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How Images Actually Work: Settling a Longstanding Debate

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Abstract

As a cultural innovation, image-making is perhaps one of our most enduring forms of new media. The many technical developments necessary for the production of convincing images have emerged over the last 40,000 years, yet there is still widespread disagreement about how images actually function. Why, for instance, are animals largely indifferent to images whereas humans are fascinated by them?

Several competing theories are in general circulation but it is a matter of considerable debate whether these adequately explain the mechanisms at work (or at fault) in the substitution of flat objects made of paper, pigment or pixels for the objects they represent.

Since the 1960's, Australian art theorist Donald Brook has been exploring the implications of a theory of representation that has been published widely during this period. This work has been positively received but considering its implications it is somewhat surprising that it is not more widely known and discussed.

This paper focuses on a crucial element of Brook's theory and explores how recent research in the field of cultural anthropology strongly supports the theory that imagistic representations rely not only on systematic sensory discrimination failures but on the procedural principles by which such discrimination failures can be exploited.

Introduction

Images[1] are two dimensional entities standardly presented perpendicular to the viewer's line of sight. They are substitutive *tools* that require the skillful application of numerous innovations developed in large part during the last 40,000 years, many of which have only been discovered in relatively recent history. The importance of the realisation that images are tools cannot be overstated. It provides a basis for understanding both why animals are largely indifferent to images and also why the emergence of the many techniques of depiction has been such a gradual and often erratic process, dependent upon both the availability of materials and the accumulation and dissemination of knowhow.

Part 1 of this paper examines four of the most prominent theories of depiction (**Resemblance, Transparency, Signification and Illusion**) with the intention of exposing their several limitations and contradictions. Each of these theories offers a degree of explanatory utility, but in Part 2, I hope to show that if the theoretical foundations are well laid, we require only one account to explain depiction entirely. The theory I intend to explore is the work of Australian art theorist Donald Brook and has been published in a number of books and journals since the late 1960's. It forms part of a more expansive theory of representation and perception which, I contend, deserves more serious attention and wider dissemination than it has so far received.

Part 2 concentrates on Brook's theory of "Simulation" (1997) because of its fundamental relevance to the issues of depiction. Simulation is to be contrasted with a partner form of nonverbal representation that Brook calls "Matching". Matching representations exploit the fact that many commonly encountered objects are genuinely alike in one or more respects. Duplicates, replicas, copies and mimicry all trade on this relation of genuine similarity.

Simulation, on the other hand, relies on the fact that the sensory capacities of creatures are necessarily limited (for example by our physical point of view) in regular and therefore highly exploitable ways. *When carefully presented*, depictions

[1] All reference to images, pictures and pictorial representations will be to those representations of a depictive kind, standardly exemplified by photographs or photorealistic images. Abstract, symbolic and other forms of *non-simulating* imagery are outside the scope of this paper.

can sometimes be mistaken for the things they represent. This *potential for deception* enables depictions to be used as Simulating tools even though in most circumstances they are easily discriminable from the things they represent.

Part 2 is intended to explain how depiction is largely reliant upon a range of Simulating techniques and the commonly shared perceptual limitations upon which Simulation depends.

Part 3 of this paper demonstrates how evidence from art history and other cultural and perceptual research, lends strong support for Brook's theory of Simulation. In particular, I will draw attention to a largely overlooked international study (Segal et al. 1966) which investigated cultural variations in susceptibility to optical illusions and an earlier study by Hudson (1960) that gathered significant results from individuals unused to pictorial representations.

Part 1: Four Mainstream Theories Of Depiction

Resemblance

Nigel Thomas (2005) asks us to imagine a photograph of Leo the lion. Whilst the photograph resembles Leo, Thomas points out that it would actually resemble another similar photograph of Leo just as much if not more. In fact the photograph would share its size, shape and numerous other properties not only with other photographs of Leo but with many other photographs in general. Thomas also remarks:

> Of course, a photograph of Leo does resemble him, when the right aspects of resemblance are considered, but in this regard Leo equally resembles the photograph. We are unlikely, however, to want to say that *he* represents the photo. Resemblance is a symmetrical relationship, and representation is not. (Thomas 2005, section 3.3)

Thomas seems to have derived this conception from Nelson Goodman (1976) who writes: "[U]nlike representation, resemblance is symmetric: B is as much like A as A is like B, but while a painting may represent the Duke of Wellington, the Duke doesn't represent the painting." (4). It may be true that neither Leo nor the Duke represent the images that depict them but it would be wrong to claim that this could never be the case. If the Duke were to deliberately strike the same pose in front of the painting, it

would be reasonable to assume that his behaviour *represents* the painting precisely by mimicking his depicted stance. Or he could stand at the entrance to the gallery saying "Go in there and find the painting that most closely resembles me." Likewise if Leo died, his skin could be used by a taxidermist to create a diorama representing the photograph. So in fact the symmetry of resemblance does indeed permit representation, even though Goodman and Thomas are quite right to point out that resemblances are not intrinsically representational. However, the vital point here is that resemblance is profoundly suited to representational use. If two things are not alike in any way, then the task of using one as a representation of the other — of usefully substituting it — will have to rely on mutual consent amongst the representation's users, otherwise there is no reliable means of securing the necessary relation of representation.

Whilst two identical photographs may depict Leo, they do not depict each other. Strictly speaking duplication (which Brook defines as a "Matching representation" (1997)) is not a form of depiction, and nor is depiction a form of duplication. It should be clear then that the concept of resemblance fails to distinguish between two quite different ways in which we might say that two objects are alike. Two photographs, or two lions, share what we assume are objective properties, whereas a photograph of a lion shares very few objective properties with a lion. Lions are not flat pieces of paper covered on one side with various distributions of pigment. Likewise photographs have no legs or fur, nor do they sleep long hours, eat meat or roar.

In Part 2, I aim to show how the confusion over these two differing *kinds* of resemblance is fully explained by Brook's distinction between practices of Matching and practices of Simulating (Brook 1992/1997).

Transparency

The theory of transparency is typically applied only to photographic images and as such, its scope may seem somewhat limited. Nonetheless the issues raised are worth examining if a clear appraisal of the competing theories of depiction are to be properly evaluated. The Transparency Theory is most closely associated with Kendal Walton (1984) and Dominic McIver Lopes (2003). Both claim that photographs are

transparent to their objects in the manner that windows, mirrors or views through telescopes are transparent to their objects. So when we look at a photograph, the claim is that we see things *via* the photograph. Walton states: "My claim is that we *see*, quite literally, our dead relatives themselves when we look at photographs of them" (Walton, 2008, 86, original emphasis). Likewise, Lopes states: "When we look at photographs we literally see the objects that they are of." (Lopes 2003, 433)

According to Dawn M. Phillips (2007): "Lopes simply takes for granted the truth of [the transparency theory]"(3); nonetheless, at one point, Lopes expresses a significant variation on the theory:

> Seeing an object through a photograph is not identical to seeing it face-to-face. The transparency claim shows only that the interest one may properly take in seeing a photograph as a photograph is necessarily identical to the interest one may take in *seeing the photographed object through the photograph.* It does not show that interest to be necessarily identical to any interest one may have in seeing the object face-to-face. (Lopes 2003 p.441 – original emphasis).

If seeing an object via a photograph is not identical with seeing it face-to-face, then seeing the object via a photograph cannot be *literally* seeing the object (Brook 1986). In Walton's case, the contradiction is yet more pronounced. For Walton, photographs function by way of what he calls "visual games of make believe" (1993). In his view we *pretend* that we see things through photographs. But this is incoherent. Either we pretend that we actually see our dead relatives etc. or else we do actually see them. If I pretend that I am looking at my grandparents, even without using a picture, I do not actually see them. When we literally see something, we do not need to make believe. Make believe seeing is only necessary when we literally do not see the thing or things we are intent upon. So, if looking at a photograph of my grandparents is literally seeing them (which I contend it is not), then no game of make believe should be any more necessary than if I were *actually* seeing them.

> In looking at the most realistic picture, I seldom suppose that I can *literally* reach into the distance, slice the tomato or beat the drum. (Goodman 1976, 35, my emphasis).

It would seem then that the Transparency Theory cannot adequately account for the difference between literally or actually seeing something and literally or actually seeing a photograph of the same thing, not to mention seeing something that is *not* flat "in" a photograph that *is* flat.

Another, and perhaps more significant, difficulty for the Transparency Theory is raised by Jonathan Cohen and Aaron Meskin (2004). Their analysis of the epistemic value of photographs leads them to the conclusion that: "Photographs are not transparent because, unlike mirrors, telescopes and the like, they are spatially agnostic informants." (208). By describing photographs as “spatially agnostic informants” Cohen and Aaron Meskin are referring to the distortions and spatial ambiguity of perspectival representations. It should be clear then that a complete account of depiction must also explain this characteristic spatial ambiguity of depictions.

Signification

Signification has its roots in the work of Charles Sanders Pierce and his tripartite theory of "Semiosis" (1998): "[B]y “semiosis” I mean [...] an action, or influence, which is, or involves, a cooperation of three subjects, such as a sign, its object, and its interpretant." (411). The point to note here is that all signs require an interpretant because all signs involve meaning.

Signification is without doubt the most powerful way in which we use representations but in order to properly explain depiction it will be necessary to extract all vestiges of signification and its cognates from our account. By "near-synonyms" I mean anything that requires the skills of symbol interpretation including connotation, denotation, meaning, reference, designation, metaphor and analogy. This is because signification must follow in an evolutionary way, and cannot precede, the more rudimentary substitutive representational practices from which it emerged.

If our interest in depictions were merely a question of what they are *of,* then our responses to images would probably mirror those of other intelligent sighted creatures. Depictions are quite obviously not the things they represent. Unless they are extremely carefully presented, we very seldom mistake images for the things they depict and when we do, the error, associated as it often is with illusion, can always be remediated in some practical way.

The value of depictions lies in their utility as tools — not merely as useful stand-ins but as purveyors of meaning by virtue of their substitutability for the thing that is depicted, for certain purposes and under certain circumstances. We humans are

interested not only in what depictions are *of* but in what they are *about*.

Depictions are most useful to us because we are prodigiously skilled interpreters, but depictions are not fundamentally reliant upon interpretation. Depictions *are* fundamentally reliant upon the fact that they can be viably substituted for the things they depict because in certain circumstances and in certain respects they can be mistaken for them. A theory of depiction must provide a thorough answer to the question of how such mistakes are possible.

Illusion

Of all the concepts used to explain depiction, illusion is both the most widespread and the most useful — which is to say that, wielded with care, it has the capacity to help greatly in the explanation of depiction. Nelson Goodman (1976) puts it like this:

> One popular answer is that the test of fidelity is deception, that a picture is realistic just to the extent that it is a successful illusion, leading the viewer to suppose that it is, or has the characteristics of, what it represents. [...] The proposed measure of realism, in other words, is the probability of confusing the representation with the represented. [...F]or what counts here is not how closely the picture duplicates an object but how far the picture and object, under conditions of observation appropriate to each, give rise to the same responses and expectations. (34)

The notion of *deception* is commonplace in the theorisation of illusion and can be listed amongst a number of similar terms including misjudgement, misinterpretation, inaccuracy, falsity, misapprehension, misunderstanding, misconception, error and, as I mentioned a few paragraphs ago: "mistake". These terms are of course far from being synonymous. Most apply strictly to failures of higher-order cognition — of skills of ratiocination and intellect — whereas what are needed are terms that make no commitments in this regard.

The perceptual mistakes involved in illusion are not mistakes of intellect. They are mistakes or *failures* of what Brook (1997) describes as "sensory discrimination". If illusion is the result of deception leading to false suppositions (*pace* Goodman) or any other higher-order skill, then being made aware of the deception should dispel the illusion. However, typically knowledge of illusions does not dispel their effects and we therefore have reason to suppose that depictive illusions, as well as many related

optical illusions, are the result of lower-level perceptual issues, limitations, failures or sensory vulnerabilities or even *skills*. The explanatory challenge then, is to ensure that the fault (or *felicity* — as we will see is the case with depiction) is identified as occurring at the sensory level rather than attributed to a failure of conceptual awareness. If this stipulation is strictly adhered to, the theory of illusion becomes much more tractable and persuasive as a component in a principled theory of depiction.

Part 2: Brook's Theory of Simulation

One of the most important elements in Brook's (1997) theory of representational simulation is the sharp distinction he draws between distinguishing and discriminating. For Brook, the capacity to *distinguish* between things is linguistically enabled and is thus a culturally acquired skill involving the use of abstract categories and concepts. *Discrimination*, on the other hand, is fundamentally a nonverbal capacity, involving a differential responsiveness to stimuli. For example, when an organism responds differentially to ultraviolet light as opposed to an equivalent intensity of blue light, this constitutes sensory discrimination. It is important to note that sensory discrimination is *not an act of choice* or judgement because it does not involve the exercise of reason. Sensory discrimination is a more fundamental non-conceptual efficacious responsiveness to differing stimuli. Accordingly, to be *incapable* of discriminating between two different stimuli is to be subject to "discrimination failure" (Brook 1992) at this fundamental non-conceptual level.

Discrimination failure affects all sensory modes (although the focus here is on the visual mode) and is most noticeable when things are encountered in less than ideal circumstances, for example when our viewpoint is fixed or one eye is closed etc. Brook provides a clear example:

> We will readily accept that a small oval light-coloured patch on the surface of a photograph *looks like* a much larger, circular, plate lying on the same table alongside the photograph. We will accept this despite the fact that the two things are very obviously different in shape, different in size and different in colour. We will accept it just because we are aware that there is a way of standing up the photograph so that it is perpendicular to the line of sight, illuminating it appropriately and placing it at the right distance between ourselves and the

> subject (imaginatively acting out the picturing conventions, in short) so that the possibility of mistaking the pictured plate for the plate itself in some or all of the respects of shape, size and colour becomes quite real. (Brook 1992, 107).

The failure to discriminate between two significantly different things (a lion and a photograph of a lion, for example,) in certain circumstances and in certain respects, should really be regarded as *the great underlying* ***felicity*** *of depiction,* because without it there would be no resemblance at all between a rectangle of paper dotted with pigment and a lion. Some things resemble one another by virtue of genuine similarities ("Matching" (Brook 1997)), whereas other resemblances depend upon the exploitability of our shared sensory frailties in certain circumstances. How else could a silver coin ever look like the full moon? The moon is neither flat, metallic or small and no coin ever looks at all like the moon when viewed from its edge. So it can only be the case that the *way the coin is presented* is instrumental to the instantiation of its depictive potential: its resemblance to the full moon. A ball on the other hand resembles the moon in respect of shape from all angles because it Matches the shape of the moon. The contrast between what we could call "*Matching resemblances*" and "*Simulating resemblances*" should now be clear.

So, to reiterate. Brooks theory, as it applies to depiction, is that depictions rely on the possibility that under the right conditions, such images are capable of being mistaken for the things they represent in one or more respects. In other words, they are only fully illusory in certain circumstances and in certain ways. The crucial point is that we do not always need to arrange such full blown illusions. The mere possibility of illusion is sufficient to enable depictions to be used as representations because, unlike words, depictions are not merely symbolic but in fact share a relation of Simulating resemblance with the things they depict.

The explanatory force and ramifications of Brook's theory may not yet be entirely clear, so it might help to consider an analogy. Imagine an alien with the equivalent of a document scanner as its visual mode. This single scanner-eye (complete with inner light source) allows this species of alien to see flat objects, surfaces, colours and two-dimensional shapes to a very high degree of resolution. However, as soon as things are a few centimetres away from the "eye", they simply disappear into inky blackness (just like the document scanner you may have at home). Now, imagine what response this highly intelligent creature would have to a simple photograph of a street with a

vanishing point? What would they make of it? Remember that this alien has only ever seen flat surfaces before and has no prior experience of what we call “pictorial depth.” All it would see would be a collection of impossibly skewed and distorted shapes. Perhaps some of the flatly presented surfaces would be recognisable, but everything else would be a confusion of edges, lines and patches of colour. No matter how many such photographs we present to this alien, it would insist that there is no such thing as depth, especially in the two-dimensional world of (its) vision and visual memory. Our concept of pictorial depth would mean nothing to this visitor from another world.

The point to emphasise here, and that Brook would be keen to press home, is the fact that depiction (and simulation more generally) is fundamentally dependent upon our species-specific sensory vulnerabilities (Brook 1997). Such vulnerabilities may be shared by other similarly endowed creatures, but it is hardly surprising that our attempts to interest other intelligent creatures with depictions are commonly met with indifference. If such creatures are not tool-users and moreover if they are not culturally-equipped interpreters of meaning, then they cannot be expected to have anything more then the most cursory interest in depictions, even though they are clearly susceptible to the illusion — when sufficiently well presented.

Part 3. Evidence From History And Culture

One of the most significant factors responsible for the slow and often erratic historical development of depiction must have been the very limited opportunities for the reproduction and dissemination of pictorial representations. Just as the development of reading was significantly influenced by the invention of the printing press, so too was depiction reliant upon innovations in the manufacture and dissemination of two-dimensional images. Where previously images had been restricted to the walls of caves or buildings, the development of portable substrates, like velum, canvas and paper, allowed images to be transported easily and widely and for their technical innovations to be studied and emulated far beyond their point of origin. In Ancient Greece, for example, several sophisticated perspectival techniques had been developed, but since these were most commonly presented in the form of murals and mosaics, they were unknown to artists in medieval Europe and had to be discovered anew.

It is well documented that perspective was discovered by Brunelleschi in 1452. What remains puzzling though to many theorists is why the system of perspective was not obvious to the very earliest image-makers. If the world resembles depictions and depictions resemble the world, then why was depiction not simply the first recourse of all artists? And correspondingly, why is it so difficult to acquire the skills of accurate depiction? The insight that emerges from Brook's work on Simulation is that perception is not attuned to Simulating resemblances; it is attuned to actual resemblances. What philosophers commonly call "sensibilia" (Austin 1964), "visibilia" (Martin 2010) or "elusive appearances" (O'Dea forthcoming) are actually the result of our regarding the world in the ways that it might be viably Simulated. If this seems a contentious claim, perhaps some evidence will prove persuasive.

In a 1966 study undertaken by Segal et al. (one of the largest studies of its kind ever to have been undertaken) into cross cultural variations in susceptibility to optical illusions, the researchers found significant variance between differing communities and age groups across the globe. Some groups, for instance, reported little or no difference between the apparent lengths of the lines of the famous Müller-Lyer diagram. An earlier study by Hudson (1960), of culturally isolated South African children, encountered very similar findings. Both studies attributed their results to a lack of habitual exposure to pictures amongst the communities studied. Hudson dubbed this lack of familiarity: ‘pictorial illiteracy’. In fact, even children well schooled in language and arithmetic skills (but lacking pictorial literacy) were not susceptible to what is commonly described as the "pictorial illusion of depth" and were therefore unsusceptible to the depth cues that many optical illusions exploit.

In 2006, Robert N. McCauley and Joseph Henrich write:

> For those who experience it, the illusion may persist, but susceptibility to the Müller-Lyer illusion is neither uniform nor universal. Moreover, a plausible argument can be made that through most of our species’ history most human beings were probably not susceptible to the illusion. (97)

Further support for this conclusion is to be found in recent sensorimotor research. In several well-documented studies (Aglioti et al. 1995, Marotta et al. 1998, Carey 2001, Plodowski and Jackson 2001), it has been shown that when people reach to grab three-dimensional versions of optical illusions, their grip aperture (the distance between finger and thumb) is unaffected by the illusion. So, whilst we may be

inclined to say that one part of an optical illusion appears to be larger than the other, our sensorily mediated ability to physically interact with these illusions is unaffected.

From an evolutionary point of view, it is of utmost importance that we do not fail to discriminate between a distant object and a smaller but otherwise similar nearby object, especially if the distant object has significance for our potential to survive. It is extraordinarily fortunate, in fact, that the capacity to recognise and use depictions, in which distant objects are depicted at disproportionate scales compared with nearby objects, has not been entirely overridden by the evolution of our perceptual skills. If the research of Hudson, Segal et al., as well as the grip aperture studies, are correct, then it would seem that the capacity to derive depth cues from perspectival images is a learnt skill and is not an immediately available part of our genetically acquired perceptual repertoire. And McCauley and Henrich are surely right when they speculate that our susceptibility to illusions must be a relatively recent consequence of the increasingly widespread use of pictorial imagery.

Conclusion

I hope the arguments presented and the evidence provided will encourage further investigation of Brook's excellent research. This paper has done little more than introduce one fragment of what is a substantially more expansive theory of representation, perception and cultural evolution. It should be noted though, that the implications of getting it right about depiction are far from minor. Many cognitive scientists and philosophers are of the opinion that the brain functions by way of endogenous representations — of images in the mind or brain. Numerous keyboards have been tapped into oblivion over this claim. If Brook's Theory is correct, that depiction is indeed conditional upon the evolved limitations of the visual system, then it follows that a collection of neurons cannot generate their own images. Whatever it is that we call "mental imagery" (Thomas 2014) it cannot be depictive, although there is every reason to believe that it is substantially influenced by our skills in the production and consumption of images.

It is nothing short of extraordinary that we have learned to exploit the limitations of our sensory system in such powerful ways. In fact, the techniques of simulation have

become such an indispensable part of our culture that it seems almost contradictory to claim that our susceptibility to certain mistakes forms the basis for the entire spectacle of depiction. Sometimes even our weaknesses can be the source of our greatest insights.[2]

> *People are representers*. That is part of what it is to be a person. Not *homo faber*, I say, but *homo depictor*. People make representations. (Hacking 1983, 132)

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