This bulletin is published in tribute to Umberto Eco, the prolific Italian polymath who died on February 19, 2016. The original essay was published under the slightly longer title "How Culture Conditions the Colors We See" in the semiotics reader *On Signs* (Baltimore: Johns Hopkins, 1985), edited by Marshall Blonsky. The present, leavened version is borrowed from the "Documents on Contemporary Art" series book *Colour* (London / Cambridge, MA: Whitechapel Gallery / MIT Press) edited by David Batchelor —the only differences being our habitual omission of footnotes, and the inclusion of the lovely chart on the last page.

Cover: Umberto Eco photographed by Steve Double, Milan, 1997. www.double-whammy.com

BoTSL#11 2016 JUN 16 12:25 PM

Color is not an easy matter. James Gibson, in *The Senses Considered as Perceptual Systems*, says that "the meaning of the term color is one of the worst muddles in the history of science." If one uses the term "color" to mean the pigmentation of substances in the environment, one has not said anything about our chromatic perception. Johannes Itten, in his *Kunst der Farbe*, distinguishes between pigments as chromatic reality and our perceptual response as chromatic effect. The chromatic effect, it seems, depends on many factors: the nature of surfaces, light, contrast between objects, previous knowledge, and so on.

I do not have any competence about pigments, and I have very confused ideas about the laws governing chromatic effect; moreover I am neither a painter, nor an art critic. My personal relationship with the colored world is a private affair as much as my sexual activity, and I am not supposed to entertain my readers with my personal reactivity towards the polychromous theater of the world. Thus, as far as colors are concerned, I take the privilege of considering myself a blind man. I shall be writing about colors from a merely theoretical point of view, namely, from the point of view of a general semiotic approach.

Since I have assumed myself to be blind or at least a Daltonist, I shall mistrust my visual experience. I shall start from a verbal text, chapter 26, Book II of Aulus Gellius's *Noctes Acticae*, a Latin encyclopedia of the second century A.D.

To deal with colors by making recourse to a text of this period is rather challenging. We are facing linguistic terms for colors, but we do not know what chromatic effects these words refer to. We know much about Roman sculpture and architecture, but very little about Roman painting. The colors we see today in Pompeii are not the colors the Pompeians saw; even if the pigments are the same, the chromatic responses are not. In the nineteenth century, Gladstone suggested that Greeks were unable to distinguish blue from yellow. Goetz and many others assumed that Latin speakers did not distinguish blue from green. I have found also somewhere that Egyptians used blue in their paintings but had no linguistic term to designate it; Assyrians, in order to name

BoTSL#11 2016 JUN 16 12:25 PM

the color blue, could do no better than transform the noun "uknu," naming lapis lazuli, into an adjective.

All of this is highly speculative, but we need not test every case. Let me concentrate on the following passage from Aulus Gellius. The reader is advised to hold his temper, since the passage is highly confusing.

Gellius is reporting a conversation he had with Fronto, a poet and grammarian, and Favorinus, a philosopher. Favorinus remarked that eyes are able to isolate more colors than words can name. Red (*rufus*) and green (*viridis*), he said, have only two names but many species. He was, without knowing it, introducing the contemporary scientific distinction between identification (understood as categorization) and discrimination, of which I shall speak later.

Favorinus continues: *rufus* is a name, but what a difference between the red of blood, the red of purple, the red of saffron, and the red of gold! They are all differences of red but, in order to define them, Latin can only make recourse to adjectives derived from the names of objects, thus calling *flammeus* the red of fire, *sanguineus* the red of blood, *croceus* the red of saffron, *aureus* the red of gold. Greek has more names, Favorinus says, but Fronto replies that Latin, too, has many color terms and that, in order to designate *russus* and *ruber* (red), one can also use *fulvus*, *flavus*, *rubidus*, *poeniceus*, *rutilus*, *luteus*, *spadix*.

Now if one looks at the whole history of Latin literature, one notices that *fulvus* is associated by Virgil and other authors with the lion's mane, with sand, wolves, gold, eagles, but also with jasper. *Flavae*, in Virgil, are the hair of the blonde Dido, as well as olive leaves; and the Tiber river, because of the yellow-grey mud polluting its waters, was commonly called *flavus*. The other terms all refer to various gradations of red, from pale rose to dark red: notice, for instance, that *luteus*, which Fronto defines as "diluted red," is referred by Pliny to the egg yolk and by Catullus to poppies.

In order to add more precision, Fronto says that *fulvus* is a mixture of red and green, while *flavus* is a mixture of green, red and white. Fronto

then quotes another example from Virgil (*Georgica*, III, 82) where a horse (commonly interpreted by philologists as a dapple-grey horse) is *glaucus*. Now *glaucus* in Latin tradition stands for greenish, light-green, blue-green and grey-blue; Virgil uses this adjective also for willow trees and for *ulva* or sea lettuce, as well as for waters. Front says that Virgil could also have used for his same purpose (his grey horse) *caerulus*. Now this term is usually associated with the sea, skies, the eyes of Minerva, watermelons and cucumbers (Propertius), while Juvenal employs it to describe some sort of rye bread.

And things get no better with *viridis* (from which comes the Italian *verde*, green), since in the whole of Latin tradition, one can find *viridis* associated with grass, skies, parrots, sea, trees.

I have suggested that Latin did not clearly distinguish blue from green, but Favorinus gives us the impression that Latin users did not even distinguish blue-green from red, since he quotes Ennius (*Annales*, XIV, 372–3) who describes the sea at the same time as *caeruleus* and *flavus* as marble. Flavorinus agrees with this, since — he says — Fronto had previously described *flavus* as a mixture of green and white. But one should remember that, as a matter of fact, Fronto had said that *flavus* was green, white and red, and a few lines before that, had classified *flavus* among various gradations of red!

Let me exclude any explanation in terms of color blindness. Too easy. Gellius and his friends were erudites; they were not describing their own perceptions, they were elaborating upon literary texts coming from different centuries. Can one say that they were considering cases of poetic invention — where, by a provocative use of language, fresh and uncommon impressions are vividly depicted? If that were the case, we would expect from them more excitation, more marvel, more appreciation for these stylistic *tours de force*. On the contrary, they propose all these cases as examples of the most correct and precise use of language.

Thus the puzzle we are faced with is neither a psychological nor an aesthetic one: it is a cultural one, and as such it is filtered through

BoTSL#11 2016 JUN 16 12:25 PM

a linguistic system. We are dealing with verbal language insofar as it conveys notions about visual experiences, and we must, then, understand how verbal language makes the non-verbal experience recognizable, speakable, and effable.

To solve Aulus Gellius's puzzle, we must pass through the semiotic structure of language. In fact, color blindness itself represents a social puzzle, difficult both to solve and detect, for linguistic reasons. Let me quote this important passage form Arthur Linksz, which is later commented upon by Marshall Sahlins:

To suppose color terms merely name differences suggested by the visible spectrum, their function being to articulate realities necessarily and already known as such is something like the idea that genealogical relations comprise a DE FACTO grid of "kinship types," inevitably taken in this significance by all societies, which differ merely in the way they classify (cope with) such universal facts of "relationship." The point, however, in color as in kinship, is that the terms stand in meaningful relations with other terms, and it is by the relations between terms within the global system that the character of objective reference is sedimented. Moreover, the concrete attributes thus singled out by the semantic differentiation of terms then function also as SIGNIFIERS of social relations, not simply as the SIGNIFIEDS of the terms. In the event, it is not even necessary that those who participate in a given natural order have the same substantive experience of the object, so long as they are capable of making some kind of sensory distinction at the semiotically pertinent boundaries. Hence the cultural facility of color blinds, functioning on differences in brightness — in a world that everyone else sees as differentiated by hue. Red-and-green color blind people talk of reds and greens and all shades of it [*sic*] using the same words most of us assign to objects of a certain color. They think and talk and act in terms of "object color" and "color constancy" as do the rest of us. They call leaves green, roses red. Variations in saturation and brilliance of their yellow gives [*sic*] them an amazing variety of impressions. While we learn to rely on differences of hue, their minds get trained in evaluating brilliance. Most of the red-and-green blind do not know of their defect and think we see things in the same shades

they do. They have no reason for sensing any conflict. If there is an argument, they find US fussy, not THEMSELVES defective. They heard us call the leaves green and whatever shade leaves have for them they call green. People of average intelligence never stop to analyze their sensations. They are much too busy looking for what these sensations mean.

Commenting on this passage in his beautiful essay on "Colors and Cultures," Sahlins not only insists on the thesis that color is a cultural matter, but remarks that every test of color discrimination is rooted in a sort of referential fallacy. Psychologists frequently assume that classifications of colors and utterance of color names are linked to the representation of an actual experience; they assume that color terms in the first instance denote the immanent properties of a sensation. Therefore, many tests are contaminated by this confusion between MEANING and REFERENCE. When one utters a color term one is not directly pointing to a state of the world (process of reference), but, on the contrary, one is connecting or correlating that term with a cultural unit or concept. The utterance of the term is determined, obviously, by a given sensation, but the transformation of the sensory stimuli into a percept is in some way determined by the semiotic relationship between the linguistic expression and the meaning or CONTENT culturally correlated to it.

Our problem, to quote Sahlins again, is "how then to reconcile these two undeniable yet opposed understandings: color distinctions are naturally based, albeit that natural distinctions are culturally constituted? The dilemma can only be solved by reading from the cultural meaning of color to the empirical tests of discrimination, rather than the other way around."

. . .

It has been said that color discrimination, under laboratory conditions, is probably the same for all peoples no matter what language they speak, though psychologists also suggest that there is not only an ontogenetic but also a phylogenetic increase in discriminatory competence.

BoTSL#11 2016 JUN 16 12:25 PM

The Optical Society of America classifies a range of between 7.5 and 10 million colors which can theoretically be discriminated.

A trained artist can discriminate and name a great many hues, which the pigment industry supplies and indicates with numbers, to indicate an immense variety of colors easily discriminated in the industry. But the Famsworth-Munsell test, which includes 100 hues, demonstrates that the average discrimination rate is highly unsatisfactory. Not only do the majority of subjects have no linguistic means with which to categorize these 100 hues, but approximately 68 percent of the population (excluding color defectives) make a total error score of between 20 and 100 on the first test, which involves rearranging these hues on a continuous gradation scale. Cases of superior discrimination (only 16 percent) scored from zero to 16. The largest collection of English color names runs to over 3000 entries (Maerz and Paul), but only eight of these commonly occur (Thorndike and Lorge).

Thus average chromatic competence is better represented by the seven colors of the rainbow [...] This segmentation does seem to correspond to our common experience, though it was not the experience of Latin speakers, if indeed it is true that they did not clearly distinguish between green and blue. It seems that Russian speakers segment the range of wavelengths we call "blue" into different portions, *goluboj* and *sinij*. Hindus consider red and orange a unified pertinent unit. And against the 3000 hues that, according to David Katz, the Maori of New Zealand recognize and name by 3000 different terms, there are, according to Howard Conklin, the Hanunóo of the Philippines, with a peculiar opposition between a public restricted code and more or less individual, elaborated ones:

Color distinctions in Hanunóo are made at two levels of contrast. The first, higher, more general level consists of an all-inclusive coordinate, four-way classification which lies at the core of the color system. The four categories are mutually exclusive in contrastive contexts, but may overlap slightly in absolute (i.e. spectrally) or in other measurable terms. The second level, including several sub levels, consists of hundreds of specific color categories, many of which overlap and

interdigitate. Terminologically, there is "unanimous agreement" [...] on the designations for the four Level 1 categories, but considerable lack of unanimity, with a few explainable exceptions, in the use of terms of Level II.

Let us disregard Level II, which seems a case of many elaborated codes differing from males to females and even from individual to individual. Let us consider the various formats of Level I as idiolectal and quasi-professional codes.

The three-dimensional color solid is divided by this Level I categorization into four unequal parts; the largest is *mabi:ru*, the smallest *malatuy*. While boundaries separating these categories cannot be set in absolute terms, the focal points (differing slightly in size, themselves) within the four sections, can be limited more or less to black, white, orange-red and leaf-green respectively. In general terms, *mabi:ru* includes the range usually covered in English by black, violet, indigo, blue, dark green, grey, and deep shades of other colors and mixtures; *malagti*, white and very light tints of other colors and mixtures; *marara*, maroon, red, orange, yellow, and mixtures in which these qualities are seen to predominate; *malatuy*, light green and mixtures of green, yellow, and light brown. All color terms can be reduced to one of these four, but none of the four is reducible. This does not mean that other color terms are synonyms, but that they designate color categories of greater specification within four recognized color realms.

Hanunóo segmentation follows our basic English paradigm only to a limited extent, since it involves black, white and grey in different ways. What is important for our present study is that the pertinentization of the spectrum depends on symbolic, i.e., cultural principles. Note that these cultural pertinentizations are produced because of practical purposes, according to the material needs of the Hanunóo community.

The basis of this Level I classification appears to have certain correlates beyond what is usually considered the range of chromatic differentiation, and which are associated with linguistic phenomena in the external environment.

First, there is the opposition between light and dark, obvious in the contrast of ranges of meaning of *lagti* and *biru*. Second, there is an opposition between dryness or desiccation and wetness or freshness (succulence) in visible components of the natural environment which are reflected in the terms *rara* and *latuy* respectively. This distinction is of particular significance in terms of plant life. Almost all living plant types possess some fresh, succulent and often "greenish" parts. To eat any kind of raw, uncooked food, particularly fresh fruit or vegetables, is known as *sag-laty-un* (*latuy*). A shiny, wet, brown-colored section of newly cut bamboo is *malatuy* not *marara*. Dried-out or matured plant material such as certain kinds of yellowed bamboo or hardened kernels of mature or parched corn are *marara*. To become desiccated, to lose all moisture, is known as *mamara* ‹ *para* "desiccation." A third opposition, dividing the two already suggested, is that of deep, unfading, indelible, and hence often more desired material as against pale, weak, faded, bleached, or "colorless" substance, a distinction contrasting *mabi:ru* and *marara* with *malagti* and *malatuy*.

We have then a system of cultural units (lightness, darkness, wetness, dryness) which are expressed by four fundamental colors; these colors are, in turn, four cultural units expressed by four linguistic terms. This double organization of the content depends, as does any such organization, on a system of disjunctions: it represents a structure. Just as a "mouse," within a semantic space concerning rodents, is everything which is not a "rat," and vice versa, so the pertinent content space of *malatuy* is determined by its northern borderline beyond which there is *marara*, and its southern borderline, below which there is *mabi:ru*.

Geopolitically speaking, Holland is a negative concept: it is the class of all points adjacent to, but not, Germany, Belgium or the North Sea. The same principle holds for all other geopolitical expressions such as Germany or Italy or the Soviet Union. In any system, whether geopolitical or chromatic or lexical, units are defined not in themselves but in terms of opposition and position in relation to other units. There can be no units without a system. The different ways in which cultures make the continuum of colors pertinent, thereby categorizing and

identifying hues or chromatic units, correspond to different content systems. This semiotic phenomenon is not independent of perception and discrimination ability; it interacts with these phenomena and frequently overwhelms them.

. . .

At this point we can probably tackle Aulua Gellius's puzzle. Rome, in the second century A.D., was a very crowded crossroads of many cultures. The Empire controlled Europe from Spain to the Rhine, from England to North Africa and the Middle East. All these cultures, with their own chromatic sensitivities, were present in the Roman crucible. Diachronically speaking, Aulus Gellius was trying to put together the codes of at least two centuries of Latin literature and, synchronically speaking, the codes of different non-Latin cultures. Gellius must have been considering diverse and possibly contrasting cultural segmentations of the chromatic field. This would explain the contradictions in his analysis and the chromatic uneasiness felt by the modern reader. His color-show is not a coherent one: we seem to be watching a flickering TV screen, with something wrong in the electronic circuits, where tints mix up and the same face shifts, in the space of a few seconds, from yellow to orange or green. Determined by his cultural information, Gellius cannot trust to his personal perceptions, if any, and appears eager to see gold as red as fire, and saffron as yellow as the greenish shade of a blue horse.

*