot have the corresponding pile-up or strip-down experiences.

5 Argument templates

The phrasings in Section 4 depend on the argument templates that follow. The templates demonstrate that the arguments on which my position hinges are well formed.

The first cluster in Section 4 concerns pile-ups about J itself and the entailments.

The proposition '*J is a duck-head-drawing at time* t' is symbolized by *d.*

The proposition '*J is a rabbit-head-drawing at time* t' is symbolized by *r.* Here is the argument:

Premise 1: d & r
Premise 2: d → ¬r
Conclusion 1: d & r → r & ¬r

If J is a duck-head-drawing at time *t*, then we have an entailment where the negation affects the verb 'is'. We also have an entailment where the negation affects the predicate nominative 'rabbit-head-drawing'. Concretely, '*J is not a rabbit-head-drawing at time* t' and '*J is a not rabbit-head-drawing at time* t' follow from Conclusion 1.

The second and third cluster in Section 4 concerns pile-ups about belief and experience.

For the argument template in support of the second and third cluster, consider 'to believe' and 'to perceive' as relations (R) between an agent *a* and a proposition *p.*

A *pile-up* of belief is stated in English: 'The agent believes that J is a duck-head-drawing at time *t* and that J is a rabbit-head-drawing at time *t.*'

A *pile-up* of experience is stated in English: 'The agent sees J as a duck-head-drawing at time *t* and sees J as a rabbit-head-drawing at time *t.'*

Both of these pile-ups can be represented symbolically as:

[R(a,d) & R(a,r)]

Since 'R' may represent belief or experience, the symbolic representation may be read in two ways: (1) Agent believes J is duck and agent believes J is rabbit. And (2): Agent perceives J as duck and agent perceives J as rabbit.

The pile-up [R(a,d) & R(a,r)] is a contradiction about our beliefs and about our experiences since the following argument template is valid.

Premise 3: [R(a,r) → ¬R(a,d)]
Premise 4: [R(a,d) → ¬R(a,r)]
Conclusion 2: [R(a,d) & R(a,r)] → [R(a,d) & ¬R(a,d)]

The argument is valid on all accounts, but sound only for the case of experience, since Premise 3 is false for belief, i.e. it is not the case that if agent believes J is rabbit then agent does not believe J is duck. The reason that Premise 3 is not the case is that the agent can believe the contradiction!

Next, the pile-up [R(a,d) & R(a,r)] is a contradiction about the content of our beliefs and of our experiences since the following argument template is valid.

Premise 5: [R(a,r) → R(a,¬d)]
Premise 6: [R(a,d) → R(a,¬r)]
Conclusion 3: [R(a,d) & R(a,r)] → [R(a,d) & R(a,¬d)]

Again, the argument is valid but is only sound concerning our experience. Premise 5 is false for belief, i.e. it is not the case that if agent believes J is rabbit then agent believed J is not duck. The reason that Premise 5 is not the case is that the agent can believe the contradiction!

Perhaps we do not have these contradictory experiences because "our perceptual mechanisms impose a 'consistency filter' on what we see" (Priest, 1999, p. 444). Consistency filters would be such that "we cannot observe contradictions, despite each conjunct (as it were) being individually observable" (Beall, 2000, p. 113).

It is important to notice that in order for the argument to be valid about experiences, negative facts must be observable. E.g. we should be able to see that J is *not* a duck. This is contestable on grounds that we cannot see negative facts directly. Graham Priest argues against the position that "we always see that something is the case, and then infer

that something else is not the case" (Priest, 2008, p. 143). I draw from Priest's argument in the following paragraph.

It is not the case that positive facts are observable in contrast to negative facts solely because of their positive character. For example, I directly see the negative fact that the light is *not* on whenever I walk into a room that has the lights off. Seeing *the lights as not on* is not perceived less directly than seeing *the lights as off*. We have no reason to favor the view that we infer from seeing the lights off, that they are not on. At least there is no better reason to favor the view that we infer that they are not on than to favor the converse. If what I say is so, we may see positive facts just as directly as negative facts. That is, we might not be able to decide whether one is observed and the other inferred or if both are directly observed *merely on the positive or negative phrasing of the fact*. The point is that they are on the same footing in regards to our capacity to perceive them.

For the cases that concern this paper, seeing J as a rabbit is on equal footing than seeing J as not a duck. One impression is on the same footing than the other.

In summary, the unavailable experience of seeing J as duck and rabbit can be described as a contradiction of experience or an experience with contradictory content.

The fourth cluster in Section 4 concerns strip-downs about J itself. The proposition '*J is at time* t, *some way that excludes all the ways that J can seem to be a time* t' is symbolized by *e.*

Premise 7: e
Premise 8: $e \rightarrow \neg e$
Conclusion 4: $e \rightarrow \neg e$

In uttering that J is, J already seems to be some way. Since *e* asserts that the way J is has the attribute of being some way it cannot seem, then *e* entails its negation. The negation can be taken to affect the verb 'is' or else the noun phrase 'some way'. What follows are the entailments that J is not some way it cannot seem, and that J is no way it cannot seem. These entailments still logically follow, though they contradict their premises.

Cluster 5 and 6 in Section 4 concern belief strip downs and experience strip-downs. A *strip-down* of belief is stated: 'The agent believes *J, at time* t, *is some way that excludes all the ways that J can seem to be a time* t'.

A *strip-down* of experience is stated: 'The agent sees *J at time* t, *in some way that excludes all the ways that J can seem to be a time* t'.

Both strip-downs can be expressed:

[R(a,e)]

The strip-down [R(a,e)] is a contradiction about our beliefs and about our experiences since the following argument template is valid.

Premise 9: [R(a,e)]
Premise 10: [R(a,e)] → [¬R(a,e)]
Conclusion 5: [R(a,e)] → [¬R(a,e)]

The argument is sound only for the case of belief.

Next, the strip-down [R(a,e)] is contradiction about the content of our beliefs and of our experiences since the following argument template is valid.

Premise 11: [R(a,e)]
Premise 12: [R(a,e)] → [R(a, ¬e)]
Conclusion 6: [R(a,e)] → [R(a, ¬e)]

This section has shown that the arguments supporting my position are well formed.

6 Pile-ups, strip-downs, and ordinary experience

Although my investigation focuses on the case of J, I believe the findings can extrapolate to all, or most, cases of ordinary vision. In the broadest terms, any conscious visual experience that can have two or more impressions which we cannot pile-up or strip-down is subject to the treatment that the perception of J is submitted to here. As Orlandi (2011, p. 24) notes: "the visual system constantly faces the problem of reconstructing a stable representation of the world from ambiguous retinal information."

Ultimately, any case of an experience corresponding to a single stimulus, where there are exclusive alternating impressions which can be rationally believed, will share the crucial features with J. This means that we can generalize the conclusions of this article to some cases of ordinary experience.

Observers may find alternative impressions for most of their ordinary, conscious, visual experiences. The face of the moon offers many well-known impressions; cloud formations and agglomerations of tree branches offer shifting impressions as well. Think of the experience of seeing the stars as points of light spread upon a dome or else as having different depths between them. One can regularly see figures in the wood grain or on the surface of rocks. A leaf can be seen as a separate entity to the tree or as a part of it. One may look at a mountain

and see its peak as going infinitely deep along the *z* axis, towards a vanishing point. This impression makes the mountainside look like an infinitely long bridge that ends in an indiscernible point. Of course, we cannot rationally believe that a mountain-top goes up into the sky and also away towards a vanishing point simultaneously.

But consider that we may see our own actions as being causally determined, or else willed. Willed movements of my body may just be resulting from an unbreakable chain of cause and effect, or else they may be guided by force of will. Perhaps there is an explanatory path forward when we believe that it is simultaneously both.

After a certain physics conference I had the impression that objects were present in more than the three usual physical dimensions. As an object moved, I saw it as if its constituent parts whirled along extremely tiny curvatures of space. I felt I could shift between alternating impressions, yet I could not superimpose some impressions nor omit them all. It is my opinion that alternating impressions are available in most, if not all, cases of ordinary vision and experience, and that we are not able to pile-up or strip-down said impressions; said inability is analogous to the case confronted in this paper of not being able to see J as suggested.

Thus, whenever it is rational to believe a pile-up or a strip-down concerning an object, an event, an action, etc., I suggest that the conclusions contained herein apply.

7 Conclusion

Perhaps J really is the simultaneous superposition of all its impressions. Or maybe J really is something independent of all its impressions. If so, it is rational for us to believe that J is so. The problem is that we cannot experience J in such ways. The scenario contained in the three previous statements flies in the face of the orthodox view of the Law of Non-Contradiction.

Not only does it seem rational to believe contradictions about J, it also seems that a contradictory state of affairs obtains in reality. This is a contentious view. The LNC is still upheld as paramount and fundamental in the grand majority of philosophical endeavors. But if my arguments are sound, the LNC is relegated only to the realm of experience. And, since there seems to be no reason for contradictory experiences to be unavailable, and given that impressions might

correspond to cognitive neural circuits,[19] perhaps we may one day learn to experience contradictions.

That we cannot perceive something as both what it seems and what is excluded in that particular seeming does not mean that the thing we observe is not what we cannot experience. Things can be in a way that is beyond what we can experience. But even if contradictions are beyond what we can experience, this is no reason to exclude them from belief or from the state of affairs of the world. The case study of J has implications not only for other multi-stable phenomena but for phenomena in general. That is, every time that there are competing perspectives for any given phenomena, and pile-ups and strip-downs are available to us as rational beliefs to hold about the phenomena, then we are not compelled to give up an assertion for its negation. Indeed, we may rationally believe the contradiction, and so contradictions may actually obtain in the real world.

Bibliography

Addis, M. (2010). Seeing As. In E. Goldstein (ed.), *Encyclopedia of Perception*. (pp. 877-878). Sage Publications.

Andersen, R. & Buneo, C. (2002). Intentional Maps in Posterior Parietal Cortex. *Annual Review of Neuroscience*, 25(1), 189-220.

Aristotle. (1928). *The Works of Aristotle Translated into English*. W. D. Ross (ed.). Clarendon Press.

Beall, J. C. (2000). Is the Observable World Consistent? *Australasian Journal of Philosophy*, 78(1), 113-118.

Berman, R. & Colby, C. (2009). Attention and Active Vision. *Vision Research*, 49(10), 1233-1248.

Blake, R. (2009). Multistable Perception. In T. Bayne, A. Cleeremans & P. Wilken (eds.), *The Oxford Companion to Consciousness*. (pp. 455-457). Oxford University Press.

Blake, R. & Logothetis, N.K. (2002). Visual Competition. N*ature Reviews Neuroscience*, 3(1), 13-21.

[19] Same as footnote 15: Andersen & Buneo (2002), Berman & Colby (2009), Blake & Logothetis (2002), Chen *et. al*. (2008), Churchland (1988), Heekeren *et. al.* (2008), Helmholtz (2013), Leopold & Logothetis (1999), Maier & Leopold (2009), and Vernet *et. al*. (2015).

Chen, Q., Marshall, J., Weidner, R. & Fink, G. (2008). Zooming In and Zooming Out of the Attentional Focus: An fMRI Study. *Cerebral Cortex*, 19(4), 805-819.

Churchland, P. M. (1988). Perceptual Plasticity and Theoretical Neutrality: A Reply to Jerry Fodor. *Philosophy of Science*, 55, 167-187.

DeGraaf, T., DeJong, M., Goebel, R., VanEe, R. & Sack, A. (2011). On the Functional Relevance of Frontal Cortex for Passive and Voluntarily Controlled Bistable Vision. *Cerebral Cortex*, 21(10), 2322-2331.

Dennett, D. (2002). Seeing Is Believing—Or Is It? In A. Noë and E. Thompson (eds.), *Vision and Mind.* (pp. 481-496). MIT Press.

Dretske, F. (2006). Perception without Awareness. In T. Gendler & J. Hawthorne (eds.), *Perceptual Experience*. (pp. 147-180). Oxford University Press.

He, S. (2010). Bistable Perception. In E. Goldstein (ed.), *Encyclopedia of Perception*. (pp. 213-215). Sage Publications.

Heekeren, H. R., Marrett, S. & Ungerleider, L. G. (2008). The Neural Systems that Mediate Human Perceptual Decision Making. *Nature Reviews Neuroscience*, 9, 467-479.

Helmholtz, H. (2013). *Treatise on Physiological Optics, Volume III*. Dover Publications.

Hohwy, J., Roepstorff, A. & Friston, K. (2008). Predictive Coding Explains Binocular Rivalry: An Epistemological Review. *Cognition*, 108(3), 687-701.

Ilg, R., Wohlschläger, A., Burazanis, S., Wöller, A., Nunnemann, S. & Mühlau, M. (2008). Neural Correlates of Spontaneous Impression Switches in Ambiguous Stimuli: An Event-Related fMRI Study. *European Journal of Neuroscience*, 28(11), 2325-2332.

Koch, C. (2004). *The Quest for Consciousness: A Neurobiological Approach*. Roberts & Co.

Leibniz, G. W. (1989). New System of Nature. In R. Ariew and D. Garber (eds.), *G. W. Leibniz: Philosophical Essays.* (pp. 138-144). Hackett Classics.

Leopold, D. A. & Logothetis, N. K. (1999). Multistable Phenomena: Changing Views in Perception. *Trends in Cognitive Sciences*, 3(7), 254-264.

Macpherson, F. (2006). Ambiguous Figures and the Content of Experience. *Noûs*, 40(1), 82-117.

___ (2015). Cognitive Penetration and Nonconceptual Content. In T. Gendler & J. Hawthorne (eds.), *The Cognitive Penetrability of Perception*. (pp. 331-358). Oxford University Press.

Maier, A. & Leopold, D. (2009). Binocular Rivalry. In T. Bayne, A. Cleeremans & P. Wilken (eds.), *The Oxford Companion to Consciousness*. (pp. 105-107). Oxford University Press.

Orlandi, N. (2011). The Innocent Eye: Seeing-As without Concepts. *American Philosophical Quarterly*, 48(1), 17-31.

Palmer, S. (1999). *Vision Science: Photons to Phenomenology*. MIT Press.

Pettigrew, J. (2001). Searching for the Switch: Neural Bases for Perceptual Rivalry Alternations. *Brain and Mind*, 2(1), 85-118.

Priest, G. (1999). Perceiving Contradictions. *Australasian Journal of Philosophy*, 77(4) 439-446.

___ (2008). *Doubt Truth to Be a Liar.* Oxford University Press.

Siegel, S. (2016). The Contents of Perception. In E. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*. URL: https://plato.stanford.edu/archives/win2016/entries/perception-contents/.

Sterzer, P., Kleinschmidt, A. & Rees, G. (2009). The Neural Bases of Multistable Perception. *Trends in Cognitive Sciences*, 13(7), 310-318.

Stokes, D. (2015). Towards a Consequentialist Understanding of Cognitive Penetration. In T. Gendler, and J. Hawthorne (eds.), *The Cognitive Penetrability of Perception*. (pp. 75-100). Oxford University Press.

Vernet, M., Brem, A. K., Farzan, F. & Pascual-Leone, A. (2015). Synchronous and Opposite Roles of the Parietal and Prefrontal Cortices in Bistable Perception: A Double-Coil TMS–EEG Study. *Cortex*, 64, 78-88.

Wilson, H. R. (2003). Computational Evidence for a Rivalry Hierarchy in Vision. *Proceedings of the National Academy of Sciences of the United States*, 100(24), 14499-14503.

Wittgenstein, L. (2001). *Philosophical Investigations*. Blackwell.

Wohlschlaeger, A. (2000) Visual Motion Priming by Invisible Actions. *Vision Research*, 40, 925–930.