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Colors in the Life-World

Introduction

Do things look red, because they are red? Or are things red, because they look red? Naive realists would answer positively to the first question, and idealists positively to the second. But since Galileo natural scientists have provided a more radical answer: If there were no human beings, there would be no colors on the earth. To be exact, there are no colors in the objective world, and things in the world have no color. Colors are only subjective phenomena, like "hallucinations."

Husserl has taken a very clear stance against this "scientific realism" concerning so called "secondary" qualities or "qualia," such as colors, sounds, and so on. Colors are "sensory qualities": they are not to be confused with "sense data," but are to be taken as "properties of the bodies which are actually perceived through these properties" (Husserl 1970, p. 30). Therefore, according to Husserl, there are colors in the world, at least in the life-world. But how do they exist? This is the question that I would like to take up in this paper.

1. Mixed color

There is a famous phenomenon in which two things seem to have the same color, although they reflect totally different spectral components of light. It is called "metamerism." Metamerism is a phenomenon that color scientists and philosophers use in order to "demonstrate" that colors are subjective phenomena. But is this a necessary consequence?

It is thoroughly trivial that two things may show the same form when we see them from a certain direction even though they have different spatial structures. The spatial form has various "sides" or "aspects," and each time we see it, it shows one corresponding aspect. Husserl has called this structure of phenomena "adumbration" ("*Abschattung*"), and saw the same structure in the sensory qualities of things. Color is therefore considered to "adumbrate" itself. But does that mean that color has various "aspects"?

Let's take a familiar example of mixed color. The picture of a color television consists of three kinds of luminous colored points: red, green, blue. When we see, for example, the yellow color of a fresh lemon in a picture, components of light reflected from it are mostly made of red and green spectral light and are very different from those reflected from a real lemon. Psychologists often describe this situation by saying that the mixed color in the television picture is an *illusion* and that the color television uses this kind of illusion.

Why must our perception of the yellow in the television picture be taken as an illusion? Because, answer the psychologists, there are really only two kinds of luminous colored points, i.e. red points and green points, in the place where the yellow color is seen. These luminous points, however, cannot be identified, for they are too small to see.

But this argumentation lacks necessity: If we accept this kind of reasoning as an explanation of an illusion, we must regard almost all of our perceptions as illusions. For example, when we see a picture of Monet and see water lilies in it, our perception of water lilies is an illusion, because there are really only colored spots on the canvas. Or although tap water looks transparent, the appearance of the tap water is an illusion, because it really contains many kinds of things that we can identify through a microscope.

Against this argumentation we can describe the situation in another way, using the Husserlian concept of "adumbration."

First, there is no reason why the appearance of the color seen through a microscope must be taken as "real" or "true," whereas the appearance of color seen with the naked eye should be taken as illusory. If we should use a microscope with more magnifying power, the appearance will change even more. The appearance of a color through a microscope is just one mode of appearance along with various other modes, and *as a mode of appearance* it has no reason to be taken as having a privileged status. Every appearance must be taken as having equal status. In this sense, color has various "aspects," just like a spatial form.

Second, if the magnifying power of a microscope is so high that the scale of objects and that of wave lengths of light do not differ appreciably, then the objects will be unable to reflect light and not be seen. In this case, the contrast will no longer be that between the real color and illusory color, but a contrast between something colored and something colorless, in other words, the contrast between the visible and the invisible. And in consequence, all the perceptions of colors are to be taken as illusory because what "really" is must be considered as belonging to the realm of the invisible. In fact, this is the direction of argument that the Modern scientific view since Galileo has taken. Could we also use the concept of "adumbration" against this kind of argumentation of "scientific realism"?

Perhaps this can be presented in the following way: Our visible world is constituted not only of visible components but also of invisible components. Color has visible "aspects" and invisible "aspects." Both "aspects" are inseparable. If we can describe the phenomenon in this way, we can defend our perceptions of colors in the lifeworld against the eliminalistic monopoly of scientific realism, without falling into the reverse extreme position, that is, the position that makes our lifeworld something absolute and incorrigible. In this way we come to a position that could be classified as a kind of "double aspect theory" of the mind-body problem without taking the two "aspects" as autonomous and closed. While the invisible scientific world shows only one inseparable aspect of the lifeworld, the visible colorful world cannot be closed and is always open to a variety of scientific research. How these aspects are related to each other has long constituted the core of the mind-body problem. Before we go into this problem, we would like to remain in the visible world a little longer.

2. Incommensurability of colors

In the first section I have described the problem as if we could perceive color independently from other factors, and we must correct this now.

Color shows itself, firstly, always only as the color *of* something and secondly as the color of something *in a certain situation*.

When we see a yellow color in a television picture, we see not only the yellow in general but the yellow *of a lemon*. If we take this point into consideration, the red and green spotted surface, which appears through a microscope, is unnatural and abnormal. If we see a red and green spotted lemon, either we think that the appearance is abnormal or we take the lemon itself to be abnormal. In any case, we presuppose that there is a normal mode of appearance which is taken to be a criterion we can then use to evaluate the appearances of a color.

If we nevertheless have not taken this trivial point into consideration in the above example, the reason must be that the red and green spotted surface, which we see through a microscope, has not been seen as the surface of a lemon but as a surface of the cathode-ray tube (CRT) of a television. The object of the perception itself has changed. But so long as colors are always colors of some object and so long as this object takes a role in determining the criterion of the appearances of colors through which the object is perceived, and so long as the object is changed in the above case, colors in both cases stand under different criteria and therefore cannot be compared directly. The red and the green of the color spots on a television picture and the yellow of a lemon are "different kinds" of colors.

To every color of an object corresponds a standard situation, in which the appearance of the color is taken as optimal and in this sense as "real." In our everyday life we presuppose this "secondary objectification" (Husserl 1982/1913, p.96/p. 82) in some way or other. That is why when we want to buy clothes we try to see them not under artificial light but under the sun. Usually we consider the day light of the sun to be standard lighting. But on the other hand, we cannot ignore that this everyday criterion has only a limited validity. For example, what kind of color does the moon have under this "standard lighting"? What about the color of the setting sun or the color of a neon sign?

What is the "standard situation" in which the color of the moon is determined? Is it the night in which the moon shines in the sky? Or is it the situation in which we view the moon from a spaceship? Or is it the situation in which we find ourselves on the moon? If we take such different situations into consideration, it is difficult to determine one universally

valid criterion that applies to all of them. We must rather determine a standard condition corresponding to each situation. That means the criterion of colors, according to which the kind of color the object has is determined, changes with each situation. Even if the object remains the same, as in the case of the moon, colors which appear in the various and "incompossible" situations do not stand under the same criterion and cannot be compared simply with each other. The moon shows its "incompossible" colors which correspond to "incompossible" situations. Perhaps we could say that not only colors but also the "being" of the moon itself is different and incompossible corresponding to each situation, so long as the way of being perceived is concerned. Merleau-Ponty has pointed out this peculiar structure of the perceptual world. "But for me the perceiver, the object a hundred yards away is not real and present in the sense in which it is at ten yards..." (Merleau-Ponty, 1962/1945, p. 302/p. 348).

In our perceptions of our everyday life we are usually not conscious of such a difference, and cross the border between incompossible situations very easily. Nevertheless our perceptual world is full of possibilities for being surprised with "other kinds" or "new kinds" of colors that we encounter through various experiences, although it is seldom to be so surprising as in the case of travel from the earth to the moon. The identity of an object, which is constituted through perceptual processes, can establish itself only through such adventurous experiences. If we nevertheless regard these various appearances as having equal status from the beginning and with Husserl as various "adumbrations" of an "objective identity," then we presuppose with it that the first "idealization" ("*Idealisierung*") has already been accomplished. The Husserlian thesis that colors are properties of perceived objects is situated in this level of the "constitution of the lifeworld."

While up to now we have mostly taken into consideration only a *successive* "incompossibility" of perception, there are *simultaneous* "incompossibility." That is, it is not rare that we experience the various situations that we have covered in the above example in one perceptual field simultaneously.

Can we say that the yellow of the moon which shines in the sky is the same as the yellow of a lemon which is lighted by a lamp? So long as there is no common "standard condition," it is rather adequate to say that the place where the moon lies and the place where the lemon lies are different or different kinds of places, and that the heavenly world and

the earthly world are "different" worlds. We can find an impressive description of this remarkable structure of the perceptual world once again in Merleau-Ponty.

> We must not neglect to refer back to the important remarks of psychologists who have shown that in free and spontaneous perception objects standing in depth do not have a definitive apparent size. The objects which are in the distance are not larger than the rules of perspective indicate, and the moon on the horizon is not "larger" than the piece of a franc which I have in my hand, or at least it has not a largeness which would become a measure of two objects. The moon is a "large object in the distance." The largeness which matters here is like warmness or coldness, a property which adheres to the moon and which cannot be measured by a certain number of aliquot parts of the piece of money. (Merleau-Ponty, 1969, p. 72.)

That an object appears in depth in a perceptual field means that it shows a "largeness" which has no common measure with other objects, and in this sense is "incommensurable." Painters have long been conscious of this incommensurable depth structure of our perceptual world. For example, they have developed a technique to represent the essential difference between the foreground and the background. "Both the Graeco-Roman and the Chinese masters of the genre refused to acknowledge the middle ground and preferred to veil it in haze or mist. Thus they achieve a sharp distinction between houses or rocks in the proximity which are made to look solid, and the mountains or trees in the distance which are projected as flat shapes against the sky" (Gombrich 1974, p. 87). This technique could be interpreted as the method painters used to make the difference of the "being" of things in depth perceptible.

We can find the same depth structure in the phenomena of colors as well. So long as colors such as the yellow of the moon and that of a lemon, which are situated in different places in a perceptual field, cannot be compared directly with each other and are in this sense incommensurable, we can also say that they appear in the "depth" related to colors. Color has not only "aspects" but also "depth." With this characterization of the depth of colors we can now understand the significance and the consequence of the concept of "adumbration"

("*Abschattung*") with which Husserl has characterized not only the perception of form but also color. Only something that appears in depth can have "aspects" in the true sense, because without depth there can be no "aspects" nor "sides," but only parts.

Color in "free and spontaneous perception" cannot be considered as something that can be identified with a functional relation of elements in a commensurable dimension. Nevertheless, Newton began trying to breed the "raw and wild" being of colors and to make them manipulable: He made the "free" light of various colors pass through a slit into a dark room, made a thin ray of light, resolved it into the spectral lights through a prism, and then remixed these resolved lights, and so on. The science of color, the founder of which was Newton, could be seen as a "forcible" attempt (to the same extent that the perspectivism which began in the Renaissance could be seen as a "forcible" attempt, to make incommensurable spatial depth commensurable). The result of this attempt was the "discovery" of the phenomenon called "metamerism."

In the Newtonian view, colors are first abstracted and separated from both the things to which they adhere and from the situation that they inhabited, and are then analyzed, manipulated, and calculated. The yellow of the lemon and the yellow of the CTR of the television are on the one hand considered to be the same and on the other hand considered to be totally different with regard to the constituents of spectral colors. In this way the first constitution in the lifeworld is skipped, and the phenomenon of color is decomposed into one thing purely psychological and another thing purely physical. The simultaneity of the incompossibles and the incommensurables is resolved to the simultaneity of the compossibles and the commensurables. But through that process emerges another paradox of the simultaneity of the incompossibles, that is the simultaneity of the visible and the invisible.

3. "Double aspects" of colors

1) "The ray has no colors"

"The ray has no colors." This thesis, which Newton proposed in his *Optics*, has become now a slogan of color scientists who seem to think that only after this thesis has been posited can colors become an object of

scientific research. But if the ray of light has no colors it cannot be seen since things that have no colors are essentially impossible to see. How can one then explain the fact that we see the rays of light and their colors?

Newton's answer to this question is similar to Locke's. While the ray of light has no colors, it has a "power" or disposition to make colors. The red ray must therefore be called the "red-making-ray." But this kind of answer cannot solve the difficulty; it simply transfers it to another problem, that is, the problem of explaining how colors can be "made" from colorless rays. The answer would be: through the process in which the ray is received by a perceiving subject.

But how and where can the invisible ray be transformed to a visible and colored ray when the ray is received by a subject? Is there any transformation process in the eye, in the nervous system, or in the brain? Husserl has already very clearly pointed out the absurdity of this way of thinking.

> Not even a Divine physics can make simply intuited determinations out of these categorical determinations of realities which are produced by thinking, any more than a Divine omnipotence can bring it to pass that someone paints elliptic functions or plays them on a violin. (Husserl 1982/1913, p. 123/p. 102.)

If we want to avoid this "mythological" (Husserl 1982/1913, p. 122/p. 101) process, which is impossible even for God, there seems to remain only two alternatives. One is the eliminalistic strategy, according to which the existence of colors itself must be abandoned. If no colors exist, neither is there a mythological transformation process, and we need not be bothered by the so-called mind-body problem.

But seen from the constitutional point of view, I think this eliminalistic position is in reverse order. It is not the case that we have first physical, chemical, and physiological knowledge about our color perceptions and only then on the ground of these kinds of knowledge do we evaluate the ontological status of colors. Rather conversely we begin scientific investigations only on the ground of our various perceptual experiences of colors. Without these experiences we cannot carry out either scientific observations or experiments related color phenomena,

nor can there be research into objects, although our perceptual cognition can and must sometimes be revised through the results of scientific investigations. Husserl has coined this constitutional fallacy "the forgetfulness of lifeworld" and Whitehead "the fallacy of misplaced concreteness."

Besides, even if there should be ontologically only material processes and nothing more, and color perceptions should be seen as "hallucinations," there remains the problem of explaining why we would have developed such experiences as color "hallucinations" over time, and how it is possible that such "hallucinations" "exist" in the material world. It is in principle impossible to answer these questions in the eliminalistic view, so long as in this view colors have only redundant status.

If we avoid the constitutional fallacy and if the problem concerning the relationship between the material processes and qualitative experiences remains in any case, there remains for us only a second alternative, that is the alternative that we presuppose from the beginning the visible colorful world. This world is originally filled with incompatible and incommensurable colors, and then on the ground of the first "idealization" it is filled with various colors as properties of things. According to this phenomenological position, all objects that we encounter in the lifeworld have some color, and therefore we must say that the rays have colors. It is not that the colors emerge through the "mythological" process of the transformation from the invisible to the visible, but the reverse. The scientific determinations of the rays of light are nothing but "the experimental-logical determination of the Nature given in intuition simpliciter" (Husserl 1982/1913, p. 122/p. 101). The physical determination belongs to the higher and later level of constitution. And only on the ground of this constitutional level can we say that the theoretical determinations of science show only one "aspect" and the other "aspect" appears filled with various colors.

2) Phenomenological model of "Lived Body"

There remains now the difficult problem of making understandable how these two "aspects" are related with each other.

A special problem related to color is that color is not definitely determined only by the wavelength of the ray of light or with the structure of the surface of things, so that it cannot be reduced to some physical property, making the objectivistic view about color unsustainable. One of the most

conspicuous examples that shows this circumstance is the color brown. Brown can neither be found in the spectral components of sun light, nor made only by mixing spectral lights. Brown is not a "film color" such as the color of spectral light or the color of sky but a "surface color," i.e. a color of an opaque object.

On the one hand, the surface of a brown thing reflects a light whose wavelength is the same as that of yellow light. On the other hand, brown is differentiated from yellow in the respect of the reflectance, meaning that it is different from yellow because of the difference of brightness. In this sense brown can be called a kind of "dark yellow," especially in contrast with surrounding things. Therefore there cannot be brown color that shines more brightly than surrounding things. Wittgenstein indicated this characteristic of brown in the following way: "'Brown light.' Suppose someone were to suggest that a traffic light be brown (III-65)" (Wittgenstein 1977, p. 25).

In this way the objectivistic approach, in which color is to be reduced to some physical property such as wavelength or surface reflectance, cannot be sustained, and other factors, for example the contrast of colors, which is a phenomenon related to the whole organizational structure of the perceptual field, must be taken into consideration. In addition to that, when it comes to the characteristics of colors, such as their "logical relation," for example, the incompossibility between red and green, or yellow and blue, we must also take various other factors into consideration. In order to explain such a "logical" relation of colors, we need to refer to the structure of the retina and also to that of the nervous system. There is also much research concerning how "illusory colors," i.e. colors that are caused by an after-image effect, occur, corresponding to the changes of the retina, of the nervous system, or of the brain.

On the ground of this knowledge, we must recognize that there is a "close" relationship between color perception and the material process, which is constituted by surface structure, rays of light, the retina, the nervous system and the brain. But this relationship cannot be a causal one, because the causal relation is only meaningful either in the material field or in the psychological field. Parallelism would be unsatisfactory. We have now other new versions, such as identity theory or functional theory. But these positions have not yet cleared themselves of the suspicion that they fall into fundamental difficulty, especially when it comes to the "qualia" problem (cf. Nagel 1979).

Perhaps phenomenologists could propose a possible model here.

As we have already seen in the first chapter, Merleau-Ponty has impressively described phenomena of the extension of the lived body through artifacts, for example, the car of a skilled driver, a feather in the hat of a lady, or a blind person's stick. What matters here is not the body as object but the body as an organ for perception and movement, which makes the perception and the movement possible, and which is not objectively cognized but "lived." If the stick of a blind person becomes a part of a lived body and "transparent," the object can be "touched" directly through the stick. On the other hand, if a part of the stick appears and is perceived in some way, the perception of the original object will be hindered and changed. Here is a remarkable structure of appearance and disappearance, or the structure of being open and being hidden (cf. Murata 1997 [chapter 1, this volume]).

There is no fundamental difficulty in transferring this structure concerning the appearance of tactile perception to visual perception. When we take into consideration the phenomenon of contrast and constancy, which are characteristics of surface color, this structure of appearance and disappearance is especially conspicuous.

Let's take the following famous experiment concerning the constancy of colors. We prepare two boxes whose insides are painted white and black respectively, and one is dimly lighted, the other brightly. We can arrange these lightings so that we cannot differentiate the colors of these boxes, seeing only a dim gray space inside these boxes when peering inside through a small peephole. But when we put a white paper into the black box, or a black paper into the white box, the appearance changes dramatically. Immediately the former is seen as the white box lighted dimly, and the latter as the black box lighted brightly (cf. Merleau-Ponty 1962/1945, p. 307/p. 355).

This experiment shows clearly that the constancy of colors is possible only on the condition of the contrast of colors and that on the ground of this contrast the differentiation of the lighting and the being lighted occurs. According to Merleau-Ponty, an "organization of color itself" occurs here and an institution of "the structure of the lighting and the being lighted" (Merleau-Ponty, 1962/1945, p. 307/p. 355).

But why is the differentiation between the lighting and the being light-

ed so important for the constancy of colors? Our answer would be the following.

Through this differentiation the lighting retreats from being the object which is the focus of perception to its "background" through which we see colors. That means, the lighting becomes "invisible," in the sense that through it something colored becomes "visible." Without this structure of organization we could not see the surface color of things, and the constancy of color could not be retained, as the case of the above experiment shows. In the first case of the experiment we could say that the colors of the lighting is the object because our gaze is stopped at the level of the lighting and cannot go through it to reach the surface of the boxes. Only when the contrast of colors has been constituted and the differentiation between the lighting and the being lighted is established, does it become possible for us to see through the lighting and see the surface of things.

In this way we can find a structure in the perception of colors similar to the case of tactile experience. One of the important points of the phenomenological model of the "lived body" is that the relationship between the "visible" and the "invisible" is compatible with the order of constitution. As we have already seen, the physical, chemical, or physiological factors, which are conditions of color perception, are situated at the later level of constitution in contrast with the color perception itself. When we follow the phenomenological model to interpret the relationship between factors that belong to scientific research and the color that we experience directly, the former factors are considered to be cognized as objects only indirectly and only on the ground of color perception, while the colors are considered to be direct objects of perception. The factors that are "lived" through in the experience can become objects of cognition only indirectly and only later than the experience itself. If we understand the sense of the phenomenological model in this way, there is no fundamental obstacle to extend this model to other factors of perception than the lighting which we have mainly considered above.

It can then be said that when we see a certain color of an object, we see not only "through" a certain ray of light, but also "through" a certain structure of the retina, "through" a certain structure of the nervous system, and "through" the brain. To the extent that rays of light, the retina, the nervous system, and the brain become "embodied" and "transparent," the colors of an object correspondingly will be visible.

Another important characteristic of this phenomenological model concerning the relationship between the visible and the invisible is, I think, that we can experience the change from the visible to the invisible and vice versa as a kind of gestalt change or aspect-switch. A color can become visible insofar as the other "side" or "aspect" of it becomes invisible. And if some factor of the embodiment relation does not function in a normal way, and if the embodiment relation is not more "transparent" and becomes "visible" in some way, the appearance of the original color will change greatly or be diminished and other kinds of color appear. If there is such an essential relationship between the two "aspects" of a color, we cannot identify what a certain color is unless we grasp both of its "aspects." And it is exactly this embodiment structure or the invisible aspect that creates the "depth" of each color. In this sense, every color has its own "depth."

When what is said above is admitted, where is the place of a color?

One answer is that so long as we see a color through many factors of perception, the color is where it is seen. That means, in the case of surface color in the normal condition, it is on the surface of things. This characteristic of surface color constitutes the way of the existence of color. The brownness of the table is considered to continue to exist when the light is turned off or when nobody sees it. In this sense the existence of the surface color is "independent" of the conditions of perceptions and of perceivers, just as the form of things has an independent existence.

But on the other hand, so long as the color has its proper "depth" and the factors that constitute the depth of color can be considered another "aspect" of the color, the place of the color is not only on the surface of an object, nor in the ray of light, nor in the retina, nor in the nervous system nor in the brain, but rather it is realized in the whole system, which comprises all of these factors together. In other words, so long as these factors can be taken as constitutional conditions on the ground of which the appearance of each color is possible, the "ontological" place of colors is considered to be the whole system, which includes factors from the surface of things through rays of light to the brain, i.e. the lifeworld in which we live. These are the consequences of the Husserlian thesis that colors "adumbrate" themselves.

4. Coexistence of lifeworlds

The above consideration of color perception was made mostly from a static point of view. But the constitution of colors occurs factually in the course of a long evolutionary history in which various perceivers of colors and various colors of things emerge and develop together. To the extent that we have embodied and adapted ourselves to a certain range of electromagnetic waves, it has become possible for us to see corresponding colors. In order to realize this, we have also had to develop and embody a certain structure of the retina, the nervous system, and the brain. The situation is not fundamentally different in the case of other living creatures. Animals and insects have developed their perceptual organs with which various colors can be identified. On the other hand, plants have developed colorful flowers and trees in order to be identified by and "use" the animals and insects. The colorful world, which we now perceive, is the result of a long process of the co-evolution between various living creatures and their lifeworlds.

It is well-known that bees perceive ultraviolet colors. What it might be like to experience such colors for bees is beyond our ability to understand. The colors of other living creatures are in principle incommensurable with "our" colors. In this sense the colors of the other living animals are in principle invisible, and these colors cannot be considered to be other "aspects" of our visible colors in the sense of this concept we have considered up to this point. Nevertheless this does not mean that we can revive the view that the colors of the other animals are subjective sensations and do not exist in the world. Rather the same thing can be said in the case of the colors of other animals as in the case of "our" colors. The ultraviolet "color" that bees perceive is constituted by the whole system of factors and lies in the lifeworld of the bees. Besides we can see and enjoy the colors of flowers, which have coevolved with perceptual organs of bees, "from our point of view" and in "our" lifeworld. In this sense although the colors of other animals are impossible to see, we could say that we see the other "aspects" of that invisible color. The colors which we see are other "aspects" of the invisible colors of the other animals, and how we perceive colors shows the form of coexistence between "our" lifeworld and the lifeworlds of other animals.