

Chapter One

Recoloring the Dreamworld

If you took all the girls I knew when I was single
And brought 'em all together for one night
I know they'd never match my sweet imagination
Everything looks worse [1973 version] / better [1981 version] in black and white
– Paul Simon, “Kodachrome”¹

i.

In 1951, Calvin S. Hall announced in *Scientific American* that 29% of dreams have at least a bit of color in them.² He called such dreams “technicolored”, thereby explicitly comparing them to the technicolored movies that were increasingly prevalent at the time, and implicitly contrasting them with lower-tech black and white movies and dreams. Some of Hall’s contemporaries might have thought him to be overestimating the occurrence of color in dreams. In 1958, Fernando Tapia and colleagues found that only about 9% of their non-psychiatric hospital patients reported dreaming in color (compared to 12% of “neurotic” men and 21% of neurotic women). In 1953, a large majority of Manfred de Martino’s undergraduate respondents said either that they never saw colors in their dreams or saw them less than once a month. In 1942, Warren Middleton reported that only 10% of his students said they saw colors in their dreams frequently or very frequently, and 71% said they rarely or never did (19% said they saw colors in their dreams “occasionally”).³ A widely shared opinion was that dreams were predominantly black and white

phenomena, comparable to black and white movies, with an occasional splash of color here and there.

Scientific opinion changed dramatically in the 1960s, beginning with a report by Edwin Kahn and colleagues in 1962, asserting that when people were awakened during rapid eye movement (REM) sleep, they attributed color to 83% of their dreams. Ralph Berger, using a similar technique in 1963, found that colored dreaming was reported after 71% of REM awakenings. In 1968, J. Herman and colleagues reported 69%. In 1970, Frederick Snyder suggested that all dreams may contain color, even if the colors are not always remembered. Table 1.1 summarizes all the studies I could find in English-speaking countries that report either the percentage of people claiming to dream in color or the percentage of dreams experimental subjects described as containing color.

TABLE 1.1

Scientific studies of the incidence of color in dreams (English-speaking countries only)⁴

Author	Year	Method	% of people reporting color dreams*	% of people's dreams said to contain color
Middleton	1933	questionnaire [†]	26%	--

* These percentages exclude people saying they don't recall, and include people who report a mix of color and black and white dreams. I'm counting people who say they "occasionally" dream in color as reporting colored dreaming, but not those who report color dreaming only "rarely".

Husband	1935	questionnaire	41%	--
Middleton	1942	questionnaire	29%	--
Doust	1951	questionnaire	19%	--
Hall	1951	dream reports [‡]	--	29% ⁵
De Martino	1953	questionnaire	17%	--
Tapia, Werboff, Winokur	1958	questionnaire	9%	--
Kahn et al.	1962	REM awakenings [§]	94%	83%
Berger	1963	REM awakenings	100%	71%
Suinn	1966	dream reports	81%	~41%
Herman, Roffwarg, Tauber	1968	REM awakenings	--	69%
Snyder	1970	REM awakenings	--	77%
Padgham	1975	REM awakenings	100%	50%
Jankowski, Dee, Cartwright	1977	REM awakenings	89%	62%
Frayn	1991	questionnaire	74%	74%
Rechtschaffen, Buchignani	1992	REM awakenings	--	80%

[†] The “questionnaire” method involves asking during normal waking hours for generalizations about dream content.

[‡] The “dream reports” method involves analyzing reports about the characteristics of individual dreams – dreams usually (but not always, see Hall 1947) recorded directly upon waking.

[§] The association between REM sleep and dreaming first became widely known in 1953 with a report in *Science* by Eugene Asersinsky and Nathaniel Kleitman.

Schwitzgebel, Version 1	2003	questionnaire	81%	--
Schwitzgebel, Version 2	2003	questionnaire	100%	--
Murzyn, questionnaire	2008	questionnaire	92%	--
Murzyn, dream reports	2008	dream reports	100%	older people: 72% younger: 89%

Two of the studies are my own: Schwitzgebel 2003, Version 1 was as precise as possible a replication of Middleton’s 1942 study, with the key question “Do you see colors in your dreams?” and response options “very frequently”, “frequently”, “occasionally”, “rarely”, and “never”. Version 2, given to different respondents, asked “Do you dream in color or black and white?” The response options were “color” (selected by 62%), “black and white” (0%), “both” (23%), “neither” (0%), and “don’t know” (15%). The thesis of this chapter is that the last of those response options is, unfortunately, the best. We don’t – I don’t, probably you don’t – know whether we dream in color or not. Although I’ve found in conversation that most people answer confidently when asked about the coloration or not of their dreams, that confidence is misplaced.

Before the rise of scientific psychology in the late 19th century, scholars interested in dreaming generally stated or assumed that dreams have color. For example, Aristotle specifically includes colors among the remnants that sense impressions may leave in the organs and which thus appear to us in sleep (4th c. BCE/1996, 459a23-462a31). Epicurus says that our impressions in dreams have color and shape (3rd c. BCE/1926, *Letter to Herodotus*, 50-51). Descartes in his famous *Meditations* (1641/1984) – in the same meditation where he finds it impossible to doubt that he thinks and exists – describes a piece of wax as seeming to change

color, and he wants to grant that such an appearance could come to him in sleep. Indeed, the skeptical idea, also familiar from Descartes, that our ordinary waking experience is not qualitatively different from dream experience requires that dreams are pervasively colored, since our ordinary waking experience is pervasively colored – at least presumably so. (I’ll be raising some doubts about this, however, in Chapters 6 and 7.) More explicitly, in *The Passions of the Soul*, Descartes asserts that “everything the soul perceives by means of the nerves [i.e., sensations] may also be represented to it through the fortuitous course of the spirits [i.e., in dreaming]” (1649/1985, §26). In general, I have not found in my wanderings through the pre-scientific literature on dreaming any assertion that dreams lack color. Commonly, dreams were compared to paintings or tapestries – typically colored media.

Early scientific psychologists were divided. The prominent psychophysicist Gustav Fechner writes “I also never dream in color, but all my experiences in dreams appear to me as though proceeding in a kind of twilight or night” (1860, vol. 2, p. 470, my trans.). Freud, in contrast, frequently reports color in his *Interpretation of Dreams* (1900/1931) without any special comment, apparently taking its presence for granted. (By my count, 50% of the long dream reports – those over 15 lines of text – in *Interpretation of Dreams* explicitly mention colors other than black, white, or gray.) Mary Calkins (1893), in a long and detailed description of the phenomenology of dreaming, describes dreams as consisting of reproduced and recombined images, never once mentioning any lack of color in those images, though by 1900 a research assistant of Calkins reports color in fewer than half of her dreams (Andrews and Calkins 1900). In 1898, E.B. Titchener describes “flashes of color” as a primary cause of dreams – though by 1912 his opinion too appears to shift, mentioning (based, evidently, on a dinner conversation) that some people see only shades of gray in their dreams (Titchener 1898/1900,

1912a). A few years later in 1915, Titchener's former student Madison Bentley, waking people randomly at night, noticed about four times as many grays as chromatic colors in the experiences reported. By the 1930s, as shown in Table 1.1, Middleton and Richard Husband were finding the majority of people to deny dreaming in color.

So there appears to be an arc of opinion: prior to scientific psychology a consensus or assumption that dreams are colored; divided opinion into the early 20th century; a consensus from about 1930-1960 that dreams typically have little color; and then a sudden overturning of that consensus in the 1960s.⁶ Why? Let's speculate a bit.

ii.

The early- to mid-20th century was, of course, the pinnacle of black and white media. Black and white photography was first made public in the 1830s and became increasingly popular through the early 20th century. Although color photography was invented in the 1860s, color photos did not become easily obtainable to the public until the 1940s. Motion pictures, invented around the turn of the century, were from very early on occasionally hand-painted with colors, and two-color filming was sometimes used in the 1920s (for example in *Ben Hur*). Nonetheless, motion pictures were overwhelmingly black and white until the late 1930s when a few "technicolor" movies such as *Gone with the Wind* and *The Wizard of Oz* drew huge crowds. It was not until the 1950s that colored movies became commonplace, and even as late as 1960 a black and white film, *The Apartment*, was mainstream enough to win an Academy Award for best picture. Black and white television became widespread after World War II; color television did not become popular until the late 1960s.

It can't be chance that this flourishing of black and white media coincided with the opinion that dreams are mostly black and white. To further confirm the relationship between available media and opinion about dreams, I collected cross-cultural data with Changbing Huang and Yifeng Zhou in 2006, taking advantage of the fact that different groups in China at the time had very different access to technology. Huang, Zhou, and I examined three groups of Chinese students of different socioeconomic status and consequently different levels of black and white and colored media exposure: low status rural high school students, high status students at an elite urban university, and intermediate status students at a non-elite urban university. To each group, we gave the same questionnaire Middleton gave to his American students in 1942 and that I gave to mine in 2003, supplemented (at the end) with questions about the respondent's own current and past media exposure. As shown in Table 1.2, across the 5 replications of Middleton's study, the percentage of students reporting seeing colors in their dreams matches nicely with their subgroup's media history.^{7,8}

TABLE 1.2 (adapted from Schwitzgebel, Huang, and Zhou 2006)

Reported color dreaming and media exposure in replications of Middleton's 1942 study

	percentage reporting seeing colors in dreams at least occasionally	percentage reporting access to colored film media before age 11
Middleton (U.S.A.) 1942	29%	0% (inferred)
low status rural Chinese 2006	29%	19%
intermediate status urban Chinese 2006	39%	47%
high status urban Chinese 2006	52%	76%

Schwitzgebel (U.S.A.) 2003	81%	100% (inferred)
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Here's one possible explanation of all this: A ubiquity of black and white images in film media changes people's dreams. Although Aristotle, Epicurus, Freud, and their contemporaries dreamed in color, the average American in 1950 dreamed mostly in black and white. And now that color media again dominate, our dreams are returning to color.

But is this plausible? It does seem plausible that black and white media would affect people's dreams in various ways. After seeing a black and white film about Frankenstein's monster, one might have a nightmare in which his black and white figure appears as one's tormentor. Maybe, too, since most romantic movies seen by people living in English-speaking countries in 1950 were black and white, some of those people dreaming of themselves as romantic heroes would paint their dreamworld that way. However, most of our dreams are not so directly modeled on motion pictures. Every day a person sees her house and family in full color. It would be odd to suppose that whether she dreams about them in color depends on what she sees in the cinema or on the television screen. Despite their cultural importance, photography, film, and television seem unlikely to have so profound an effect on our cognition as to regularly transform our dreams of all the things we normally see in color to black and white. If so, then although people's *opinions* about their dreams changed dramatically, their dreams remained more or less the same.

One person's plausibility is another's tendentious guess, I suppose, so let me buttress this assertion with two more concrete pieces of evidence. One is the consistency of color term use in dream reports since the 1940s. Calvin Hall and Robert Van de Castle collected hundreds of dream reports from 1947 to 1950. In these reports, about 0.19% of all words – about one word in

500 – is a color term other than black, white, or gray. Although that may seem like low rate of color term use, it's virtually identical with the rates of color term use I found in four sources of dream reports from the end of the 20th century – rates ranging from 0.19% to 0.23%.⁹ It's also somewhat higher than the color term usage rates of approximately 0.02%-0.14% in samples of English drawn from various other sources.¹⁰ Nor is there any notable difference in the use of “black”, “white”, and “gray” between the two eras. Those achromatic terms constituted 0.09% of words in Hall and Van de Castle and 0.13% of the words in the modern dream reports (pooled together) – a trend in the wrong direction if anything. So if Hall and Van de Castle's respondents were dreaming in less color than were people fifty years later, that fact is not reflected in their use of color terms when describing those dreams.

A second piece of evidence that seems to support the idea that it is mainly opinions about dreams that have changed rather than dreams themselves is a finding from the Chinese study mentioned above. It turns out that in those data there is only a weak relationship between *individual-level* exposure to colored or black and white media within each Chinese subgroup and reported black and white or colored dreaming. The effects were mostly at the group level.¹¹ What this means is that respondents' opinions about colored dreaming depended more on *what sort of media exposure was characteristic of their group overall* than on what they themselves had been exposed to, contrary to what one might expect if individual exposure to media was directly affecting dream experience. These results suggest that whatever is affecting people's reports is something shared at the group level – something, I suspect, like cultural attitude, like the availability of certain metaphors, certain ways of thinking and talking about one's dream life.

The profound changes in opinion about the coloration of dreams, then, appear to be unmatched by equally profound changes in the dreams themselves. It follows that at least some

people must be pretty badly mistaken about their dreams. If dreams really are mostly colored, then most of the 91% of Tapia's respondents who claimed not to dream in color must have been wrong, as was Tapia himself when he believed them. If dreams really are mostly black and white, then most of us now must be wrong. Or maybe dreams are neither colored nor black and white – a possibility I'll explore in section v – and pretty much everyone is wrong.

iii.

One might attempt to defend the view that dreams are mostly black and white as follows. The failure of Aristotle, Descartes, and company to notice this feature of dreams was due to the lack of black and white film media in their time. Absent those media, it may have been natural to assume that since the things dreamed about are colored in real life (family, locations, etc.), they are colored in dreams. Once black and white media gained prominence in the early 20th century, people came to recognize that their dream images resembled the images in those media. Now that black and white media are losing importance, most people have returned to mistakenly assuming that their dreams are thoroughly colored, though an observant minority maintains that their dreams are mostly black and white. People may even mistakenly attribute color to black and white dream objects in the course of a dream, just as in a dream I might judge something to have the layout of my house when in fact it does not resemble my house at all. Slightly differently, one might simply *know* that an object is red without experiencing a red dream image, just as one might know in a dream that someone is one's sister even if she looks nothing like her.

A weakness in this argument is that it's not clear that pre-20th century media were generally colored. Black and white ink sketches and prints were common in some periods, as

were monochromatic representations of people and animals on pottery and as sculpture. If dreams were black and white, they could as easily have been compared to those media as to colored paintings and tapestries. To this objection, the defender of black and white dreaming might counter that if dreams really are colored they could in 1950 just as easily have been compared to colored media. Paintings and tapestries did not cease to exist. However, I think the suggested parity fails. Black and white movies had other advantages over the competing media of the time that may have compelled comparison to dreams. They integrated visuality with movement and narrative as had no other medium previously – except perhaps theater, if that’s a medium. (Why wasn’t it more common, I wonder, to describe dreams as like plays on the mind’s stage? Not even Shakespeare, who writes so much about dreams and plays, ever seems to make the comparison.) Another problem for the friend of black and white dreaming is the implication that people who still report black and white dreaming are the ones who are most observant of their dreams. Recent evidence suggests that this isn’t so. Michael Schredl and colleagues (2008) and Eva Murzyn (also 2008) have found that people reporting relatively high percentages of black and white dreams also report recalling fewer dreams and recall the dreams they do report less well. Schredl interprets this as evidence that reports of black and white dreaming might simply reflect errors of memory, while Murzyn takes the black and white dream reports at face value, but neither finds any *special* acumen among people reporting black and white dreams.

More appealing, perhaps, is the idea that dreams – at least most people’s dreams, most of the time, even sixty years ago – really are colored, and the 1950s view that they were not was due to an infelicitous but natural comparison between dreams and the flourishing black and white media of the day. As painting and tapestries yielded to photographs and movies, people

naturally updated the media to which dreams were compared, and since these media were black and white, so also, it came to seem, were dreams. One of Middleton's 1942 respondents even claims that nearly all his dreams appear in sepia, a common tint of old black and white photographs. (His own explanation? "Maybe it's because I'm partial to brown.") In the future, maybe the media will change again to integrate not just visual and auditory but also tactile elements, coming closer to giving us a full fictional sensory experience. People have often told me that tactile experiences are weak or rare in their dreams – they don't feel the impact of their feet on the sidewalk or the breeze against their arms, nor even in a nightmare the pain of the knife in the belly. Maybe this is why feeling a pinch is sometimes thought to indicate wakefulness. Perhaps if the media continue to improve, dreams will come to seem ever more vibrant with sensory detail – even if they're not really, or always were.

iv.

Let me confess a few difficulties for my thesis. First, there are some misalignments between features of the dominant media and features of people's dream reports. For example, paintings and tapestries don't represent motion well (despite some attempts). This has led me to wonder whether, when those analogies dominated, some scholars doubted that dream images moved. I can find no evidence of such doubts. Also, radio was a lively and pervasive medium for fiction in the early 20th century. However, as far as I know, dreams were never compared to radio broadcasts. Now, maybe dreams have some obvious features, such as visuality and motion, about which it's difficult to go wrong. But there are temporal misalignments too. Decades after the end of silent film in the 1920s, Peter Knapp (1953) and Ángel Garma (1961) describe dreams

as mostly soundless, more like silent motion pictures than like “talkies”. (The first sentence of Garma’s article “Colour in Dreams” is “Dreams are like old silent films, without sound or technicolor.”) Were Knapp and Garma old men clinging to an ossified concept of dreams from their childhood? Not Knapp at least: His publishing career ran from the late 1940s into the 1990s. Given the limited literature on the sensory aspects of dreams, it’s difficult to assess exactly how unusual the “silent movies” view was – though presumably it’s the kind of point Hall (1951) at least would have mentioned, had he thought it true.

Second, and relatedly, the story of the previous section can’t very well explain the *sudden* transition of opinion from the very low estimates of colored dreaming in the late 1950s (Tapia’s 1958 estimate that 9% of people dream in color) to the very high estimates of the early 1960s (Kahn’s 1962 estimate of 94%). As I described at the beginning of section ii, the transition from black and white to colored media was much more gradual than that. If culturally salient metaphors are driving our opinions about dreaming, shouldn’t the change in opinion be as slow as the change in the objects of metaphorical comparison?

Maybe the change in research methodology – from mostly questionnaires in the 1940s and 1950s to mostly REM awakenings in the 1960s – is partly explanatory. Maybe, for example, REM awakening is a more accurate method of assessing dream content. Then perhaps what happened is this: The questionnaire studies assessed only casual opinion about dreams, which was influenced by media analogies, while the REM awakening studies assessed the dreams themselves – dreams which contained color and always had. Once scientists had this better method in hand, their opinions changed with due speed.

Questionnaire studies from the 1960s would help us assess this suggestion, if only they existed. If popular opinion changed as swiftly as scientific opinion, then the latter may simply

have been an echo of the former, despite the change in method; but if popular opinion lagged behind scientific opinion, that might suggest that scientists were tapping into something else, perhaps the truth about dreams. Unfortunately, the next English-language questionnaire study wasn't published until 1991. Looking at research based on individual dream reports after natural awakening, there does appear to be a gradual rather than a sudden shift – from Hall's 1951 estimate that 29% of dreams contain color to Suinn's 1966 estimate of 41% to Schredl's and Murzyn's 2008 estimates of 72% or more. That gradual shift is consistent with the view that for this methodology at least the change in dream reports reflects (perhaps with some delay, especially for the older people in Murzyn's study) the gradual change in the media.

To help improve my sense of popular opinion in the 1960s, I looked up “dreams” in the *Reader's Guide to Periodical Literature* and read every article (21 total) on that subject published between 1955 and 1975 in *The New York Times Magazine*, *Reader's Digest*, *The Saturday Evening Post*, and *Time Magazine* (magazines I chose for their wide circulation and general-interest news content). Unfortunately, I found only a few passing remarks about the coloration of dreams: two early articles (1959 and 1961) describing dreams as mostly monochrome; a 1965 article on psychic dreams that describes the colors of two dream objects but makes no general comments about the coloration of dreams; a 1967 article briefly stating that dreams can be either colored or black and white but not saying which is more common; and a 1971 article claiming that people who dream in color have more satisfying emotional lives. A ProQuest search of the *New York Times* and *Los Angeles Times* from 1955-1969 yields not much more: a couple of artists in 1962 and 1963 who say they dream in color and a Nicaraguan poet in 1969 who says that blue “is the color of dreams”.

If immediately upon discovering the association of REM sleep and dreaming in 1953, REM-awakening researchers had thought to ask people about coloration, what would they have found? Would they have found that most people report – presumably to their own surprise – colored dreams? The closest early method to REM awakening was random midnight awakening, and Bentley (1915) reported many more grays than colors using this method. But Bentley’s study differs too much in method and aim from the studies of the 1960s for this to be any more than a hint. (Bentley did not ask subjects directly about coloration but rather noticed the rates at which they described the “visual contents” of their dreams as gray vs. other colors.) Also, the shift in the 1960s, though large, was not complete: A substantial proportion of Kahn’s and others’ REM-awakened respondents did report dreaming sometimes or exclusively in black and white – up to half of all dream reports in Padgham’s 1975 study. If the real rates of black and white dreaming are actually substantially lower than that – if dreams in both eras are almost all at least partly colored – then even the REM awakening reports of the 1960s and 1970s are substantially distorted.

And I don’t see why they shouldn’t be. After all, we often awaken from REM sleep quite naturally and reflect on our dreams. In any era, someone interested in the coloration or not of dreams could take advantage of that fact to form opinions about his own personal experience at least. Indeed, it would be strange to suppose that researchers and their subjects didn’t sometimes do this; and their resulting opinions, in the middle of the 20th century, overwhelmingly favored the rarity of color in dreams. It’s doubtful that the formal REM-awakening method was so much better than all other methods that the transition of scientific opinion in the 1960s and 1970s can be attributed to the methodological shift alone. If media metaphors precipitated the first shift of

opinion, toward black and white dreaming, it's hard to believe that they haven't also have played a role in the more recent shift away from that opinion.

v.

Although the view that our dreams have color may seem more plausible, to us today, than the view that they're black and white, we should also consider the possibility that they're neither colored *nor* black and white, that applying either of these categories is misleading. Consider, as an analogy, a novel. While novels are surely not in black and white (though the words on the printed page may be), it also seems a little strange to say that they're in color. Novels, of course, attribute color ("she strode into the room in a dazzling red dress") and refer to objects that normally have a particular color ("she promptly chopped a carrot"). Maybe it makes sense to say that such fictional claims are "in color" or partly so. However, most elements of most scenes in novels do not have determinate colors in that way. When our character slides into her 1966 Mustang and rumbles away, the scene could be imagined with any of a variety of colors. Her skin might be dark brown or light, the Mustang might be red or black or green, the sky might be blue or gray or dusky or star-spangled. And even though we know her dress is red, it could be any of a variety of shades, as long as they're suitably dazzling. It's a bit odd to say that this part of the novel – the sentence describing her departure – is "in color" when the color of so much of it is underdetermined. It's correspondingly a bit odd to say that the novel as a whole is in color, though maybe one could say that if one were careful enough in circumscribing the implications of the phrase "in color".

One might more naturally say that the *images* that a novel evokes in (most of) its readers are in color (I imagine the Mustang as green and the sky as dusky), but even that may not be quite right. Can't one just imagine her driving away without imagining the colors of the car, road, and sky? If one is reading the novel quickly, one may not have time to piece together a completely colored scene in one's imagination. Stephen Kosslyn (1980) argues (based on the experiential reports of multiple subjects) that it takes considerable time to fill in the details of complex images. If so, when reading quickly much must remain sketchy and underspecified. A novel would not play before one's mind with all the detail of a color movie.

If you find yourself disinclined to think that novels, or the images evoked by novels, are properly described as being either in black and white or in color, then you might find yourself hesitant also to apply the terms "black and white" or "colored" to dreams. Maybe dream objects and dream events are similar to fictional objects and events, or to the images evoked by fiction, in having, typically, a certain indeterminacy of color, neither cerise nor taupe nor burnt umber, nor gray either.

If so, the analogy between dreams and black and white movies might not be as inapt as I've been suggesting. Many of the objects in black and white movies are after all similarly indeterminate in color, though they appear on the screen as gray. Although our heroine is eating a bell pepper the screen image of which is gray, it does not follow that she is eating a gray bell pepper. The color of the bell pepper is unspecified by the medium. Black and white movies, then, may be like novels and dreams in leaving indeterminate the colors of most of their objects, something that color film cannot (or at least cannot easily) do. So it's possible – *if* dreams are mostly indeterminate in color – that those folks from the 1950s were on to something that we've since forgotten, even if they went too far in saying that dreams were literally black and white.

I'm tempted by both of these contrasting views – on the one hand, by the view that dreams are richly colored, as richly colored, perhaps, as ordinary vision (assuming ordinary vision is richly colored), and on the other hand by the view that most dream objects have only indeterminate color. But which view, if either, is actually right?

If neuroscience were more advanced, we could look to it. If we knew, for example, exactly what sort of brain activity co-occurred with the conscious experience of color, we could see whether people showed this sort of brain activity while dreaming. But as things are, neuroscientists disagree about the neurological basis of color experience (see Gegenfurtner and Kiper 2003; Solomon and Lennie 2007; Wade et al. 2008), and neuropsychological research on visual brain activity during REM sleep has not yet even attempted to focus on narrow issues like color cell activity (Braun et al. 1998 and Wehrle et al. 2005).¹²

We might take seriously the low rates at which people in some recent questionnaires and dream reports describe their dreams as “neither” colored nor black and white when explicitly given that option (0% in Schwitzgebel 2003; 0-17% in Schwitzgebel, Huang, and Zhou 2006; 0-4% in Murzyn 2008). But if we are willing to suppose that the majority of people in 1950 could have been radically mistaken about the coloration of their dreams, thralled by the analogy to film media, it seems we should also take seriously the possibility that the majority of people today could be mistaken in saying their dreams are colored, being still under the sway of that analogy. Indeed, the idea that dreams must be *either* colored or black and white – that there is no other than these two possibilities – may be even more deeply ingrained in the media metaphors we use

in thinking about dreams than was black-and-whiteness in 1950. In 1950 the film media were not all black and white, but they were all, or virtually all, either black and white *or* colored. And so of course were paintings and tapestries. If we allow ourselves to be guided by such analogies, the idea that dream experience could be neither colored nor black and white might seem incoherent or impossible to understand. Now maybe the idea of imagery or dream experience that leaves its colors unspecified without thereby being grayscale or monochromatic *is* somehow incoherent – but it's not obvious why this should be so or that people's general avoidance of the “neither” option in surveys like mine and Murzyn's should be particularly telling on the matter.

Maybe if we could establish that dream experience was qualitatively identical to perceptual experience while awake – what Descartes seems to have assumed and what Jonathan Ichikawa (2009) calls the “percepts” view – then, from the assumption that waking visual experience is mostly colored, it would follow that dream experience is too. However, this argument seems to invert the order of explanation. Until we determine whether dreams are rich with color or whether they leave the colors of most objects unspecified it seems premature to commit to the view that dream experience and waking perception are experientially identical. Of course maybe, in principle, some piece of evidence for the qualitative identity of perceptual experience and dream experience – that we sometimes think, when we are dreaming, that we are awake? – is so compelling, independent of any assumptions about coloration, that we can infer qualitative identity based on that evidence alone and draw out the richness of dream color as a separate conclusion; but if so, I don't see that compelling argument.

But why, you might wonder, should we need to turn to such indirect forms of evidence? If dreams are richly colored, the subjective experience (or “phenomenology”) of dreaming is radically different than if dreams leave the color of most of their objects unspecified. Shouldn't

we then simply be able to reflect directly on the phenomenology of dreaming to decide the question? The experiential difference between the two cases is so vast that it seems – doesn't it? – that a moment's reflection should make it obvious which view is correct. Can't we guard against cavalier assumptions about similarity to media and against loose ways of talking, and just go sleep on it? When we wake, shouldn't the answer be plain?

Here's where I find myself quite thick. Though I remember a dream or two many mornings – and sometimes they have seemed quite vivid – I can't tell you whether those dreams are in color. The historical swings in opinion about black and white vs. colored dreaming suggest that I'm at least not singularly inept, that incompetence in assessing the coloration, or lack of it, of our dream life is fairly widespread, despite the considerable confidence people often exhibit when questioned on the matter. We don't know the phenomenology of dreaming nearly as well as we think we do.

You might think that the mistakes I say people make, or have historically made, aren't so terribly large. After all, it's sometimes difficult to remember which classic movies are in color and which are black and white, and such amnesia doesn't constitute a serious epistemic failure. However, confusion about the coloration of dreams is substantially deeper than an innocuous mistake about a particular Jimmy Stewart film. It's rather more like being confused about – or worse, confidently persisting in the wrong opinion about – whether *all* the movies one sees are in color or *all* are in black and white, or whether there's some mix, despite seeing movies every night.

This fundamental fact about the experience of dreaming, then, eludes me – eludes many of us, eludes you too, I suspect. To determine the coloration or not of the dreamworld proves surprisingly difficult – pending, at least, substantially more sophisticated psychological or neuroscientific research. Let me conclude this chapter with a question that will bring us to the heart of this book: Is dreaming, in this respect, *particularly* elusive? Or are we equally in the dark about other aspects of the stream of experience – our emotions, our waking imagery, our ongoing visual phenomenology?

It could well be that dreaming is particularly or uniquely elusive. We have a powerful tendency to forget dreams. They evaporate almost instantly when we wake unless we fix upon them with special attention. We don't forget outward events – especially emotionally powerful ones – with the same alacrity. Dream reports would thus appear to be good candidates for distorted reconstruction. Yet if I'm right – and this is what I'll argue for in the rest of this book – our profound ignorance of our dreams is matched by our nearly equally profound ignorance of most of the rest of our subjective experience.

¹ Simon's shift from reality's being black and white in 1973 to imagination's being black and white in 1981 is actually, I'm afraid, the reverse of what I'd conjecture based on the ideas of this chapter. However, Simon has said that he's not sure which way he originally wrote the lyrics and just flips between singing it the two ways. I retain a stubborn attraction to the view that Simon's original thought was "better" and that in revising he changed it to "worse" to cohere better with the song's celebration of color.

² When a date and name occur in proximity like this, the relevant work is referenced in the bibliography (in name-date order), even though the date may not be parenthetically joined to the name in standard Author (date) format. In this chapter, where dates are often crucial to the point of a sentence, it does not always seem appropriate to relegate them to parentheses.

³ Oddly, Middleton found almost identical percentages to report *hearing* in color – 11% saying they did so frequently or very frequently, 21% saying occasionally, and 68% saying rarely or never. Middleton makes clear to his readers (and he claims he made it clear to the respondents too) that by "hearing in color" he means the synaesthetic experience of having sensations in one sensory modality when stimulated in another – for example literally seeing streaks of green when hearing C-sharp or seeing swirling yellow when hearing the long "a" vowel sound. Recent estimates of the percentage of people who experience *any* form of synaesthesia (sound-color synaesthesia being only one subtype) run from virtually zero to about 4% (e.g., Simner et al. 2006; Hochel and Milán 2008). I can imagine a researcher in Middleton's time doubting the very existence of colored dreaming on the basis of these data. If "colored hearing" is very rare and thus presumably virtually or entirely non-existent in Middleton's respondents and so being grossly overreported by them, then perhaps "colored dreaming" should

be interpreted as on a par. Tapia's finding that psychiatric patients reported colored dreaming more frequently than others might seem to bolster such skepticism. One needn't believe all one's respondents. For some reason, though, skepticism about colored dreaming didn't seem to tempt researchers of the era. I can find no evidence that anyone doubted the veracity of reports of color in dreams.

Incidentally, my respondents in Schwitzgebel 2003 and Schwitzgebel, Huang, and Zhou 2006 reported colored hearing at about the same high rates as did Middleton's respondents, suggesting that many of my respondents either answered wrongly or misunderstood the question – or perhaps that occasional bouts of synaesthetic phenomena are fairly widespread. Contemporary research on synaesthesia generally attempts to verify subjective reports with some sort of objective measure, which seems very desirable but which will only verify the existence of synaesthesia in people who experience it dependably.

⁴ This table excludes discussions based on personal experience or experience interpreting dream reports in psychotherapy, where percentage estimates are generally not given. For estimates of color incidence in non-Anglophone countries, see my discussion in note 8. Among the 20th century claims based on personal experience or psychotherapy are: Beaunis's (French) 1903 report that colors in his own dreams tend to be limited and grays common; Savage's 1908 claim that color is rarely or never present in his dreams; Ellis's 1911 statement that "in the dreams of most people color is rare" (though he also remarks that in his own experience "it is difficult to decide whether the absence of color is due to its actual absence from the dream imagery, or merely its failure to make any impression on memory"); Paul (not Wolfgang) Köhler's (German) 1912 discussion of the phenomenology of dreaming that appears to take the coloration of dreams for granted; Titchener's 1912a report of a dinner conversation in which

people were divided about whether they only experienced gray in their dreams; Bellamy's 1915 remark that "every one has noticed the rarity with which colors and sunshine appear in dreams; I have found, however, that colors and sunshine always appear if there is any necessity for their doing so"; Rapport's 1949 report that in his own dreams color is usually present but easily forgotten; Kubie's 1950 view that "For most people the visual images of dreams consist largely of black, white, and grey"; Calef's 1954 view that color is not predominant but may be more frequent than is typically assumed; Huxley's 1956 view that most dreams lack color; Garma's (Argentine) 1961 view that "dreams are like old silent films without sound or technicolor"; Tauber and colleagues' 1962 view that color is very common and underreported; Blum's 1964 view that color may often be present but quickly forgotten; Miller's 1964 view that color is generally present but unattended; and Yazmajian's 1964 and 1968 view that when color is present it is for highly affective dreams and elements, especially involving viscera and genitalia. Thus, we see the same shift in the personal reports as in the systematic studies.

Two studies have been repeatedly mishandled in the literature and are not included in the table. Knapp (1956) is sometimes cited as claiming that about 15% of most people's dream reports involve color – he is cited this way for example by Kahn and colleagues in their influential 1962 article – but Knapp is including reports of black, white, and gray as "color" reports, and he offers no estimate of the ratio of reports of chromatic colors as opposed to black, white, and gray. Monroe (1898), who has also sometimes been cited in connection with the view that dreams are often black and white (including again by Kahn and colleagues), said that color was a "pronounced feature" in 21% of dreams reported in the morning after experimental subjects studied colored patches at night, but he neither asserted nor denied the presence of colors in the other 79% of dreams in which it was not a "pronounced feature" (nor did he,

unfortunately, use a control group). Furthermore, like Knapp, he treats black, white, and gray as “colors” for his purposes, so discovering the ratio of black and white to color experiences appears not to have been his interest. Since Monroe unlike Knapp breaks down his results by color, by reanalyzing the data we can see that the ratio of chromatic colors to black, white, and gray is about 3.5 to 1, in contrast with Bentley’s 1915 finding (briefly discussed in the body of the chapter) of about 4 times as many grays as chromatic colors.

⁵ Hall’s student Robert Fortier, also in 1951, published a dissertation containing data on the proportion of dreams containing color. Fortier’s data appear to suggest that a majority of respondents do at least occasionally – in at least one dream in twenty – report experiencing at least one color. However, his presented data are too incomplete to derive a percentage estimate.

⁶ A potential exception to this trend, however, is the *philosophical* literature on dreams circa 1950. Although Manser (1956) does mention the possibility that dreams are black and white, this doesn’t appear to be a very common remark among philosophers of the time, and there are several cases of philosophers mentioning colored objects in dreams without further remark: Yost and Kalish’s “this is green” (1955), Thomas’s “pink rats” (1956), Wolgast’s “great blue grasshopper” (1958), and Malcolm’s blue walls (p. 64) and red cloak (p. 86) in his notorious book *Dreaming* (1959). However, neither can I find any philosophers of this period who explicitly resist the opinion that dreams are mostly black and white; and of course reporting a single colored object is consistent with the view that dreams are *mostly* black and white. I would guess that *if* philosophers did tend to resist the dominant view, that resistance may have had something to do with the huge influence of Descartes on philosophers’ thoughts about dreaming. (Malcolm’s book, by the way, was notorious for arguing that dreams do not occur when one is asleep and contain no feelings, imagery, sensations, or the like. Instead, Malcolm says, when we

wake, we're inclined to confabulate stories of a certain sort. Telling such a story is what we call “relating a dream”, but there is no sense in which the dream exists independently of or prior to the story we tell about it, and no sense in which such a story can be evaluated as an accurate or inaccurate description of occurrences during sleep.)

⁷ We also replicated (with different respondents) Version 2 of my 2003 questionnaire, briefly described above, and found the same tendency for results to align with socio-economic status. Let me also take this occasion to correct some data erroneously reported in the 2006 article. Contrary to Table 3 on p. 40 of that article, among the intermediate group, 26% reported dreaming in color, 20% reported dreaming in black and white, 26% reported dreaming in both, none reported dreaming in neither, and 29% said their didn't know. These data actually fit better with the overall trends and with our hypotheses than do the misreported numbers in the original article. (Thanks to Michael Schredl for noticing this error in our reporting.)

⁸ Other cross-cultural data are a bit thin. I've found three studies from Japan: Tatibana (1938), Yamanaka et al. (1982), and Okada et al. (2005). Tatibana says that 25% of his observers reported colors in their dreams. Yamanaka's 1982 estimates are intermediate between the 1950s and 1960s U.S. estimates, and differ greatly by gender, with 30% of men and 64% of women reporting colored dreaming. By 2005, Okada found 85% of respondents reporting dreaming in color at least occasionally, comparable to my own 2003 U.S. finding of 81%. Japan was an early adopter of color television but slower than the U.S. to adopt color movies, so these results fit with my overall finding that the coloration of movies synchronizes better with opinion about dreams than does television. In Mexico, López et al. (1986) found high levels of reported color dreaming (89% of subjects). Color movies were commonplace in Mexico by 1986, but I can't say with confidence that they were more so than in Japan in 1982. In Austria, Stepansky et

al. (1998) found a surprisingly low rate of reported color dreaming (37% reported dreaming in color, 47% said they did not dream in color, and 16% said they didn't know). In Germany, Schredl et al. (2008) found respondents to estimate that, among dreams whose coloration or lack thereof they could recall, about 85% were colored. Finally, Bolton (1978), reporting on the Quechua Indians in Peru, who presumably had little media access at the time, found black, white, and gray to be mentioned in dream reports more frequently than color (32 vs. 19 occurrences in 498 reports); however without knowing the overall rates of color term use in the language, Bolton's results are difficult to interpret. (Note 4 also includes a few personal observations by non-Anglophone researchers, indicated as such.)

⁹ My four sources were: Cynthia Richmond's columns on dream interpretation in the *Los Angeles Times* in 1999; a website featuring monthly dream reports from a variety of subjects (<http://www.lifetreks.com>), January 1997 to January 2000 (accessed February 2000); a sample of 81 dreams collected from women at University of California at Santa Cruz in 1996, made available by Adam Schneider and G. William Domhoff at <http://psych.ucsc.edu/dreams> (accessed October 2001); and a sample of dreams from 4th-9th grade San Francisco Bay Area girls in 1996-1997, also from Schneider's and Domhoff's site. In 72,886 words from these four sources, colors other than black, white, and gray are mentioned approximately 153 times (depending on what counts as a color term use – e.g., “golden” can be a color or a material and it's not always clear which), i.e., as 0.20% of all words. In the Hall and Van de Castle dream reports from Schneider's and Domhoff's site, I found approximately 228 color words out of 122,280 (0.19%). Black, white, and gray appeared 92 times (0.13%) in the late 20th century reports and 109 times (0.09%) in Hall and Van de Castle.

¹⁰ I estimated rates of color term use in ordinary English using word-frequency charts from a variety of different sources: Carroll, Davies, and Richman 1967, Kučera and Francis 1967, Dahl 1979, Johansson and Hofland 1989, and a search, at my request, of the HAL database of internet usegroup text by Curt Burgess (on HAL, see Burgess and Lund 2000). Of course, such a comparison is only suggestive, since it could reasonably be argued that these samples of English are not the appropriate comparison class. None of them, for example, is confined to narratives about experienced events.

¹¹ The claim is based on taking each of four individual media-exposure variables separately as a predictor, along with SES group, in two-predictor logistic regressions of binary-coded response on the target question, for each version of the questionnaire. Since it's not clear that the statistical assumptions of logistic regression are adequately satisfied, I confirmed the results by looking at various Spearman rank correlations and chi-square tests. It's a bit messy, I'm afraid, so I don't want to put too much weight on this analysis. Murzyn, in her 2008 British study, does find a relationship between individuals' history of media exposure and their reports of black and white versus colored dreaming within a group of respondents over age 55. However, as she acknowledges, age differences within that broad group may be confounding her results; a finer discrimination by age might have washed out the effects of the individual history variable.

In any case, the thesis of this chapter does not require that I deny the possibility of differences in dream report driven by individual exposure. If capture by media metaphor explains differences in dream report, it would be unsurprising if people sometimes differed in their attraction to the metaphor due to different histories of media exposure. My view is consistent with either result. What's relevant to the present argument is the potential difficulty,

for the defender of the view that the dreams themselves have changed, of explaining the weak relationship in China between personal history of media exposure and report of color in dreams.

¹² In Schwitzgebel, Huang, and Zhou (2006) we presented the Braun and Wehrle studies as tentatively suggestive of color experience during sleep because they showed activity in extrastriate visual cortical areas like V4. However, V4 is not exclusively associated with color and their studies did not focus specifically on that area; and furthermore they found deactivation of V1 which is also involved in color vision (though *perhaps* too early in the visual stream to be necessary for consciousness); so I now think that suggestion was premature.