

Art and Ambiguity: A Gestalt-Shift Approach to Elusive Appearances

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I

Russell's *The Problems of Philosophy* (1912), an attempt to introduce contemporary philosophy to a general readership, begins with a discussion of the appearance/reality distinction, via the 'argument from illusion'. His example is an ordinary visual experience of a rectangular, uniformly coloured table. From most perspectives, Russell observes, the table will "appear" irregular in shape; the real shape is not seen but inferred. Moreover, he continues, the table will "appear" non-uniformly coloured, due to shadows and highlights; the reality of an evenly coloured surface is similarly inferred - an inference so automatic that it tends to escape notice and requires careful attention to resist. This idea does not, of course, originate with Russell; it is found in Berkeley's *Dialogues* (1713), and appears to have been common enough in Hume's time for him to remark that "It is commonly allowed by philosophers, that all bodies, which discover themselves to the eye, appear as if painted on a plain surface" (*Treatise* Part II, section V). A consequence of this view is that variations in orientation and illumination have no sensory appearance *as such* — every change in orientation corresponds, at the level of "mere appearances", to a change in apparent shape; every change in illumination on a surface corresponds to change in apparent colour.

No one now thinks that Russell's observation of the table is an example of an "inferred judgement" in any meaningful sense. We now know that perceptual constancy mechanisms are built into the perceptual system itself, rather than being an additional add-on. The visual system compensates for changes in perspective and illumination, at least to a fair approximation and within a certain range, at an early enough level of processing that our perceptual experience of shape and colour has already at least that much complexity. Perhaps the best evidence for this comes from the large range of animals, including insects, that exhibit constancy behaviour (see Neumeyer, 1981; Ingle, 1998; Burge, 2009, contains an interesting summary). Perceptual constancy is arguably necessary for veridical perception of objective reality (as Burge notes), so it is not surprising that we find it to be very widespread, even in the simplest of creatures.

But if the inferred judgement idea is wrong, what are we to make of Russell's distinction between "appearances" and reality? Surfaces do look different in shadow, even though they do not look to *be* different. If both 'looks' are at the level of perception, it is unclear how they are to be reconciled. Moreover, on the surface they seem contradictory. Many find it natural to

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describe the “appearance” of a white wall in shadow as, in some sense, grey; the “appearance” of a tilted circle as, in some sense, elliptical; and so on.¹

Much has recently been written on this topic, following a number of broad strategies. In what could be called the *reversal* approach, some writers deny that there is any genuinely perceptual puzzle - that the “appearances”² in question are actually judgements about how perceived objects would look if projected on an interposed two-dimensional plane (e.g., Gibson, 1979; Schwitzgebel, 2011; Overgaard, 2010, could also be interpreted this way). For these writers “appearances” are essentially judgements about the way objects would look if painted, but they are not the way those objects actually look. Russell’s error, according to this view, is to mistake *how one would paint* something for *how it really looks*. Gibson and Schwitzgebel both hold that this error is caused by a long-standing and deeply ingrained, yet misleading, analogy between a painting and the retinal image.

Others claim that the problem is caused by an over-simplification of the representational contents of perception (e.g., Smith, 2002; Hilbert, 2005; Jagnow, 2009; Matthen, 2010). The idea here is that we can account for the troublesome phenomenology by noting that we have sensations of, in addition to surface colour, *illumination*; in addition to shapes, *orientation*; in addition to size, *distance*. An impoverished account of the properties we perceptually experience, which did not traditionally include these, left a phenomenal remainder that was filled by Russell’s “judgements”. The problem is solved, according to this approach, by a more “complex” (Chalmers, 2006) account of the contents of perception. Thus, for example, it is not the surface colour of the table that appears to vary – the variation in appearance is due to apparent differences in illumination.

Perhaps the most common general strategy, however, is a *dual aspect* strategy. This involves holding that Russell’s “appearance” and “inferred judgement” are both part of perception proper, but instantiate different aspects of perception. Noë’s approach, discussed extensively in Kalderon (this volume; see also Kelly, 2008), is one example. This strategy allows the possibility that the apparent contradiction between the “grey look” of a shadowed white surface and the white that, *ceteris paribus*, it is perceptually judged to be, is not really so. Most of those pursuing this strategy hold that there is an epistemic relation between “appearances” and the final perceptual judgement (as did Russell). There are many ways in which this has been cashed out (e.g., Peacocke, 1983; Rock, 1990; Noë, 2004; Kennedy, 2007; Cohen, 2008; Reeves et al., 2008), though none which seems able to explain away the apparent contradiction in a phenomenologically plausible way. A number of damaging critiques of the dual aspect approach have recently been published, of which some of the most devastating include Overgaard (2010), Hilbert (2005),

¹ Allen (this volume) refers to this as the “exclusion problem”; Siewert (2006) calls it the “problem of contradictory appearances”.

²In this essay I will use “appearance”, in quotation marks, to denote the phenomena.

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and Allen (this volume)³. I will not survey them here.

In this paper, I pursue a strategy associated with Kelly (2008), which was also proposed in a different context by the art historian E.H. Gombrich (1960/2000). This strategy involves accepting both the phenomenal reality of “appearances” and that their content really does contradict how we perceive things to be. The central pillar of this view is the fundamental ambiguity of retinal stimulation, resulting in a visual system which can switch, in a Gestalt-like way, between different possible disambiguations. Thus, a dark patch on the wall could be a cast shadow or darker paint. Though these are different ways the wall could look to be — two different visual experiences — it is possible in some contexts to switch between them. Thus, I will argue, the “apparent greyness” of a shadowed white wall *really is* contradictory to its perceived whiteness but, and therefore, the two are not experienced simultaneously. This seems to me the overwhelmingly plausible explanation for the phenomenon of “mere appearances”. While real and resulting from important features of perception, “appearances” themselves are ephemeral and largely epiphenomenal.

II

The link to art history is no accident, as “appearances” have regularly been compared to the qualities a realistic picture of the perceptual scene would have. Darker colours, after all, must be used to depict shadows. Hume’s remark that things visually appear “as if painted on a plain surface” is echoed by art critic John Ruskin’s (1856) famous insistence that it is the task of a painter to recover the “innocence of the eye” and more recently by Russell’s observation that “the painter wants to know what things seem to be.” (Russell 1912, p.5). Central to this line of thought is that “appearances” are obscured by experience and, though always present, require effort to be uncovered. A young J.J. Gibson described a procedure for doing so:

[L]ook at the room not as a room but, as far as you can, as if it consisted of areas or patches of colored surface, divided up by contours. To do so, you must fixate your eyes on some prominent point and then pay attention not to that point, as is natural, but to the whole range of what you can see, keeping your eyes still fixed. The attitude you should take is that of the perspective draughtsman. It may help if you close one eye. If you persist, the scene comes to approximate the appearance of a picture. You may observe that it has characteristics somewhat different from that of the former scene. This is what here will be called the *visual field*. It is less familiar than the visual world and it cannot be observed except with some kind of special effort.” (Gibson, 1950, p.27)

³ Allen (this volume) does, however, pursue a weak version of this strategy.

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The idea that there is something literally picture-like about one's perceptual experience is also discredited, of course, implying as it does a homunculus and therefore a regress problem. Gibson himself was later to emphatically reject the idea of the flat visual field on general grounds, as for example:

I once believed that you could, with training, come to see the world as a picture, or almost to do so, but now I have doubts about it. That comes close to saying that you can almost see your retinal image, which is a ridiculous assertion (Gibson, 1979, p.196).

To explain his earlier (apparently) mistaken introspective report, Gibson proposed that he had been in the grip of a common analogy between the “retinal image” and a picture. This analogy, according to Gibson, is so ingrained and so natural that even perceptual psychologists have a tendency to be drawn in to an almost literal interpretation of it:

The doctrine of flat visual sensations together with the theories of sensation-based perception, of the cues for depth, and of how the cues get interpreted developed in close connection with the rise of perspective painting from the Renaissance to the nineteenth century. A picture was obviously a patchwork of pigments on a surface. By analogy the picture in the eye was a patchwork of colored light on the retinal surface. Hence, the deliverance of the eye to the mind was a corresponding patchwork of visual sensations. (Gibson, 1979, p.286)

Among those who similarly deny the phenomenology in question, Schwitzgebel (2011) recently also blames “over-analogizing” for the apparent introspective failure. However, there are reasons to doubt that “appearances” can be explained away as an intellectual error. The earlier Gibson's careful description of the phenomenology seems to belie any such mistake. Why, for example, would closing one eye facilitate this error? If “appearances” are not really there at all, but the imaginary result of a misleading comparison, what relevant difference did this elaborate procedure make? A misleading comparison cannot explain, it seems to me, why “flat visual sensations” have been taken *on reflection* to be a clearly sensory phenomenon by a broad range of philosophers and scientists, historically and in the modern day, who are often centrally concerned with visual experience.

In addition, one can point to empirical findings which support the idea that there are two kinds of perceptual experience. The most well known is a series of studies conducted by Arend, Reeves and colleagues (Arend & Reeves, 1986; Arend et al., 1991; Reeves et al., 2008). These studies are a variant of standard “asymmetric matching” experiments, in which participants are asked to manipulate patches of colour under different apparent illuminants. For a broad range of illumination values, people are very good at matching colours between two illuminants. In other words, colour constancy, while not perfect, is quite robust. Arend & Reeves (1986) found,

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however, they could reliably manipulate participant behaviour by phrasing the instruction differently. When they asked participants to match the two conditions according to the apparent underlying physical qualities of the patches (to match the patches of colour “as if they were cut from the same piece of paper”), the normal constancy response followed. However, when participants were asked to match the different patches so as to be the same in terms of “hue and saturation”, constancy was much reduced; participants tended to match closer to the quality of the light reaching the retina. Reeves et al. (2008) take these results to be evidence that “observers can separate their phenomenal percepts from their mental projections of those percepts onto the physical world” (p.226). A related effect was observed by Thouless (1931), who asked participants to match a tilted circle with an ellipse according to “as it appeared to him from that point of view” (p.340). In this case, the participants tended to choose an ellipse with dimensions somewhere in between circular and the “perspectival shape” (i.e., the shape as projected on a flat plane perpendicular to the line of sight to the object). Thouless, and more recently Hill & Bennett (2008), take this to be evidence of the phenomenally apparent shape of tilted circles in perceptual experience.

This so-called “instruction effect” seems to further confirm, contra later Gibson and Schwitzgebel, that there is real sensory phenomenology here to be accounted for (Thompson, 2006; Cohen, 2008; Gert, 2010, for example, all interpret instruction effects in this way). Nonetheless, the analogy between the retinal image and a painting clearly had an impact on historical debates about the nature of visual experience. It seems reasonable to suppose, for example, that one effect was an impoverished list of the kinds of properties that can be visually experienced. The mistake about “appearances”, then, was perhaps not so much a mistake in reasoning as a descriptive error. The vocabulary for describing visual sensations did not include distance, orientation or shadow, perhaps since these can only be depicted; they are not in themselves available for the painter to use on the canvas. Lacking this vocabulary, how is one to describe a shadow other than as a darker area, or a tilted circle other than as an ellipse? The answer to the problem of “appearances”, then, may be a richer vocabulary - shadows *look* shadow-like, not simply darker; tilted circles *look* tilted and circular, not elliptical. If we allow that this can be an accurate description of the contents of the relevant visual experiences, then the apparent contradiction is removed. A white wall in shadow does not look white and yet, in some sense, grey - rather, it looks to be a white surface in shadow. When the lighting visibly changes, it is not a “colour sensation” that changes but, rather more simply, the apparent illumination on the wall. The colour of the wall itself does not visibly change in this case; the only visible change is the illumination change. If this is right, as suggested in Kalderon (this volume), Smith (2002), Hilbert (2005) and Matthen (2010), then we seem to have enough resources to describe the difference between a visual experience as of a white wall in different lighting conditions without attributing an apparently contradictory greyness.

As a description of *ordinary* visual experience this approach seems to me right and an impor-

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tant advance.⁴ It does offer what seems to me an accurate description of the phenomenological change that occurs in spite of perceptual constancy, as when a shadow passes over an object. What it does *not* offer is an explanation for the content of the careful introspective observations of many scholars, including the the early Gibson, quoted above. Gibson is here describing a visual experience with an apparent “picture-like” quality, with “characteristics somewhat different” from the way things usually look, that is either noticed or evoked only with “a kind of special effort”. “Somewhat different” invokes the apparent contradiction, and the “picture-like” characteristics do correspond to the “appearance properties” seemingly revealed by instruction effects, which are also of the type affirmed through introspection by many who emphatically reject the pictorial model of visual experience and its limited vocabulary, such as Alva Noë. Therefore a richer vocabulary for describing ordinary perceptual experience, while an advance, does not seem enough to account for “appearances”.

III

The procedure described by Gibson is striking in its detail, and is consistent with widespread agreement about the the *elusiveness* of “appearances” (for Gibson, the *visual field*). However one is to describe this phenomenology, it does not seem to announce itself with the same force as the apparent objective properties of visible objects. For Rock (1990), who identifies it as “proximal mode” phenomenology, it is “lingering” and “non-salient” (p.219). Russell (1912) remarks that only artists and philosophers tend to notice that objects have “appearances” different from their real properties. But this elusiveness is already implied by the fact that, otherwise, realistic painting would not be as difficult to produce as it is. If the alleged picture-like aspect of visual phenomenology was obvious, surface phenomenology, then we would all be better artists than we actually are, and perspective drawing would not have taken centuries of trial and error to perfect.

The idea that picture-like “appearances” are a non-salient and yet ever-present aspect of visual phenomenology, to be recovered by the artist, was rejected by the art historian E.H. Gombrich in his *Art and Illusion* (1960/2000). In this work, he offered a different account of what artists are doing when they attempt to recover the “innocence of the eye”, based partly on the idea in Gibson (1952) that “The visual field is product of the chronic habit of civilized men in seeing the world as a picture. ... So far from being the basis, it is a kind of *alternative* to ordinary perception.” (p. 151) It is an alternative in two ways; firstly, in being a possible interpretation of the retinal stimulus, and secondly in being a genuinely different perceptual state. For the retinal stimulation, Gombrich emphasized, is multiply ambiguous, perhaps infinitely so. Point-

⁴In this respect, Allen and I are furious agreement about what we experience in “normal conditions” (Allen, this volume, p.14).

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ing to Ames' "chair demonstration" (Figure 1), a series of lines in three dimensional space that look to be a chair from one perspective but are actually a jumble of unconnected lines (Figure 1, centre), he observed that the same illusion could be brought about by an infinite number of line configurations. A flat interpretation — one in which all of the lines lie on a single plane perpendicular to the line of sight — is one *possible* (or "consistent", for Gombrich) interpretation of the scene from that perspective. From a certain perspective (Figure 1; left), the visual system prefers one interpretation - the chair - even when the perceiver knows full well that it is merely a jumble of lines. The "jumble-of-lines" interpretation is (for various reasons) trumped by the "chair" interpretation, which is at least to that extent shielded from belief. What artistic training might do, Gombrich proposed, is make a "flat" interpretation more available to the visual system, in the sense that it might be switched to in a Gestalt-like way. Experience with pictures, he suggested, can make this flat interpretation *able to become salient*. The artist, then, "has learned to look critically, to probe his interpretations by trying alternative interpretations both in play and in earnest" (p.313). In earnest, because one might be trying to see the world as it is; in play, because one might be trying to see the world as if it were a flat projection. Thus, "the 'discovery of appearances' ... is really the discovery of the ambiguities of vision" (p. 314). Each interpretation is for Gombrich a distinct perceptual experience, though of the same kind. One is privileged by being veridical but there is no difference in the kind of properties perceptually attributed through "appearances".⁵

The idea of "appearances" as involving a switch between two distinct perceptual states of the same kind appears more recently in Kelly (2008).⁶ Kelly compares the "elliptical" appearance of a tilted coin — and by extension the "darker" look of shadowed surfaces, and so on — to the kind of Gestalt shift that happens when viewing an ambiguous image, such as a Necker cube or duck-/rabbit. Kelly suggests that "appearances" do not, introspectively, seem to be an ever-present *aspect* of perceptual experience; rather they seem to be an *alternative* to ordinary experience. Agreeing that a visual experience as of ellipticality is possible when looking at a tilted coin, nonetheless Kelly insists, "it seems to me clear that focusing on the real shape [circular] pushes

⁵Allen (this volume) treats apparent properties, such as the apparent ellipticality of a tilted coin, as *relational* and therefore different in kind, from what he calls "constant" properties such as, in this example, the coin's perceived circularity. This is similar to Noë's treatment, according to which the relevant property is not ellipticality as such, but "elliptical from here". This approach is supposed to have the advantage that the (relational) apparent ellipticality and (non-relational) perceived circularity of a tilted coin are compatible. Overgaard (2010) argues, rightly I think, that this advantage is illusory, as it suggests that that one could coherently say "The coin looks circular from here, though it does not look 'circular from here'". Although in this paper Allen is ecumenical as to the nature of apparent properties, specifying merely that they are "constituted in terms of relations to perceptual conditions" (p.2), it seems to me doubtful that any plausible specification of this relation will overcome Overgaard's objections. Allen argues that apparent properties in the relational sense "stake a claim to reality" by affording explanations for a variety of phenomena associated with "appearances". I hope to show that the approach defended here offers a better, in the sense of more complete, explanation for the phenomena he mentions.

⁶Overgaard (2010) also contains the idea of a perceptual switch; the idea is that it is possible to switch to a "reflective", "painterly" attitude to one's experience. The proposal is sketched very briefly, however, and difficult to interpret.

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Figure 1: Adelbert Ames Jr.'s "chair demonstration" (taken from Ittelson, 1952, p.27), from a variety of perspectives.

the apparent one out of experience, and focusing on the apparent shape [elliptical] likewise makes the real one go away" (p.686). While Kelly does not, in this paper or elsewhere, suggest a reason for there to be two alternating experiences, his comparison to ambiguous pictures is consistent with Gombrich's account.

Ambiguity — the main pillar of Gombrich's proposal — also happens to be a defining feature of perceptual constancy. Though constancy is usually characterised merely as as perceptual stability with respect to some attribute (colour, shape, size, etc), the reason this is a special achievement is that the retinal stimulation is always ambiguous in those respects. The ambiguity arises because there exists a *further* attribute (respectively: illumination, orientation, distance) that contributes *in the same way* to the retinal stimulation (Mausfeld 2003). This fact can be used to create illusions, as in Figure 2. The retinal stimulation caused by a shadow on a wall could be kept exactly as it is by darkening the surface while lightening the shadow. The visual system must therefore go beyond the local retinal data to calculate whether there is a shadow or merely a darker area. Its success in doing this, to a fair approximation and within a certain range, is the phenomenon of perceptual constancy.

An object in the distance is sometimes said to "appear small" compared to a nearby object of the same size. The present proposal is that this does not happen by shifting one's attention to a different aspect of the visual experience, but rather by bringing about a *different* visual experience. This different experience is a different possible visual interpretation of the scene. As Gombrich notes, it must be a *consistent* interpretation. This qualification is important; it implies, for instance, that insofar as the distant object appears smaller, it should also appear *nearby*; similarly, for a tilted coin to appear elliptical, it must also appear *not tilted*). For example, the "forced perspective" photo in Figure 3 shows a distant car that seems small at first glance because the context makes it and the leg seem equidistant from the camera. But the descending foot could also seem very large, if one sees the car as its real size. The configuration of objects

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Figure 2: A shadow illusion in Amsterdam: “Police Shadows” by DosJotas.

in the photo “forces” a reading that puts the foot and car into potential contact, thereby fooling size constancy mechanisms. One can switch between these two ways of seeing the depicted scene, as well as the veridical way of seeing it - in which both car and foot appear their normal size, with the foot very much closer to the camera than the car. Note that there are infinitely many sizes and distances that are consistent with the photo — both could be very small and very close to the camera, or very distant and very large — but these are more difficult to see. Note also that although the foot *helps* to jog the visual system into seeing the car as small, this is not strictly necessary. One could see a photo of the car by itself either as a small, nearby car or as a distance, large car, since these are both consistent interpretations of the photo.

A photograph is one thing, real life is another. The idea defended here is that the different ways of seeing the photo are also available to the photographer as she is looking through the range finder of the camera. And they are available to a person simply looking at the scene from that point of view, though with much more difficulty. The photo simply makes the switch easier by implementing some of Gibson’s procedures, such as removing stereopsis and stopping all movement (another of early Gibson’s recommendations, not included in the quotation above). While the photo can be seen *in addition* as mere ink on paper (which, of course, is all it really is), for a person looking at the scene itself from the position of the camera there is no such “neutral” or non-depictive interpretation. One can only see the scene as containing objects of some size



Figure 3: An example of ‘forced perspective’ (Photo: Alicia Nijdam).

or other, at some distance or other, in a way that is consistent with the retinal stimulation.⁷

This approach is consistent with modern-day representational approaches to perceptual experience, according to which there is no “sensory” quality to perception beyond the qualities attributed to the perceived scene. It is also consistent with the Gestaltist rejection of the idea that the perceptual experience of a scene is built on elementary sensations that stay fixed through changes in the Gestalt.⁸ For both approaches, all perceptual experience begins with an interpretation of what is “out there”, without the need to hypothesise additional “sensations”. The crucial point for my purposes is that the “smaller look” of distant objects denotes not a way distant objects inherently look, but rather a *different* visual experience of distant objects; looking *small and close* is simply a different visual experience to looking *distant and large*. The *small and close* experience is, by hypothesis, non-veridical and therefore illusory.

⁷One does not, of course, see the retinal stimulation itself and *that* a certain visual representation is consistent with it. Consistency is instead envisaged as a built-in *constraint* on the sorts of visual experience one can have, given the pattern of light reaching the eye.

⁸At least, Berlin School of gestalt psychology; see (Wagemans et al., 2012; Smith, 1994, Ch.8). Thanks to Fabian Dorsch for setting me right on this point. The earlier Austrian School held on the contrary that the final Gestalt is more than its sensory “parts”, but that the parts continue to be experienced in addition.

IV

The idea that we can switch from one visual experience to another on demand might seem implausible on the face of it. It is important at this point to keep in mind the generally acknowledged *elusiveness* of “appearances”; whatever they are, they are not normally noticed, and then only with “special effort”. The real virtue of the Gestalt-shift approach to “appearances” is that it can explain the precise nature of this effort, and the reason for the elusiveness. To do this, we must now turn to recent empirical research on an aspect of Gestalt shifting that is most well studied — the phenomenon of *multistable perception*.

Multistable perception is most associated with ambiguous images, such as the well-known duck/rabbit and Necker cube (see Figure 4), and is so called because it involves a spontaneous switching between different visual interpretations of these images.⁹ “Stable” might seem a misnomer, since the visible experience is constantly changing, never resting on one interpretation. Nevertheless, the number of interpretations is small and fixed, and the switching usually very regular. The switching is so regular that for many years a basic cellular process such as “neural fatigue” was assumed to be the cause (see Rock, Hall and Davis, 1994). However, this turned out to be insufficient to explain the sensitivity of the rate of switching to a large variety of cognitive phenomena. For example, one can *try* to keep the rabbit visible rather than the duck, and this does have an effect - the rabbit will stay visible longer (though not indefinitely). In addition, *awareness that there are multiple interpretations is necessary for switching to occur*. When subjects are not informed that an image is “reversible”, they tend not to experience multistability (Rock et al., 1994). Other factors known to affect top-down switching in multistable perception, including the familiarity of the stimulus, spatial attention, instruction, semantic association, visual imagery and information from other sense modalities (see, e.g., Leopold & Logothetis, 1999; van Ee et al., 2005; Pearson et al., 2008; Klink et al., 2012).

For our purposes, the key findings are that an *awareness of potential ambiguity* is a normally a pre-requisite, and that the switch is amenable to *prompting*. If “appearances” do result from a switch of this kind, one would expect to find a “moment of discovery”, similar to Necker’s discovery of the ambiguity of the cube drawing,¹⁰ prior to which it was not thought that a tilted coin *could* look elliptical, and therefore the switch was simply not made. Prior to modern attempts to depict a scene realistically on a two-dimensional surface (a possible prompt for the discovery of the elliptical look), it is reasonable to expect no mention of the idea that perceptual

⁹It is also associated with binocular rivalry; when a different object is visible to each eye, each object tends to dominate the visual experience at different times, characterised by spontaneous switching between the two (see Tong et al., 2006, for a review). Since the ambiguity involved here is very different, and the cause of switching seems to involve different underlying mechanisms, I set this case to one side.

¹⁰Though difficult to imagine now, it was certainly seen as a discovery at the time, sufficient to merit publication in the *London and Edinburgh Philosophical Magazine and Journal of Science*.

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experience has a flat projection mode. This is what Schwitzgebel (2011) finds. He puts this finding forward as evidence for an “over-analogizing” explanation, but it is equally consistent with the Gestalt idea, once we take into account the role of cognition.

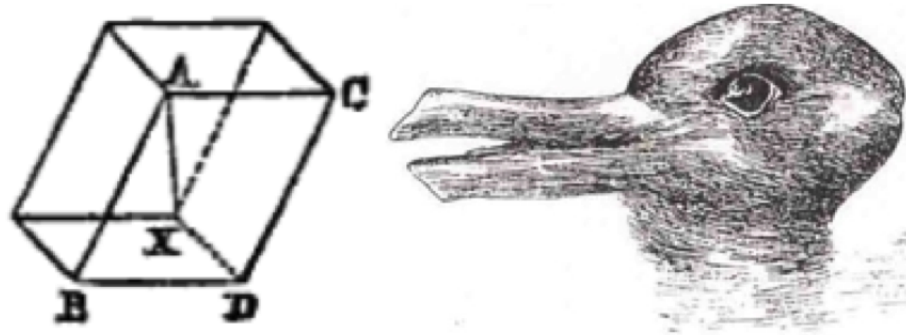


Figure 4: Well-known ambiguous images; on the left, the original Necker ‘cube’, from (Necker, 1832, p.336); on the right, the duck/rabbit that appears in Wittgenstein’s *Philosophical Investigations* (original from Jastrow, 1899, p.312)

Nonetheless, there is a clear difference between multistable perception and the experience of “appearances”: ordinary perceptual experiences of tilted coins, distant objects and shadows are not ambiguous, and therefore not multistable, precisely due to perceptual constancy. There is no spontaneous switching between “appearance” and reality. How, then, could research into multistability help to understand the phenomenon? The answer lies in the connection between multistable perception and ordinary, as it were *monostable*, perception.

Leopold & Logothetis (1999) have hypothesised that multistability is an “accidental” effect of dynamical processes that underlie all perception and connect higher integrative cortical areas to sensory processing. The idea is that higher processes persistently intervene in sensory processing in a continuing search for better hypotheses about the stimulus. The sensory system does not rest content with first appearances, which is important in a challenging visual environment such as Figure 5; harmless jungle foliage may contain a camouflaged predator. Hearing a sound, or remembering that tigers are in the area, or simply realizing that tigers are often found in this sort of foliage, may result in the tiger suddenly “popping out” and becoming visible. In Figure 4 there is not yet multistability, as once the tiger is seen it is impossible to switch back to previous experience of tiger-less foliage. Nevertheless, Leopold and Logothetis suggest, there is evidence for

...an iterative and random system of ‘checks and balances’, whereby higher integrative centers periodically force perception to reorganize or ‘refresh’. During normal vision this process is likely to proceed completely unnoticed, delivering only a stable and reliable subjective depiction of the surrounding world. (p.261)



Figure 5: Taken from Leopold and Logothetis (1999)

Though each refresh almost always delivers the same result, and is therefore completely unnoticed by the perceiver, sometimes new input causes a change. And occasionally, when there is more than one equally likely perceptual hypothesis, the constant refreshing tends to result in switching back and forth. Thus,

Multistable perception might represent an extreme manifestation of this strategy, arising when stimuli are truly ambiguous and perception can never become ‘locked onto a single solution. (p.261)

The Leopold and Logothetis hypothesis is not a hypothesis about picture perception. Ambiguity, they assume, is a feature of the visual environment as much as it can be a feature of pictures. This does not mean that they assume an equivalent between the two. For example, while a duck/rabbit picture is not more correctly seen as either duck or rabbit, because it is not “really” one or the other, the same is not true of a non-pictorial situation.

The difference between ambiguous and non-ambiguous is not a sharp line, as demonstrated by the fact that spontaneous switching can be modulated by altering the stimuli itself. A picture can be ambiguous between a duck or rabbit, and yet be more obviously one than the other. In this restricted sense, perceptual ambiguity comes in degrees.¹¹ A number of different methods have been devised to measure this. Fisher (1967) measured degrees of ambiguity by asking

¹¹It may be more strictly correct to say that awareness of ambiguity comes in degrees, rather than ambiguity itself. However I ignore that complication in what follows, and hope that my intention is clear.

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subjects what they *first* see on looking at different variations of an ambiguous image (Figure 6). He found it is possible to construct a series that gradually changes from favouring one to the other of the two interpretations. Another method, used by Kruse (1986; see Vetter & Stadler, 1998) is to compare the timing of spontaneous switching. Kruse constructed a similar series of Rubin's vase images (which can be seen either as a vase or the silhouette of two faces), and found the same gradual shift. Images which more obviously resembled faces tended to induce more bias towards the face phenomenology; the face would be seen for longer periods before the vase phenomenology asserted itself, which would then switch more quickly back to the face. For the extreme ends — the *most* and *least* face-like images — spontaneous switching stopped altogether.

The most important step in the argument of this paper can now be spelled out. The figures at the extreme for both Fisher and Kruse are not ambiguous in the limited sense that they do not result in spontaneously switching back and forth between the different interpretations. Indeed, Fisher regarded as genuinely ambiguous only the images that are *equally likely* to be seen one way or the other (see also Leopold and Logothetis' use of "truly ambiguous" in the quote above). For the extremes in the series, one interpretation persists indefinitely. But they are still ambiguous enough that one *can* intentionally force a switch to the less obvious interpretation (the reader is invited to try¹²). Crucially, however, this experience does not persist. Momentarily, without continuous effort the experience spontaneously shifts back to the more obvious interpretation, where it is stable. In other words, the more obvious interpretation is the only stable one, though this does not mean that switches to the other interpretation are ruled out. It means only that switches to the other interpretation are not *spontaneous*. The spontaneous switching is all in one direction — towards the more obvious interpretation.

What this means is that even in the absence of 'genuine' ambiguity, higher cognitive processes do have the capacity to *temporarily* force a Gestalt switch to an unlikely (or *dispreferred* by the visual system) interpretation of the visual stimulus. This, I claim, is all that "appearances" amount to. Most perceptual experience is unambiguous in Fisher's sense, nevertheless there are different interpretations that are consistent with the stimulus — as Gombrich observed, an infinite number of them. In certain situations, higher cognitive areas can bring about a transient shift in the percept to one of these alternative (normally illusory) interpretations.

¹²A reader of a previous draft remarked that spontaneous switching occurred for him even for the extremes in the Kruse series. I find the same happening for me, which can probably be attributed to not being a naive subject, and therefore more affected by the various cognitive effects.

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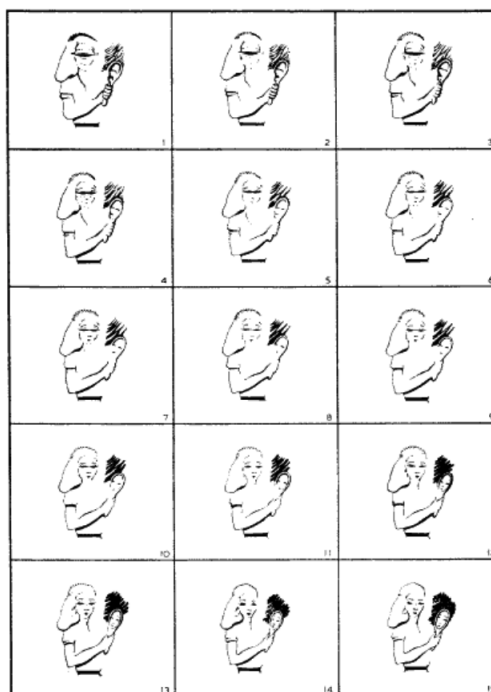


Figure 6: The series of ambiguous images used in Fisher (1967).

V

To reiterate, a darker patch on a white surface can be seen in at least two ways: (a) as a patch of grey material surrounded by white in uniform lighting, or (b) as a shadow on a uniformly white surface. These are two different visual experiences; different representationally and different phenomenologically. Nevertheless both experiences are consistent with the stimulus. Since this is not a picture, there is no neutral, non-depictive experience (that is, there is no “ink on paper” interpretation, as there is for the duck rabbit, etc). If the situation is perfectly ambiguous, one ought to experience spontaneous shifting between (a) and (b). But this is usually not the case. Usually, various contextual clues (a source for the shadow, etc) will tilt the balance to an unambiguous (a) or (b). We find ourselves at one of the extremes in Fisher’s series, or beyond. In this situation, a perceptual switch to the other interpretation is still possible, but only transiently, and requires “special effort”.

If “appearances” are made possible by the kind of perceptual switch suggested here, the nature and difficulty of the special effort required can be expected to be as varied as the phenomena known to modulate the rate of perceptual switching in multistable perception, mentioned above: the familiarity of the stimulus, spatial attention, instruction, semantic association, visual imagery, information from other sense modalities, and others. Multistable switches also become

easier with training, at least in the sense that it is possible to increase the rate of switching by practice (Ammons et al., 1960). In this list we seem to have more than enough resources to explain how a perceptual switch can be prompted, resulting in the so called “instruction effects” observed by Thouless and Arend and Reeves, as well as the connection between the ability to notice “appearances” and familiarity with paintings and pictures.

It is also possible now to explain why in some situations it is easier to attend to “appearances” than in others. In general, features which make this harder are features which remove sources of ambiguity. Thus, closing one eye helps – stereopsis introduces abundant three-dimensional clues. Eliminating or minimising movement should also help, of which the same is true. Certain objects ought to make the switch easier; flat objects, such as coins, have fewer cues as to three-dimensional shape. This is why, it seems to me, coins and plates are the standard examples used to invoke shape “appearances”.

Finally, we can also explain why “appearances” have long been thought an ever-present, introspectible aspect of all perceptual experience. Though the different experiences in multistable perception cannot be had simultaneously (the duck and the rabbit cannot be seen at the same time), it is not necessarily easy to spot this. Indeed for all that introspection reveals one might suppose that *both* duck and rabbit are continuously part of one’s experience but only one can be attended to at a time. Though this idea does not withstand scrutiny in other ways (see Leopold & Logothetis, 1999), the introspective evidence is unclear. A refrigerator light effect is an obscuring factor; the refrigerator light *seems* always on because it is on whenever one looks. Similarly, the experience of the duck can *seem* a continuing aspect of the perception of the duck/rabbit picture, because one can switch to it more or less at will. The difference between an attentional shift and a Gestalt shift is not necessarily obvious. Thus, when looking at a tilted coin one could with effort induce a perceptual shift to an experience of the coin as elliptical.¹³ This experience, which I claim is genuinely perceptual but not part of ordinary perceptual experience, can reasonably be *mistaken to be so* solely based on the introspective evidence. The elliptical experience is there, if only when one looks for it – therefore it seems to always be there. Thus we have a refrigerator light illusion. And thus we can deny, with the later Gibson, that “appearance” phenomenology is an introspectible aspect of perceptual experience, while offering a plausible explanation for why it nevertheless seemed to be so, even on reflection by philosophers and vision researchers.

It might be objected that the retinal stimulation is actually ambiguous not between just *two* possibilities, but a very large number. A shadow, for example, is consistent both with a darker surface and also many combinations of the two - a somewhat darker surface *and* a light shadow

¹³Note that this “effort” need not be specifically to induce a perceptual shift. As research on multistable perception suggests, the shift could be induced by imagining the coin to be elliptical, or by imagining a drawing of the coin, or by imagining the coin to be perpendicular to the line of sight, or some other act known to modulate spontaneous shifting.

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falling on that precise area, for example. But we do not seem able to “switch” to a transient percept as of *that*. Is this a problem for the account? No. At least, not if we are allowed to make use of the extreme implausibility of those circumstances, which seems not unreasonable. For example, probabilities are commonly invoked in current empirical accounts of how retinal data are transformed into percepts. A recently popular approach makes extensive use of Bayes rule (see, e.g., Knill, 1996). Bayesian algorithms have been shown to predict human visual experience (see, e.g., Kersten et al., 2004). Because these approaches postulate a crucial role for expectations, they can account for why extremely unlikely *but possible* disambiguations of the retinal stimulation are never experienced, even transiently. The extreme unlikeness of encountering a shadow that exactly coincides with a slightly dark surface might simply make a switch to this experience out of the question, however much prompting or training.

A final virtue of this approach to the “apparent greyness” of shadows, and similar constancy phenomenon, is that so few assumptions are required. The representational contents of perception need not be interpreted other than straight-forwardly; no special properties need to be introduced; no epistemic relation need be posited between “apparent” and perceived features.

VI

I can think of no good reason to deny that a tilted coin could be seen as elliptical and flat with respect to the viewer. This would be tantamount to denying the possibility of illusion. If this is possible, then there are surely circumstances in which the visual cues are insufficient to decide between these alternatives; if the coin is at some distance and dimly lit, for example, it could be visually ambiguous. If one accepts that these are two genuinely different perceptual experiences, then the idea that one could switch between them also seems natural. So the possibility of switching between the experience of a coin as circular and as elliptical *in itself* seems unproblematic. The only serious question, then, is whether this phenomenon is to be identified with the noticing of “appearances”. The explanatory benefits of doing so seem to me too clear not to take this possibility seriously. In broad terms, this approach does justice to the existence of the phenomenology itself, its nature (i.e., the “apparent greyness” of a white wall in shadow), the varying difficulty in bringing it about, and its connection to the history of realistic pictorial depiction. It is also open to further empirical testing, since it supposes that “appearances” are an ephemeral, alternative perceptual experience resulting from a Gestalt switch with the following concrete features:

Top-down: the switch is only induced by intention or instruction, by the same mechanisms known to modulate the rate of switching in ambiguous imagery;

Sensitive to cues: the less ambiguous the stimulus for the perceiver, the harder to produce the perceptual switch;

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Transient: the alternative percept degrades spontaneously into the “normal” percept.

Each feature is clearly amenable to empirical testing, though their *prima facie* clear consistency with phenomenological reports is already, it seems to me, quite good evidence¹⁴

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