

Title: Touchy-Feely Colour

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Abstract:

The default opinion in philosophy is that we perceive colours to be intrinsic properties of things, properties that objects have regardless of their relations with perceivers.

This intrinsic-intuition is considered a crucial objection to *relational* theories of colour, ones that account for colours in terms of interactions between perceivers and objects. In this paper I defend relationism by analysing the motivation for the intrinsic-intuition. Firstly, I argue that intuition relies on a historically entrenched, passive model of vision. Secondly, I discuss recent psychophysical work on the connection between colour and perceived material stability. Finally, I develop a relationist phenomenology of colour by making the comparison between colour vision and the active – and interactive – sense of touch.

1. Introduction

Philosophers writing on colour have concentrated on one specific metaphysical question, “what are the colours?”. It is agreed that if colours are anything, they must be some sort of property. It is often held that colours are *intrinsic* properties of objects. Roughly speaking, an intrinsic property is, “a property that a thing has (or lacks) regardless of what may be going on outside itself” (Yablo 1999).

Being an intrinsic property excludes being a *relational* property. Relational properties are ones that describe how different things stand with respect to each other. So ‘being round’ is not a relational property, whereas ‘being rounder than a rugby ball’ is.

Many philosophers, including David R. Hilbert (1987) and Frank Jackson (1998), have claimed that the redness of a cherry is a property that the fruit has regardless of the way that perceivers respond to it, and regardless of the other objects surrounding it. It follows that the cherry is still the same red when shaded by leaves on the tree, when night falls, or in a world without creatures to perceive it. The primary justification for the claim that colours are intrinsic properties comes from the intuition that colours look as if they belong to external objects, that in our perceptual experience it does not appear that the existence of colours depends on our perceiving them.

Despite the popularity of the intuition that colours are intrinsic, and therefore not relational properties, there is much to be said for theories which posit that colours are relational (Cohen 2004). Various clues point to a certain perceiver dependence of the

colours. For one thing, the colour visual systems of different species – from budgies, to bees, to chimpanzees – do not converge on the same physical properties of objects (Thompson et al. 1992). Nor even do the visual systems of different human beings, which show substantial variation in wavelength sensitivities, and hence in subjective colour matching (Hardin 1993). Consequently, your assessment of the similarity of shades of peach and pink could well be at odds with mine, and we would be at a loss to find an objective standard to decide between us.

The most well known relationist theories are *dispositional* ones. These were first put forward in the seventeenth century, when there was a felt need to reconcile the new mechanical world view – which found no place for colours (as we see them) in the physical world – with the insight that visual perception is in some way caused by external events. The dispositionalist¹ states that the colour orange is the disposition of an object to cause an orange-experience in normal human perceivers in standard viewing conditions. This is a dispositional property shared by satsumas and marigolds, as well as oranges and mangoes. Dispositionalists normally struggle at the point at which it becomes necessary to categorise normal perceivers and define standard conditions. This paper is not a defense of dispositionalism, but of relationism in general.

So relationist theories stand in opposition to the supposedly robust intuition that colours are intrinsic properties. Indeed, many philosophers believe that colour relationism is defeated by the strength of the intuition². As Boghossian and Velleman (1989:86) write,

¹ E.g. John Locke, on most interpretations. See Johnston, M. (1992) for a recent formulation of dispositionalism.

² Called the “intrinsic-intuition” below.

When one enters a dark room and switches on a light, the colours of surrounding objects look as if they have been revealed, not as if they have been activated. ... If colours looked like dispositions, however, then they would seem to *come on* when illuminated ... just as a lamp comes on when its switch is flipped. Turning on the light would seem, simultaneously, like turning on the colours.... Conversely, when the light was extinguished, the colours would not look as if they were being concealed or shrouded in the ensuing darkness: rather, they would look as if they were becoming dormant.... But colours do not look like that; or not, at least, to us.

This paper is a defense of relationism against such claims. I will not be tackling the intuition head on, arguing that contrary to consensus, the phenomenology of colour is that colours *are* simply relational. Rather, I will take two detours that I believe give us much insight into this intuition. The first detour is historical, where I examine the links between the intuition and a popular model of vision as the most objective of senses (section 2). The second detour goes into the science of colour perception, looking at the reasons why colours normally appear stable, and observer and context independent (section 3). Then in section 4 I offer up a new account of colour phenomenology, inspired by the sense of touch.

2. History of an Intuition

There is a way of thinking about vision which casts sight as the most *objective* of the senses. That is, of all the senses it is believed that vision is the one to present us with a

picture of the world best matching an external reality. This “ocularcentric” vision of vision has been identified as the dominant view from the Middle Ages to the Twentieth Century. The basic idea is that *seeing* is the paradigm of *knowing* (Jay 1993; Rorty 1979)

The intuition of the objectivity of sight gets perhaps its most extreme expression in Jonas’ (1954) article, the *Nobility of Sight*. Jonas was a phenomenologist and student of Husserl. He took it as evident from our experience that vision is objective, writing that, “all I have to do is open my eyes, and the world is there, as it was all the time” and that “objectivity emerges pre-eminently from sight”.

The intuition of objectivity is obviously kin to the intuition that the properties revealed by sight are intrinsic ones. To recap, intrinsic properties are those that an object has regardless of its interactions with other objects. These are contrasted with relational properties which describe how an objects stands with respect to other objects or perceivers. The objective-subjective distinction, on the other hand, contrasts our apprehension of things as they are “in themselves”, i.e. regardless of the peculiarities of our point of view concerning them, with the subjective apprehension which is tainted by our peculiar slant on things. According to the objective intuition visual experience represents the intrinsic properties of things, whereas the intuition of subjectivity takes vision to be representing how an object stands in relation to a viewer.

Also relevant is the notion that vision is the most passive of senses. Vision is taken to be the mere reception of light rays on the retina. In particular, it is not appreciated that

the eyes customarily move, and that these saccadic glances constitute an active probing of the world. More will be said about “active vision” in section 4. The point to be made here is that this model has a clear historical lineage (Spruit 2008). In the ancient and early medieval world, intromissionist and extramissionist theories of vision vied for supremacy (Lindberg 1976). Extramissionism is the Platonic idea that sight comes about when “fire” emitted from the eye encounters external objects and is then reflected back to be received by the eye which harvests this information. It is an active model in the sense that sight is something that happens at the eye’s own instigation, with the eye selecting what in the world is to be made visible. In contrast, the intromissionism of Aristotle made the empirically correct supposition that no rays come out from the eye. But this led to the casting of vision as a passive sense, the inert reception of visual information. By the late middle ages, the Aristotelian model was the dominant one. The scholastics believed that visual information was imparted by “intentional species”, immaterial copies of properties of objects, such as colours, that made their way to the eye (Lindberg 1976; Biernoff 2002; Knuuttila and Kärkkäinen 2008). Moreover, the Aristotelian view is marked by a strong perceptual realism: the world is, in itself, just as we see it. There is no corruption of the objective visual world due to the interference of our sensory apparatus.

The pattern of influence from Aristotelian realism to modern theories of vision is complex (Jay 1993, Clark 2007). For sure, literal realism about colour was dropped by the leading figures of the seventeenth century. Galileo declared unambiguously that colours do not belong to external objects, that they reside only in the minds of perceivers. Descartes and Locke both wrote that in some sense colours are external properties, i.e. the physical causes of peoples’ colour perceptions. But they did not

subscribe to the Aristotelian and scholastic idea that things are coloured in just the way that we perceive them to be, and that there is a literal resemblance between our perceptions of colour and colours adhering to objects.

However, as I have argued elsewhere (*Author* in preparation), it seems that some other tenets of the Aristotelian view were *not* rooted out by the seventeenth century innovators. Namely, the idea that the aim of vision is to give a faithful measurement of external properties; the idea that vision is a passive sense; and thus the idea that when visual perception is veridical, we have true measurement of physical quantities, the intrinsic properties of things, rather than a subjective impression of how things happen to affect me. These views are reflected in the seventeenth century writing on primary, as opposed to secondary qualities (Smith 1990). Even though perceptual realism came to be rejected when speaking of the secondary qualities, like the colours, it was still accepted that our perceptions of primary qualities (shape, motion, bulk, etc) could be faithful representations of an external reality.

What does all this tell us about colours and the intrinsic-intuition? Well, what is important is that an Aristotelian framework for vision did stay in place, one in which it was “intuitive” to think of vision as representing intrinsic properties of objects.

After the scientific revolution it seemed natural still to believe that an intrinsic geometric property, like shape, was visible to the human eye. It was still “intuitive” to believe that colours appeared before our eyes, *as if* intrinsic properties belonging to things. What became paradoxical was this Aristotelian understanding of our colour phenomenology *combined with* a revised scientific ontology which posited that the only properties belonging to material things were quantitative or mathematical ones,

not qualitative ones like colour (Des Chene 2006). This, in essence, is the metaphysical problem of colour: *how can it be that we see a world full of colours, if no such properties could belong to the world?* It would seem that vision is an elaborate hoax, a virtual reality conjured up by the brain (Hardin 1993).

However, what is clear now is that colours come to be seen as problematic because of the strength of the intrinsic-intuition. If it came naturally for us to take what we see to be at least in part perceiver dependent, then the finding that colours are not simply “out there”, but that our perception of colour is influenced by the workings of our eye and brain, would not be disturbing. The idea to be considered here is that the intrinsic-intuition has historical roots: it might just be a hangover from the Aristotelian-realist theory of vision that has been so influential down the centuries. My claim is that the intrinsic-intuition would not seem so compelling from the perspective of an alternative theory of vision. And of course there have been alternatives. Above I mentioned the Platonic extramissionist view. There are recent theories that construe vision as an active rather than a passive sense – the philosophy of Merleau-Ponty would be a prime example. Art historians, in particular, have written about how frameworks for thinking about vision change from culture to culture, and era to era. The subjective, embodied “visuality” of the early middle ages is often contrasted with the more theoretical, Aristotelian, approach of the late middle ages, which prized vision as an objective sense (Biernoff 2002; Camille 2000)

3. Secret Life of an Intuition

In this section I take another look at the intuition that colours are stable and intrinsic properties of things. In the previous section I put forward the argument that this intuition has been shaped by our “visuality”, our commitment to the idea that vision is the sense most capable of representing to us an objective, external world. However, the historical explanation may be only part of the story. Here I present some psychophysical findings about colour perception that also shed light on the realist intuition.

Figure. Colour and scene segmentation. With permission from Fred Kingdom.



Vision scientists now hold that colour is very much involved with the perception of form. For example, with the parsing of cluttered visual scenes into different objects (Figure), and with the recognition and memorisation of those objects (Shevell and Kingdom 2008; Mollon 1989; Kingdom, this volume). Note that the perceived

salience of different colour contrasts seems to depend on the interests of the animal. If it were not for primates' vested interest in fruit as a food source, it is improbable that cherries and leaves would appear as different in colour as they do to us.

Colour contrast is particularly useful because it is more likely to indicate a material change from one surface to another than is achromatic contrast, since achromatic contrast often indicates the presence of shadows, rather than material objects.

Kingdom et al (2004) conducted experiments to assess peoples' interpretation of boundaries in visual scenes when these were marked by achromatic or colour shifts. The achromatic shifts were likely to be interpreted as a change in surface material only when these were aligned with colour shifts.

Another observation of Kingdom's (this volume) is that shadows which do happen to be coloured are less likely to be recognised as shadows and are more likely to be interpreted as indicating a change in surface material (See Kingdom figure: coloured plaid). Kingdom has attributed these effects to the visual system's "colour as material" assumption.

Such results show that colour vision is very much tied up with our perception of objects. Moreover, the idea that the visual system makes use of prior assumptions about colour and materiality is a possible explanation for the strength of the realist intuition that colours are intrinsic properties of objects. For we do tend to take it for granted that the physical, material properties of things are intrinsic, not alterable by objects around them, or by our viewing habits. If, then, colour vision is part of the sensory process by which we recognise that one surface material differs from another,

that a change in colour perception usually indicates a change in material, it makes sense that we should interpret colour perceptions as flagging intrinsic properties. But it is one step too many to say that our colour vision commits us to the belief that colours are intrinsic properties. The intrinsic-intuition has had a hold over the philosophical debate because it has been assumed that raw visual experience is attributing an intrinsic colour property to objects. Kingdom's results entail no such thing, though. What they do imply is that vision uses spectral discrimination to flag up stability in the material surfaces of objects. They suggest that we think of colour vision as indicating the *stability of things*, rather than that we think of ourselves seeing stable chromatic properties, intrinsic to objects. Perception of a change in colour as a change in surface material is compatible with a relational account of colour by which colour appearances are as much determined by my perceptual process, as they are by objects in the world. This relational colour phenomenology is the subject of the next section.

4. Touch-like Vision

We have now completed two different detours. The first went back to the historical roots of our thought on vision. It revealed the association between the intrinsic-intuition and a passive model of vision which construes sight as the most objective of senses. The implication was that were we to subscribe to a different theory of vision, our intuitions might well shift. However, the second detour, into the psychophysics of colour perception, gave us reason to think that our experience of colours as stably embedded in objects is due to some deep features of our visual system. One might

conclude from this is that the intrinsic-intuition will not shift, no matter how many intellectual revolutions we undertake. But I do not think that this is warranted, for the psychophysical results explain why we see colours as stable, and belonging to material objects, but they do not support the claim that our phenomenology commits us to believing that colours themselves are intrinsic properties of things.

The question is, how can these two different insights be combined, and in such a way as to defuse the objection to colour relationism? What I offer in this section is a reinterpretation of the phenomenology of colour that is compatible both with the psychophysical facts, and with the relationist colour theory. And it is an active theory of vision, one which deliberately breaks with the passive model that has made the intrinsic-intuition seem irresistible. The basic idea is to think of vision as a sense more like touch. Jonas illustrates what, in his opinion, is special about vision, by contrasting it with touch. He believes that with vision, as opposed to touch, the information that we receive is assuredly objective because uncontaminated by choices over how we explore the world:

Touch has to go out and seek the objects in bodily motion and through bodily contact...whereas in sight selection by focusing proceeds non-committally within the field which the total vision presents (1954:512)

In Jonas' extreme version of the realist framework, vision is conceived of as the distanced, contact-less sense, a pure reception of information rather than an active engagement with the world. This way of understanding vision is empirically false. As it happens, we would be unable to read or view photographs if our body and eyes were static, because of the fatiguing of our photoreceptors to constant stimulation.

What is more, because of the heterogeneity of the surface of the retina, movement of the eyes (*saccades*) with precise gaze control is essential for normal vision (see e.g. Steinman, Schall and Burr and Morrone in Werner and Chalupa 2004).

Empirical work gives credence to Merleau-Ponty's (1968) claim that the gaze is something like a grasp. That is, we use the foveating gaze, the targeting of an object on the highest acuity region of retina, to gain a visual handle on the thing (see e.g. Schütz et al 2009 on saccades and object recognition). But subjective experience has been found to be an unreliable guide to eye movement, because of the effect of *saccadic suppression*, the momentary impairment of vision for the duration of the saccade. So it is no wonder that the surface phenomenology of vision suggests to us that our eyes are relatively passive and immobile, even though just as much as the sense of touch, sight relies on our active probing of the environment. As Land & Nilsson (2002) summarise, “our eyes search the surroundings for information rather than simply absorbing it”. Naturally, how we search depends on what we need to do (Yarbus 1967). And what is more, our locomotion through the environment is best guided by the seemingly random saccades of the “active free gaze” (Wilkie and Wann 2003).

With vision we may be inclined to forget, as Jonas does, that the objects that we see are physically impinging on us, through the medium of light, because of the distances involved – but that is just the prejudice which takes only mechanical effects in nature to be real ones, so neglecting optical and energetic actions and events. Likewise we may forget that our actions play a role in what we see, because their contribution is less obvious to us than is the action of a hand when it reaches for something – we do

not pick things up with our eyes, but still our eyes glide over them. Moreover, these two senses often operate in tandem. It has been argued that haptic discrimination of spatial properties “calibrates” visual judgement during early development, and vice versa (Gori et al 2008). These are all points to keep in mind. I propose that the analogy between vision and touch can inspire a relationist interpretation of visual experience and colour phenomenology, as a counter to the assumption that we necessarily experience colours as intrinsic properties.

To see how this might work, let us remind ourselves of the intrinsic-intuition and the objection to colour relationism. The argument is simply that, say, when I turn on the lights it does not look as if the blue paint has just regained its colour. Rather, it seems as if the paint was coloured all along, even in the dark. The question is, *could the same objection be raised against a relationist account of touch?* Are the ways that objects feel to us – their hardness or softness, abrasiveness or smoothness, roughness or silkiness, etc, etc – necessarily experienced as intrinsic qualities of those objects? I think not. Because touch is a mechanical, contact sense, where the interface between perceiving body and object is more obvious, it is natural to think of what we feel as being due to the interaction of body and object. One can imagine a sensation of touch being generated by the interaction of these two, something like the friction between two surfaces generating heat. Thus the qualitative abrasiveness of sandpaper is not understood to be a property it possesses in itself, but the particular way that its surface feels to me.

Since there is obvious physical contact between observer and object, it is easy to think of the sensory operation as linking them and *relating* them in some way. Furthermore,

the patently active role of the body during tactile exploration makes intuitive the idea that there is a bodily contribution to what we feel. In order to learn about an object by means of touch, we must pick the object up or go up to the object, and place our fingers on enough different parts of the object – the parable of the blindfolded men and the elephant is telling here. Therefore relationism can treat tactile experience in an intuitive way. For example, it is natural to say, *this fur is soft because of the way it brushes against my skin when I stroke it*. What I feel, and what I feel myself feeling, is due to *how* I touch this thing – a joint project of the thing and me.

Furthermore, in emphasising the commonality of vision and touch, a relationist colour phenomenology may become an intuitive one. The question now is, if it is easy to say, *the feather is felt as tickly because of how the skin on my neck happens to respond to its stroke*, is it any less easy to say, *this tomato is red because of the way it selectively stimulates my retina when I glance at it*?

Well, perhaps it is easier to give relationist readings of tactile experiences because we have less *invested* in touch. Berkeley aside, our intellectual tradition has not granted touch a primary role in our getting an objective picture of things (Jay 1993; Paterson 2007). If touch is not taken to aim at intrinsic properties, in the way that vision is, there will be less resistance to relational touch – but that is not to say that we should never revise historically entrenched intuitions. If we do resist historic prejudices, what does a relational phenomenology of colour actually look like? The idea is to think of colours as the *way things look to me*. One can say that the experience of a thing as being coloured flags a relation which holds between the thing and oneself – the perceptual relationship by means of which one comes into visual contact with the thing.

Another way of coming to this is to think back to the original objection to colour relationism. It was said that a tomato, say, does not look to become red when I go to the garden to pick it. It looks as if it had some property, “redness”, all along. But neither does the fur feel as if it has just become soft as I run my fingers over it. This is because we are not obliged to think of the softness as an property that could either come in or out of existence, or be permanently there in the fur. Instead, I can think of the softness as how the fur feels to me – how it interacts with my skin as I stroke it. Likewise, in a touchy-feely vein, I can think of the colour not as an entity that may or may not be there, but as the *way* that the tomato presents itself to my sight. Or equivalently, I can think of the colour as the selective grasp of the tomato made by my sight – a “take” on the tomato which is particular to me or my species, one due to my particular retinal sensitivity, and to the particular use that my visual system makes of spectral information there gathered.

Conclusion: To describe how the world looks to us when we open our eyes may seem a straightforward task. Yet any such description will be informed by an intellectual tradition as old as the first theories of vision. With insight into this tradition, and awareness of our other senses, new ways of thinking about colour can emerge.

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