

Why are flowers beautiful?

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My question is the eye-catching centerpiece of each table in this room. Why are flowers beautiful? My goal is not to specify the contrivances such as pigments through which the beauty is expressed. Rather, I want to explore for the deeper cause.

Functionally, flowers are vexillar or petalled structures to attract the attention of pollinating insects. Flowers select for efficiency in a tight loop with the choices of the insects, such as bees and hoverflies, and birds, such as hummingbirds. Every mutation that will not meet the efficiency requirement will not be fixed and will fade out. Since the appearance of flowers about 130 million years ago, nature has tested countless possible configurations of flowers and insects and birds. Finally, a flower can be considered as a transcodification of the physics, physiology, neurology, and, crucially, the value system of the insect or bird.

White-winged doves pollinate the saguaro cactus. Ruby-throated hummingbirds pollinate blueberries and azaleas. Beetles pollinate magnolia and pond lilies. Bees pollinate peaches. Butterflies pollinate many bright flowers while moths are attracted to sweet flowers that open in late afternoon or at night, and are typically white or pale. Species of syrphids or hoverflies pollinate many hydrangeas, for example the

oakleaf or *quercifolia* which many of you probably have in your gardens.

The mystery is why the hydrangea is beautiful also to you and to me, biological objects far on the tree of life from the hoverfly. Because varieties of flowers differ so greatly in form, color, scent, and other characteristics, and species of insects and birds differ comparably, the unifying concept must be abstract and general. Understanding that my eyes or nose may have some of the same physics and chemistry as the sensory organs of an insect is not hard to understand. The startling question is why my *value system* coincides with that of the pollinating insect. Because my appreciation of flowers is intuitive and emotional, the must coincidence must lie in the area of aesthetics. This coincidence leads to a suspicion of philosophical importance, that aesthetics must be somehow objective, a view quite counter to much commentary today.

The objectivity implies a process of mutation and selection, in view of a final objective, ultimately survival. Heuristically, it should be a selective filter in information flow. The generality suggests it operates at a deep level.

Immediately and correctly, we think of sex. Biologists intensely debate the advantages of sex but its entrenchment in most of the biological realm signals advantages. Even unicellular organisms have developed tricks to transfer DNA with one another.

Consider sex as a kind of language spoken across a species, where genetic experiences from one reproductive line can be transferred into another.

The key point is that information gathering about favorable mutations becomes an affair for the entire population of the species, which increases enormously the rate at which a sexed species can evolve,

compared to one where information transfers only vertically, from mother to daughter, so to say.

Furthermore, bits and pieces of the information can be scattered around the species, creating a genetic pool, where the information stays fluid for recombination. This keeps the species flexible and resilient on relatively short time scales, even when generation times are years and decades.

The swapping of information I have described so far is random or stochastic. Could the swapping be improved to avoid the randomness? At one time or another all of us have seen the elaborate mating rituals conducted by animals from peacocks to deer.

To give an example from the labs at The Rockefeller University, the male fruit fly starts courting the female by standing eye to eye in front of her. The female then swings right and left, swiftly and aperiodically, and the male tries to follow. The male is accepted as a mate if it can dance with the star. The female has checked the neuromuscular fitness of the partner as a criterion of choice. Perhaps only one of many.

We can say that a value or value tag is attached to the mating partner connected with the probability of success of future offspring in the struggle for life. Observing the pervasiveness of mating dances, the criteria must operate, again, at an abstract and general level. By analogy with the choice of partners in humans, we may say an aesthetic level.

If a mechanism of choice, even simple and crude, gives a selective advantage, even a small one, it will become fixed. And it will expand progressively and improve, as any other positive character. The brain makes the choice but we may call it instinctive information processing.

The instinctive program must be subtle to match the great complexity of the external world, and true. The way that quality is insured is simple. Signals are sent out and come back, filtered by offspring selection,

insuring a progressive tuning between the signal generator and the filter. The filter is the external world. The generator progressively acquires a knowledge of universals, actualized in the form of instinctive criteria of choice, that is, value tags.

Tools tends to expand their niches. The hand so swift in grasping jungle branches can grasp a violin. A natural way to expand the use of value tags is to apply them to objects other than potential mates.

A curious observation is that when certain dull flowers are photographed in the regions of the spectral sensitivity of the eyes of the pollinating insects, the images show beautiful and stimulating patterns.

Furthermore, plants such as grasses and many species of trees that rely on the wind to carry their pollen to other plants tend not to have colorful flowers. Instead, their abundant airborne pollen aggravates human allergies.

At this point we can return to square one and observe that the biology and chemistry of an insect resembles ours, especially in basics, such as DNA. And we float in the same physics. So, an intersection of the value system for visual phenomena should not be shocking. Aesthetics and physics become much the same.

Every tool, as I said, tries to expand its niche. Our nimble hands only rarely hold branches nowadays. Instead we hold smart phones, which themselves expand their niches. A value system can be precious outside the original area of mate selection. For example, to assess what is right and wrong at deep levels.

To reach a conclusion, consider that beauty tends to release stress and anxiety. Following our logic, the reason is that beauty reassures us that we fit in the world. My answer to our question is that flowers are beautiful to us so that we know we belong here.