# True Colors: A Problem for Tye's Color Realism

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(excludes notes and captions)

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Abstract

Michael Tye has recently been a vocal defender of color realism or, as I shall call it, color objectivism. Objectivism about color is the view that color properties are identical to intrinsic physical properties of the surfaces of objects. Subjectivism about color is the denial of color objectivism. Objectivists argue that color claims must be taken at face value. In this paper I forego the usual bickering about whether there are surface reflectance properties that can be identified with colors as the objectivist theory requires. Supposing that some such properties could be found, I argue that if objectivism about color were correct it would have the unsavory consequence that we are rarely if ever right—perhaps never right—about the particular colors of particular things. So objectivism does not bear out common attribution of colors to the surfaces of things, after all.

**True Colors: A Problem for Tye's Color Realism**

I.

Michael Tye has recently been a vocal defender of color realism or, as I shall call it, color objectivism.[1] *Objectivism* about color is the view that color properties are identical to or supervenient on intrinsic physical properties of the surfaces of objects. *Subjectivism* about color is the denial of color objectivism.[2]

Against color subjectivism, Tye maintains that color statements must be taken at face value, adopting "the reasonable assumption that, *ceteris paribus*, our color experiences under normal viewing conditions are veridical."[3] Consider:

(R) The wax on this bottle of bourbon is red.

The color objectivist reasons that if (R) is true then the wax on this bottle, its surface, anyhow, has the property of being red. If (R) is not literally true, then we are perplexed: If someone tries to convince you that "colors" are not surface properties of objects, then that person is not talking about the colors that we are all familiar with (red, green, blue, yellow, and so forth), for the colors we are familiar with are clearly surface properties of objects. If subjectivists claim to have a philosophical account of color according to which objects are not—literally—colored, then they are only speaking so much nonsense.

> To suppose that the qualities of which perceivers are directly aware in undergoing ordinary, everyday visual experiences are really qualities of the experiences would be to convict such experiences of massive error. That is just not credible. It seems totally implausible to hold that visual experience is systematically misleading in this way. Accordingly, the qualities of which you are aware in focusing on the scene before your eyes and how things look are not qualities of your visual experience.[4]

So says Tye.

In this paper I forgo the usual bickering over whether colors can be found among the intrinsic physical properties of the surfaces of objects. Supposing that some workable objectivist account of color could be given, I argue that, *pace* Tye, that this would not vindicate our ordinary color experiences. In fact, objectivism has the consequence that we may rarely if ever be right—perhaps never be right—about the particular colors of particular things.

## II.

Let us review the basic dispute between objectivists and subjectivists, so that we understand what we are granting when we suppose that objectivism could be correct. Color objectivism identifies color properties with first-order properties of the surfaces of objects or with higher-order properties that supervene on the first order properties of the surfaces of objects.[5] The distinctive feature of color objectivism is a commitment to the claim that the "physical correlates" of colors—so-called *reflectances*—are intrinsic properties in that they can in principle be specified without referring to any properties other than first-order physical properties (and relations among such) of the surface that is said to be colored. Specifically, reflectances can be specified without reference to any actual or possible perceiver or perceivers. According to color objectivism, the world would be colored even if there were never any perceivers able to perceive those properties, or even any perceivers at all.[6] If it makes sense to talk about colors using statements like (R), then the surface of the wax is—literally—red. That is, the wax on the bourbon bottle has some non-relational (viz., perceiver independent) surface property that is identical to or the subvenient base of the color property *red*.

Varieties of color subjectivism, on my way of drawing the distinction, are many. They include classic subjectivism (the view that color properties are, or are properties of, experiences that some perceivers have) and dispositional accounts (wherein colors are powers or capacities that objects have to produce experiences, representations, etc. of color in perceivers— such as Lockean secondary qualities), as well as anthropocentric views (wherein colors are identified with physical properties of the surfaces of objects but those properties cannot be specified without reference to perceivers).[7] According to color subjectivism, the world is not colored independently of (at least possible or potential) perceivers. Color subjectivists do not deny that we make true statements like (R). But we deny that colors are perceiver-independent properties of the surfaces of objects.

Subjectivists typically accept two basic lines of argument against objectivism. First, we point out that that opaque reflective surfaces are only one example of colored objects. That is to say, not all of the things we identify as being colored have reflectance properties, or are seen as colored in virtue of their surface properties at all. Radiant objects, translucent objects, rainbows, the sky, afterimages, dreams, mirror images, projected cinema pictures, and hallucinations can all look colored.[8] Even if reflectance accounts for the colors of some objects, it can not account for all instances of color. Acknowledging these phenomenon, the objectivist must maintain that surface reflectances are the primary or basic color properties, and that perception of other objects and properties as colored is in one or another way derivative. Hallucinations of pink rats are not really pink (i.e., do not have the property of *pinkness*) but are rather, say, hallucinations *as if* of pink rats (i.e., rats with certain reflectance properties). The pinkness of the rats, like the rats themselves, is an intentional inexistent on such a view.[9]

Second, subjectivists point to the large body of evidence suggesting that color perception is dependent on—particularly, but not exclusively—the observer and the context of observation.[10] Simultaneous chromatic contrast examples are among our favorites, along with Edwin Land's "constancy" and colored shadow demonstrations.[11] The crux of the subjectivist argument is that (i) the notion of observer-independent or context-independent color has no basis (there is no neutral, non-interacting, context against which to view a color; there is no standard or ideal observer), and (ii) there is no independent general basis for privileging any one context or observer over others.[12] Subjectivists conclude that there are no non-disjunctive intrinsic physical properties of the surfaces of objects that are even contenders for identification with color properties, for no surface properties have the same structure as the color space. That is, there are no candidates for being the "reflectance" properties that the objectivist theory requires.

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INSERT FIGURE 1 HERE

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Figures 1-4 illustrate the sorts of cases that the subjectivist has in mind. Figure 1 shows several monochromatic versions of simultaneous contrast. Here the colors at play are shades of gray (including black and white), and the effect is that the neutral gray target squares appear darker or brighter when they are shown against brighter and darker surrounds, respectively. Since the target squares are known to have identical reflectances (whatever reflectance may be—for they are the same material), their differential appearance demonstrates that the color they are seen to have is not wholly determined by—thus cannot be identical to or supervenient on—reflectance properties of the target surfaces.

One might object that black and white and shades of gray are special cases, and that brightness is a different phenomenon from hue. But there is good reason to think that these distinctions are spurious when considering color properties philosophically. (Indeed would be question-begging in this context. To presume that we can distinguish color properties from non-color properties is to presume that we know what color properties are. But that is precisely the question at hand.) In any event, it is easy enough to provide examples in which the hue, not only the brightness, of targets varies when they are presented in different contexts. Figure 2 is such a demonstration.

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INSERT FIGURES 2 & 3 HERE

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Let us also consider some examples of kinds that are not as widely known as those in Figures 1 and 2. In Figure 3a, the target gray squares, set against colored surrounds, appear differently bright in the upper and lower portions of the figure. But the degree of the perceived difference depends on the orientation of the surrounds; the stimulus pictured in Figure 3a elicits a significantly larger effect than the rotated (180°) stimulus in Figure 3b.

Similarly, the left and right surrounds in Figures 4a and 4b are identical in hue, lightness, and average brightness. In Figure 4b the left surround can be understood as the result of a single light source illuminating a surface composed of equally reflective tiles. That is, the stimulus is “consistent” with the heuristic hypothesis that the target is under the same illumination as the surround. The left surround in 4a, however, is composed of tiles which differ (among themselves) in saturation, making it unlikely that the surround and target are illuminated by a single light source (Lotto and Purves

1999). The top figure is thus “inconsistent” (or less consistent) with the single-illuminant heuristic. So it seems that the likelihood that an object is under a certain illuminant is a factor (perhaps the determining factor) in the colors that objects are perceived to have.[13] Needless to say, likelihood-of-being-under-a-certain-illuminant is not an intrinsic property of object surfaces. (Figure 5 elaborates on this result.)

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INSERT FIGURES 4 & 5HERE

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## III.

Evidence of phenomena such as simultaneous contrast is usually appealed to by subjectivists to make the case that objectivism cannot be correct because there are no intrinsic properties of objects that have the characteristics that reflectance properties must have according to objectivism. Here I will pursue a different tactic. Suppose that some singular reflectance property is discovered (or that we can assuage our concerns about disjunctive properties) and that color objectivism is correct. What does the color objectivist have to say about the kinds of examples illustrated above—examples that seem to show that two samples having the same reflectance property under the same lighting conditions can appear to be differently colored?

The objectivist claims that every color property $C_n$ is identified with or supervenient on a reflectance property $R_n$ of the colored object. $R_n$ may be disjunctive or non-disjunctive, first-order or higher-order. Accordingly, Figure 1 purports to exhibit a case in which two different colors, $C_A$ and $C_B$, are both identical to or supervenient on the same target reflectance property, $R_T$. The objectivist and subjectivist may agree, even, about the reason that the two targets appear to be of different colors. The

explanation will likely appeal to the interaction (viz., differential contrast) of the like properties of the targets with the different properties of the surrounds.[14] Whatever the mechanics, we have a puzzle: How can it be that both $C_A$ and $C_B$ are identical to or supervenient on the single reflectance property $R_T$?

The subjectivist is inclined to parlay the physiological explanation of differential color judgments into an account of the colors themselves. The different appearances of the various targets are the appearances of different colors. The objectivist, in contrast, maintains that there is some definite pair of reflectance properties, $R_x$ and $R_y$, that are identical to or are the subvenient bases for the color properties $C_A$ and $C_B$ that the targets appear to have. Likewise, there is some color property $C_T$ that is identical to the reflectance property $R_T$ that the targets actually possess. Since $C_A$ and $C_B$ are different colors, they cannot both be identical to or supervenient on the same base property $R_T$. (See Figure 6.) The objectivist must therefore say that when we see the two targets as having colors $C_A$ and $C_B$ we are mistaken about one or the other, or both.[15]

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INSERT FIGURE 6 HERE

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Of course neither Tye nor any other objectivist would deny the existence, or even the ubiquity, of simultaneous contrast effects, nor of the many other factors that influence how we see the colors of things: temporal contrast, constancy, lighting, intervening media, individual differences among perceivers, macular degeneration, pharmacological influences, and so forth. Tye maintains, rather, that there are privileged ("normal") perceivers and conditions under that determine which reflectances the colors supervene on.[16]

But even if there are normal or privileged perceivers, contexts, lighting conditions, etc., most actual perceivers, contexts, conditions, etc. are not normal or privileged. Indeed, the privileged or normal conditions, like the average taxpayer, need have no actual instances at all! But it is therefore unclear whether we are ever correct in our attributions of colors to things, or (if we are ever right) how reliable we are. Our ordinary color judgments are only vindicated to the extent that actual perceivers approximate normal perceivers and normal viewing conditions. If Tye is right and there is an objective property red—or more to the point, an objective property that is *this* red that the wax on the cap of the bourbon bottle in front of me seems to be colored—then we must ask whether *this wax* has that property and whether I reliably identify *this* property when I see things as being *this* shade of red. If the objectivist is correct, then there are definite and objective answers these questions about the color properties of the wax. But the Tye gives us little reason to think that human beings in general get those answer correct, that we are accurate perceivers of those properties.

Recall the subjectivist arguments rehearsed in Section II above. The subjectivist maintains that the myriad of factors that influence how colors are perceived render it unlikely or impossible that colors can be identified with particular surface properties of things, viz., reflectances. Suppose that an objectivist nevertheless maintains the reflectance hypothesis. Still, the objectivist does not deny that color properties are subject to phenomenon such as simultaneous contrast as in Figures 1-5. For the objectivist, the appearance of subjectivity is itself misleading; but that is not to deny that this piece of paper may appear to have one color now, another color if it were viewed under different lighting conditions, another color if it were viewed through a filter, yet another color if it were set against a green background, and so forth. What, then, is the true color of the paper, the color that corresponds to the intrinsic reflectance property

$R_P$ of the paper? Suppose, contrary to the subjectivist doubts, that there is an answer. Even so, what assurance is there that I can correctly and reliably recognize and identify the colors of things by looking at them?

In short, the objectivist has it that ordinary perception yields correct beliefs about what kinds of properties colors are: Colors are surface properties of objects. But if I am right, a consequence of the objectivist view is that we are often or always wrong about the *particular* colors of *particular* things. And this is an unhappy result.

In addition to being epistemically deficient, the objectivist account leaves us with a perplexing view of the visual system. How and why would we come to have a perceptual apparatus that is so unreliable? The objectivist account also violates the principle of simplicity: It indicts us of many different sorts of real perceptual errors rather than the subjectivist's one philosophical error. Subjectivists attribute to us a single sort of theoretical error, a mistake about the kinds of properties that colors are: We naively think that colors are surface properties of objects, but they are not. In contrast, the objectivist lets us be right that colors are the surface properties of objects, but then must dip into the grab bag of perceptual effects to explain why, on each particular occasion, we fail to perceive the true colors of things.

Of course the subjectivist still owes some account of colors and the usage of color terms. And the subjectivist may have to deny that objects are, literally, colored. On the other hand, the subjectivist will preserve the accuracy of our particular color judgments and of truisms that the objectivist denies: that red things typically look red, blue things typically look blue, yellow things typically look yellow and so forth.

## IV.

In this paper I suppose that color objectivism is correct and then expose an unsavory epistemological consequence of that view: If colors are the surface properties of objects, then it is doubtful that we see color properties accurately by seeing objects as colored. This is a bitter pill indeed. It is particularly troublesome for the objectivism recently advocated by Michael Tye, for it undermines his motivation for defending objectivism to begin with.

## Acknowledgments

[Removed for anonymous review]

## Notes

[1] Tye 1995, 2000. But Tye is a moving target. Recently (Bradley and Tye 2001) he has become less clear as to whether the reflectance properties are entirely observer independent , or whether they are "anthropocentric properties as Evan Thompson 91995) argues. (The anthropocentric view counts as subjectivist on my analysis.) To determine if Tye maintains a consistent position, whether it always (or still) qualifies as objectivist on my way of drawing the distinction, and whether it can be justified by his epistemic argument, are questions beyond the scope of this paper.

[2] This is a very strict way of drawing the distinction. What I call objectivism is sometimes called physicalism (e.g., Byrne and Hilbert 1997) or realism (e.g., Boghossian and Velleman 1989; Tye 1995, 2000); subjectivism is sometimes called antirealism (e.g., Boghossian and Velleman 1989) or eliminativism (Byrne and Hilbert 1997).

[3] Tye 2000, 160.

[4] Tye 2000, 46.

[5] Byrne and Hilbert (1997), Jackson and Pargetter (1987), Armstrong (1987), Dennett (1991), Dretske (1995), Lycan (1996), Tye (1995, 2000), Bradley and Tye (2001).

[6] I waive, for the moment, questions about whether reflectances must be (at least potentially?) detectable in a certain way (e.g., by detecting reflected light) in order to count as colors. Similarly, we shall ignore questions about whether the surfaces of objects would have reflectance properties if there were no light.

[7] For example, Hardin (1988), Boghossian and Velleman (1989), Clark (1993), Thompson (1995).

[8] For further discussion of such examples, see Hardin (1988).

[9] Note something like the Argument from Illusion at work: The pinkness in the hallucination case is not a property of an unreal or mental object, but rather it is an intentional property of an intentional object. We then generalize from the hallucination case to all cases, concluding that perception of color is always a matter of being in an intentional state vís-a-vís a surface property that may or may not be present. (Must the property be one that it is at least possible—even merely physically possible—for the purported object to have? It seems that there is no reason for such a constraint, once one goes down this path.)

[10] Factors that can affect color appearances include: spatially or temporally adjacent color experiences, past experience of the perceiver (short- and long-term "conditioning"), illumination, transmission properties of intervening media (semi-transparency), orientation, and the practical relevance of the object in the "scene" of which it is a part. (See Lotto and Purves 1999, 2000 for discussion.)

[11] For example, Land 1983.

[12] See Hardin 1988.

[13] Indeed, this explanation can be applied to the examples of the preceding figures, as well (Lotto and Purves 1999, 2000).

[14] On one popular account, this interaction is mediated by lateral inhibition in retinal ganglion cells (Hurvich 1981; appealed to by, e.g., Hardin 1988). But see Lotto and Purves (1999, 2000) for a critique of the textbook story.

[15] This also has the odd consequence that $R_T$ things might fail to look $R_T$—that they might not be $C_T$.

[16] Tye 1995, 2000, Bradley and Tye 2001.

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Figure 1. Simultaneous brightness contrast. In each case, the left and right target squares are identical to one another (Lotto and Purves 1999).

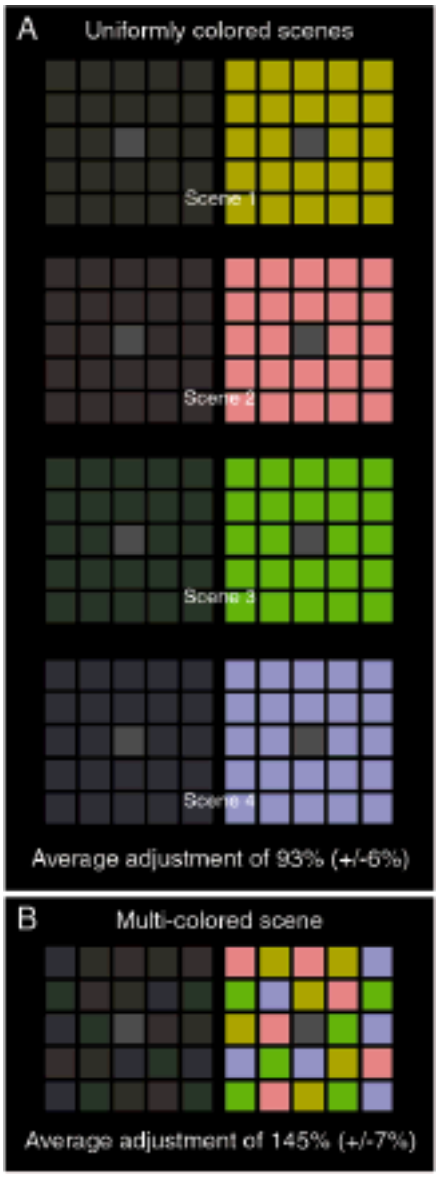

Figure 2. Simultaneous color contrast. “Spectral returns from the square targets in the centers of the red and yellow circular surrounds are identical. The color sensations elicited by the same targets on differently chromatic backgrounds are obviously different.” (Lotto and Purves 2000).

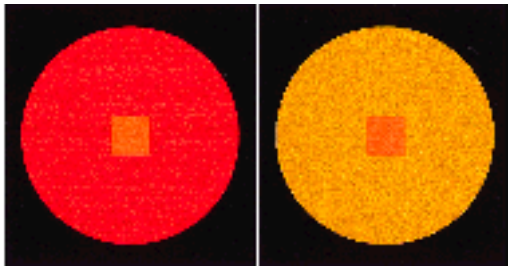

Figure 3. Effect of orientation on simultaneous contrast. “Because illumination is assumed to come from above, the spectral returns in the scene in (a) are consistent with the lower array being in light and the upper array being in shadow. However, when the same stimulus is rotated, as in (b), it becomes less consistent with this possibility. As a consequence, the identical gray targets at the center of the lighter and darker arrays were perceived to differ more in brightness in (a) than in (b), as indicated by the adjustments subjects made to equalize their appearance ($p < 0.001$)” (Lotto and Purves 1999).

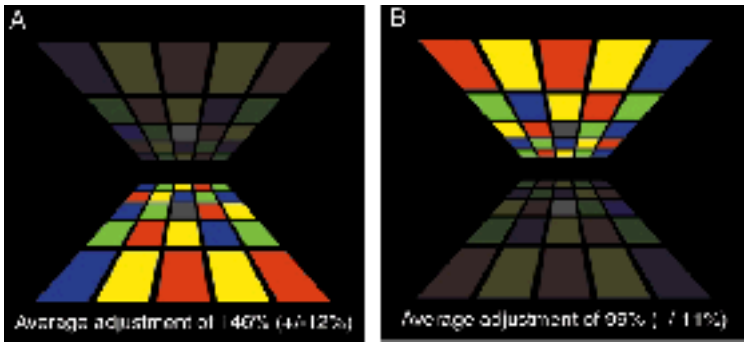

Figure 4. “Effect of inconsistent color information on the relative brightness of equiluminant targets. The pair of arrays in (a) is the same as that in (b)… however, the spectral return of the red and blue tiles in the less luminant array on the left has been altered so as to increase the saturation of these tiles while maintaining their luminance. This change caused subjects to make a smaller average adjustment to equalize the appearance of the targets in (a) than in (b); $p < 0.001$” (Lotto and Purves 1999).

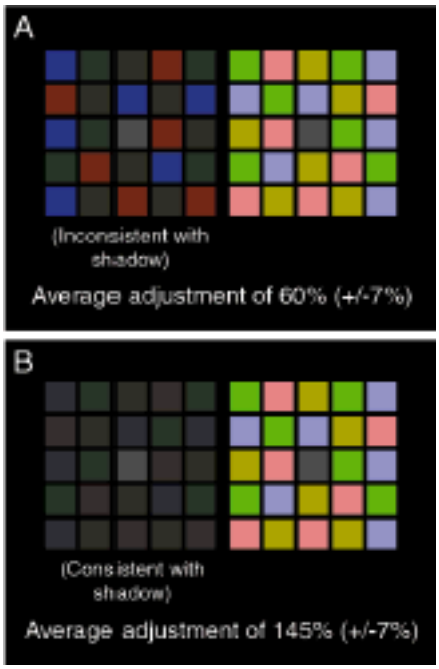

Figure 5. “Comparison of standard color contrast (A) and more complex scenes which provide spectral cues that either increase (B) or decrease (C) the probability that the two arrays are differently illuminated. Using the ‘‘buttons’’ provided, the subjects’ task was to adjust the apparent hue (H), saturation (S), and brightness (B) of the targets in comparison boxes below the stimulus until the colors in the comparison boxes matched the apparent colors of the corresponding targets in the test scene. The adjusted targets were presented below the scenes to preserve the empirical significance of the arrays. The differences in these adjustments are shown in D. The values given represent the average responses of the two authors and eight naive subjects to the stimuli indicated; all differences are statistically significant (P , 0.01)” (Lotto and Purves 2000).

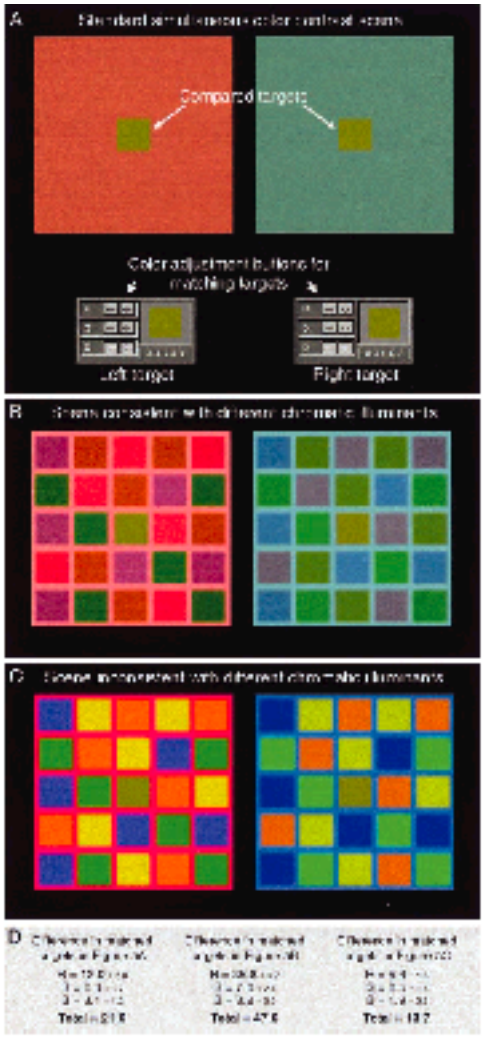

Figure 6. The objectivist must find the perceiver of, e.g., simultaneous contrast, guilty of making a mistake. ~◊[ (Ca = Rt) & (Cb = Rt) & (Ra ≠ Rb) ].