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COLOUMN

Communications and Comments

Sailing on the wine-like sea towards foreign people, I finally put in harbor with ships and mates.

Νυν δ' ὧδε ξὺν νηὶ κατήλυθον ἡδ' ἑτάροισιν

πλέων ἐπὶ οἴνοπα πόντον ἐπ' ἀλλοθροόυς ἀνθρώπους

[Omero, Odyssey, II, v. 183,
Translated by M. Lecca]

In the last number of this column, we have discussed about the meaning of color perception. We have shown that color perception is a concept difficult to be defined and explained. The main difficulty in giving a unique, simple definition of color perception is due to the fact that there is no agreement about the relationship between sensation, perception, and cognition.
In a phenomenological frame of reference. perception is independent from cognition, although sometimes it can be affected by it (that is by past experience, memory, hypotheses, interpretations, and so on). The laws of perception are basically the same in humans and in animals.
In a cognitive frame of reference on the contrary color perception depends on high level, cognitive features, that are deeply influenced by cultural heritage and societal issues; the law of perception are essentially different in humans and in animals.
As a consequence, theories about color perception may vary from time to time and from person to person.

Basically, our perceptual system strongly couples colours and emotions, and these in turn can be influenced by culture. Let's think of many expressions, like *"red passion"*, *"vie en rose"*, *"blue blood"*, *"black Friday"*, where colours clearly denote an emotion or its strength or a particular condition or situation. Since societal, historical, cultural features vary in time, colour connotations also change.

An interesting example for this is given by the recent web discussion about the colour names and colour perception by ancient Greeks [1][2][3]. Among the many web-pages dedicated to this topic, that attracted much attention, here we mention this one:
https://aeon.co/essays/can-we-hope-to-understand-how-the-greeks-saw-their-world

In this page, Professor Maria Michela Sassi, expert of ancient philosophy and ancient thought from pre-Socratic to Aristo telic ages at Pisa University (Italy), reports a short analysis of the use and of the meaning of the colour terms in the ancient Greek literature, with particular attention to some parts from the well-known poem Odyssey by Homer. Her work starts from the observation that *"The ancient Greek experience of colour does not seem to match our own."* For instance, in Odyssey, the colour term blue is never used to describe sky and sea. In particular, in many parts of Odyssey, the sea is pansy-like, wine-like or purple, while sky is like iron or bronze (see Figure 1). In addition, the colour term chloros denotes both green (like grass) and yellowish tones. Xanthos indicates yellow and red as well.
The description of the object colours provided by the ancient Greek is very surprising for us, who use the expressions blue sky and blue sea, green plants and grass, and distinguish the orange-reddish colour of the fire and of the amber from the yellow of the sun.

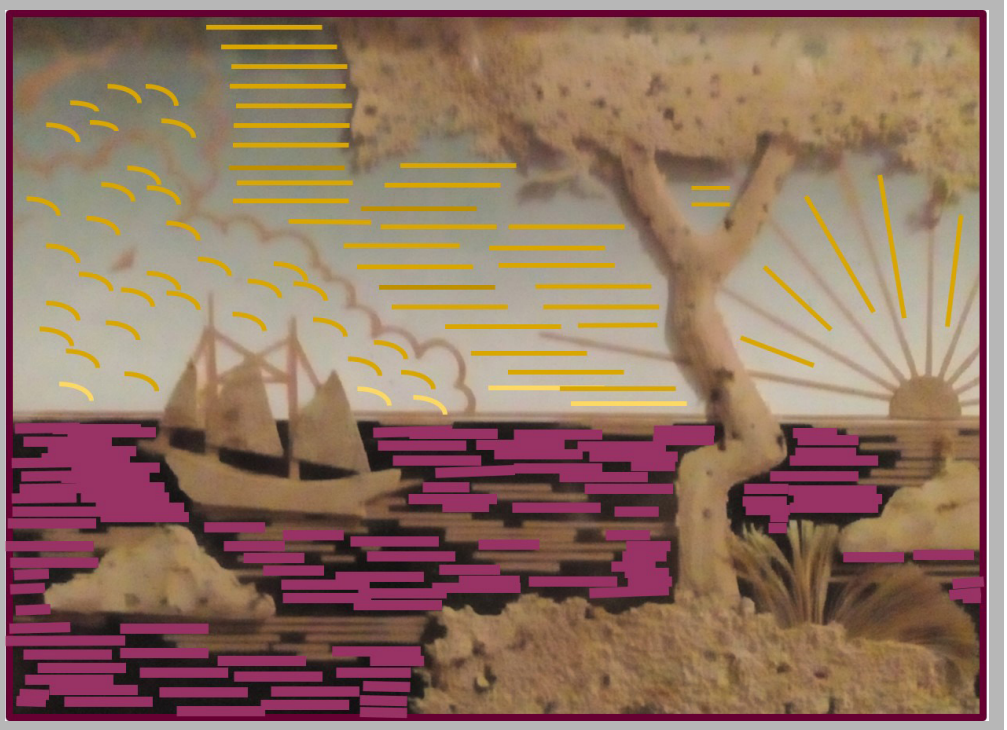

Figure 1: Were sea and sky really wine- and bronze-like in the ancient Greece?

The use of colour terms can be affected by many factors: direct perception, linguistic style, stereotypes, poetic licence. Many scholars in the last two centuries defined the Greek use of colour terms a peculiar oddness, and many of them imputed the colour linguistic poverty of the Greeks to physical problems in capturing and processing the light wavebands, i.e. to colour blindness. Today, a theory about this is that the Greek colour terminology on the one side depends on perceptual experience, which was *'normal'* (not *'defective'*), but on the other side it can adapt to poetic demands, that is the colour terms are used and interpreted according the cultural Greek style of expressing poetry.

The Greek colour oddness is thus the Greek colour culture. As Professor Sassi said, Greeks perceive blue as we do, but they were not interested in using it to describe the colour of the sky and of the sea , that were described as yellowish and wine-like upon their culture, psychological feeling or expressive needs. Sky was iron or bronze-like because it was supposed to be like an up side down bowl covering the Earth [3]. In many parts of Odyssey, the sea is called purple. The word purple comes from the Greek word porphyria (πορφύρα), which means seething, troubled [2] and refers to the procedure to produce the colorant purpura in the ancient world. In Homer's poetry, it may be considered a way to describe the evil sea that brings Ulysses from one coast to another, far from his family and home.

This last observation leads us to consider the problem of associating colour linguistic terms to perceived colours on the one side, and to stimulus colours on the other side. Different theories has been proposed and many experiments have been designed to disentangle the relationship between colour stimulus and colour names. In his commentary [4], Rolf G. Kuehni asserts that the first reference of colour terms is often made to colours understood as *"color stimuli"* or *"objective colors"*, while, on the basis of the fundamental distinction between perceived and stimulus colours, colour terms should primarily refer to the 'perceived' colours. Moreover, verbal colour descriptions should not be made in terms of physical properties (it would involve the stimulus error), as often happens. This error is often made because of the difficulty of verbally describing private perceptual experiences, which on the other side can be inter-subjectively communicated by verbal language despite the difficulty.

Figure 2 - On right: Reproduction by Michela Lecca of "Study of a Figure Outdoors: Woman with a Parasol, facing left" by Claude Monet (1886. Musée d'Orsay). On Left: here, the Woman modern dressed, with metallic and glittered cloths. How do the new materials change the color sensation and the color perception?

In [5]. Liliana Albertazzi and Osvaldo Da Pos describe a set of experiments to identify the references of colour categories in Italian language. In these experiments, a number of volunteers with different age and gender, were asked to produce through special software digital colours on a screen corresponding to a set of Italian colour names (Giallo/Yellow, Rosso/Verde, Blu/Blue, Arancione/Orange, Viola/Bluish Purple, Lime/Lime, Carota/Carrot, and so on ... a tentative English translation in italics). The assumption was that there is a special connection between perceived colours and corresponding colour stimuli, so that the colour perceived by the participant who produced the digital colour is about the same colour other people perceive when looking at that colour stimulus. The research showed that most colour terms among those used in the experiments refer to specific perceived colours, since the *'corresponding'* colour stimuli are significantly different. Moreover, other colour terms on the contrary refer to the same set of perceived colours, because the difference between the sets of colour stimuli is not statistically significant: the conclusion is that these terms are synonyms.

However, in [6], the same authors point out that the perceptual categorization of colours can be *"implicit"* that is not verbally objectified: this means that grouping the colours by visual perception, i.e. ordering colours by their visual similarities, is independent on linguistic categories and provides a stable and, let's say, universal way to classify colours.

As already discussed in the previous number of this column, colour perception is something more than colour sensation, as it entails a number of interactions between different stimulated areas of the retina; moreover it can be also strongly influenced by previous experience and cultural heritage. This is an important cue to understand the colour names and the description of the object colours in the Greek literature: it explains once again the wine-like and iron-like colours of sea and sky. The ancient Greek literature is an interesting example of how the cultural features (e.g. language, material production, science conviction, ...) influence colour naming and vice-versa. Therefore, the lesson is that while colour sensation (i.e., colour seen in isolation, like through a hole on a uniform background) has an universal aspect, colour naming does not. In addition, colour perception depends on a complex set of spatial and temporal interactions which can be quite different

case by case: thus, color perception is not immutable, like the quintessence of the Aristotelic celestial spheres, but it is an extremely varying concept [7][8].
The historical problem of colour naming and the meaning of colours has been treated many years ago also by some members of the Colour Group, see [9], but it would be interesting proposing a novel discussion about this topics, also by considering how Internet and the novel, recent technologies have changed our colour culture. Another important issue is to understand how the new techniques for colour production and the invention of new materials affect colour perception [10] [11], by creating new colour effects or variations in the modes of appearance, e.g. metallic tints, glittered colours, plastic reflections, and so on (have a look at Figure 2).
Finally, we remind that these topics will be soon discussed during the Munsell Centennial Color Symposium, that will be held in Boston (MA) on June 10-15, 2018, and organized by the Inter-Society Color Council and by the International Colour Association [12].

ACKNOWLEDGEMENTS:

Michela Lecca expresses her gratitude to Luigi Cordisco, which has provided the starting point for this discussion, i.e. the link to the work of Prof. Sassi.

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