# Needing Aesthetics can explain birds' beauty preferences

*The core idea of Charles Darwin's theory of sexual selection is beauty preference selection. It was conceived as a companion to natural selection to help explain birds' colourful plumage and behaviours for beauty. However, British naturalist Alfred Russell Wallace strongly objected to this idea, saying it adds another principle to the principle of natural selection and hence betrays Darwinism. Chenguang Lu, Associate Professor at Changsha University, suggests that male birds' beautiful features are based on mimicry of essential food resources and environments. First, nature or needing relationships selected female birds' beauty preferences (or tastes), which later selected male birds' beautiful features. This completes the link between beauty preference selection and natural selection and can explain the diversity of colours, shapes, and behaviours used in mating rituals.*

Darwin's (1859) original theory of natural selection states that certain characteristics were selected by nature because they enabled an individual to better survive in a particular environment. According to this theory, we can explain most birds' appearances by flight performance, species isolation, camouflage, and threat. However, about 20% of birds' appearances cannot be explained by this theory. One example is the beautiful but cumbersome tail of a male Peacock: surely, this tail was more of a hindrance than a help to survival if a male was suddenly ambushed by a tiger in a jungle.

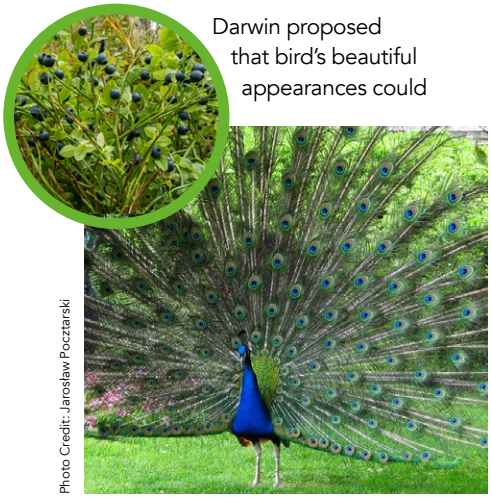

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**Figure 1:** The Peacock's tail looks similar to a blueberry bush.

Darwin proposed that bird's beautiful appearances could be better explained by the theory of 'sexual selection', whereby male birds' characteristics were selected by female birds' beauty preferences or tastes (Darwin, 1871). This theory is also referred to as the theory of beauty preference selection. Under this theory, the male Peacock's unpractical tail could still make sense if it meant a male was more often chosen as a partner by Peahens. However, Darwin's battle companion, Alfred Russell Wallace (1871, 1897), insisted that natural selection is the sole principle underlying birds' appearance. He said that accepting beauty preferences selection was to add another principle to the principle of natural selection and hence, this would betray Darwinism. He explained that male fitness, not beauty, attracts female birds. This fundamental difference in perspective formed a long-standing debate between Darwin, Wallace, and their supporters (Cronin, 1991). Other researchers have developed theories based on "arm-race" or health to explain male birds' beauty (Cronin, 1991), but were not successful.

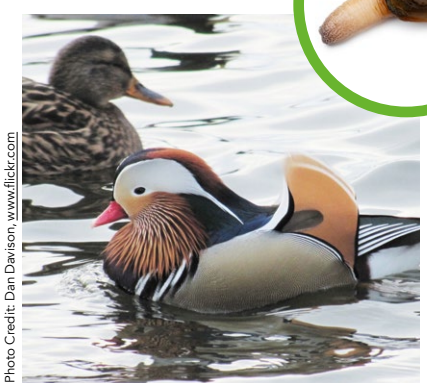

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**Figure 2:** The Mandarin Duck's tail shape and colour resembles the soft-shell clam.

While decades of research into sexual selection have demonstrated how traits continue to be sexually selected over time, none of the current mechanisms can explain the origins of the preferences for specific traits, nor do they explain the staggering diversity of features that we see in the natural world.

## THE MALE PEACOCK DISPLAYS BEAUTY BY MIMICKING A BLUEBERRY TREE

Birds' pre-existing sensory preferences, biases, or tastes are often invoked to explain the origin of male features involved in mating success. Chenguang Lu suggests that the morphology and colour of the 'eyes' on Peacocks' tails (*fig. 1*) have their roots in prized food items, such as blueberries (Lu, 1987, 2003, 2018). First, the needing relationship selected the female preference, with which Peahens were more motivated to look for berries. Later, this preference selected Peacocks' 'eyes'. Over time, the males produce 'tails with blueberries' and pass the gene to their sons.

Lu is not alone. Merle Jacobs (1998) also found that the Peacock mimics the berry tree; F. Helen Rodd et al. (2002) found that guppies mimic the fruit. The latter's discovery was highly praised by a paper in Science (Virginia Morell, 2002).

Lu's explanation of the origin of beauty preferences is based on his Needing

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**Figure 3:** The male Wood Duck has clam-like patterns on its wings.

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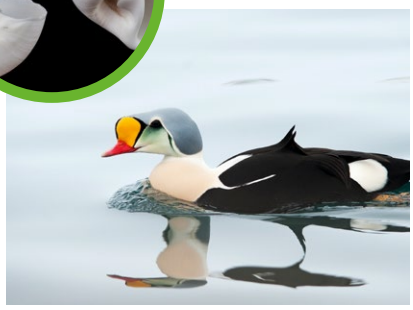

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**Figure 4:** The male King Eider's head resembles the shape of moon snails.

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**Figure 5:** The Tufted Puffin's beak resembles a prawn's body.

**Figure 6:** The Sunbittern displays a plumage pattern reminiscent of butterflies or moths.

Photo Credit: Photo by kind permission of Tomas Grim (https://ebird.org/).

**Figure 7:** The Bee-eater's yellow and brown plumage is reminiscent of a bee.

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**Figure 8:** The Groundscraper Thrush has an 'ant-colony-like' pattern on its belly.

Photo Credit: Yathin S Krishnappa

Aesthetics theory (Lu, 2003), a new version of Utilitarian Aesthetics. According to Needing Aesthetics, the significance of the sense of beauty is to inspire people or animals to approach things essential to survival, such as good food, shelter, or water. Approaching is the path to survival; the sense of beauty impels us to treat the path as the destination. Needing relationships selected beauty preferences; beauty preferences reflect shortage instead of utility. Lu provides many examples as the key to resolving the unfinished debate over natural selection and beauty preference selection, at least in birds.

***The core idea of Darwin's theory of sexual selection is beauty preference selection. But where did birds' initial beauty preferences come from?***

## HOW BIRDS MIMIC FOOD RESOURCES THEY LIKE

Lu has been documenting examples that reveal that birds' beauty preferences reflect needing relationships. Examples include the male Mandarin Duck (*fig. 2*), whose tail shape and colour closely resemble a clapper – a type of aquatic clam that is one of its preferred food items. Another is the male Wood Duck (*fig. 3*), which has clam-like patterns on its wings and aquatic snail-like patterns on its head. Similarly, the male King Eider's head resembles the shape of the moon snails (*fig. 4*) that it likes to consume. Another more subtle example is the Tufted Puffin (*fig. 5*), which has a beak that resembles a prawn's body. This prawn inhabits deep water below 60 meters along the Alaskan and British Columbian coasts. The Tufted Puffin is the sole bird that lives in this area and can dive into this depth.

Lu suggests that many birds mimic the patterns, colours, and shapes of their insect prey. For example, the male Sunbittern (*fig. 6*) displays a whole-body plumage pattern reminiscent of colourful butterflies and moths that it likes to catch, while the Bee-eater (*fig. 7*) displays a striking yellow sluff and black and brown colours that the bee has. The Groundscraper Thrush (*fig. 8*), who likes eating ants, has a distinctive 'ant-colony-like' pattern consisting of black dots on its belly.

Other examples arise in bird species that feed on nectar or honey, such as Anna's hummingbird (*fig. 9*), which has tiny crimson 'flowers' on the side of its head, similar to the flowers it seeks.

Lu also found some counterexamples against the previously mentioned health explanation. For example, the Macaw's faces have bare skin patches (*fig. 10*) that resemble clay and look ugly to humans. Its patches look beautiful to Macaws because they like to lick clay to eliminate toxin from certain leaves they have eaten. The male King Vulture (*fig. 11*) displays torn fur and uncovered flesh on the neck and yellow gut on the nose because King Vultures like to feed on dead bodies of large animals. The Red-Headed Vulture, which also feeds on dead bodies, displays similar features, not only on its head and neck but also on its legs.

## HOW BIRDS MIMIC ENVIRONMENTS THEY LIKE

Furthermore, Lu suggests that other resources, especially environments linked to food, safety, and so on, can also provide the sensory bias behind female

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**Figure 9:** Anna's hummingbird has tiny crimson 'flowers' on the side of its head.

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**Figure 10:** The Macaw's faces have bare skin patches.

Photo Credit: Olaf Oliviero Riemer

**Figure 11:** The male King Vultures display yellow gut on the nose.

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**Figure 12:** The Green-Winged Teal has green patterns on its plumage.

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**Figure 13:** The Baikal Teal's face has island-like patterns on it.

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**Figure 14:** The Red-breasted Goose's plumage patterns look like islands.

preferences. For example, many species of ducks have blue or green patterns on their plumage that mimic deep water, wavy patterns mimicking shallow water, and brown patterns mimicking wetland. The Green-Winged Teal has each of these patterns (*fig. 12*). The Baikal Teal's face looks like an aerial photo with island-like patterns (*fig. 13*). This duck breeds around Lake Baikal, Russia, in summer and spends its winters in East Asia, often seeking out the Yangtze river basin; sand islands in rivers are their most favourite spots since they provide rich food and safety from predators. Similarly, the Red-breasted Goose (*fig. 14*) reflects the island on the river it migrates to for breeding each spring.

## DIFFICULT EXAMPLES

There are also some birds with strange appearances and behaviours which are hard to explain with needing relationships so far. Why does the male Warship Bird display a big red airbag? Why does the male Sage Grouse have a pair of egg-like bubbles on its breast? Why do many Birds of Paradise dance in the ways they do? Explanations are still difficult. However, Lu's research experience shows that after more observations and imagination, difficult examples can be reduced gradually. For example, the Mallard has river-like patterns on its wings, which reveals that it likes rivers; but why does the male Mallard have black-cloud-like patterns on its wings (*fig. 15*)? After long observations, Lu believes that this pattern simulates the inverted image of a mountain on a lake because lakes, besides mountains, are their favourite habitats. What is the connection between the strange head-swinging behaviour of the male Riflebird and its essential need (*fig. 16*)? Lu suggests that its dancing mimics a river in a valley. He believes this bird must like flying along the river in the valley to find better surroundings. Since the river is winding, the flying bird can see the end of the river sway left and right. By searching, we can find that this bird often inhabits gallery forests.

***Birds' appreciation for beauty appears to have evolved from needs for survival, such as good food, shelter, or water.***

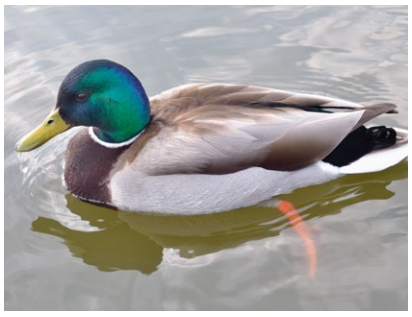

**Figure 15:** The Mallard has black cloud-like patterns on its wings.

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**Figure 16:** The magnificent riflebird and its signature head-swinging.

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It can be expected that we can explain more birds' beauty preferences by needing relationships after more observations and imagination.

# Behind the Research

## Chenguang Lu

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## Research Objectives

Chenguang Lu attempts to explain the colourful appearances of birds for reconciling the contradiction between Darwin and Wallace.

## Detail

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**Bio**
Chenguang Lu graduated from Nanjing University of Aeronautics and Astronautics with a Bachelor's degree and was trained at Niagara College and Beijing Normal University as a visiting scholar. Lu has published six books and many articles about colour vision, aesthetics, evolution, semantic information theory, machine learning, portfolio, and philosophy.

**Collaborators**
Lu thanks his classmate Yuzhang Diao and Professor Yew-Kwang Ng, a renowned economist, for their encouragement and help. He thanks the Dalian Natural History Museum whose previous caption about the Peacock inspired him. He also thanks the authors who granted permissions for their images.

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## Personal Response

***What is the main difference between Needing Aesthetics and Utilitarian Aesthetics?***

Needing Aesthetics stresses that lack, dissatisfaction, or difference between idea and reality instead of utility cultivates the sense of beauty. Using Needing Aesthetics, we can easily explain why in the eyes of prisoners, the mountains and forests are very beautiful; in the eyes of tramps, others' comfortable homes are very beautiful; and in the eyes of a wishful thinking man, the lady he loves is very beautiful. Using Utilitarian Aesthetics, we cannot explain the above phenomena and why many useful objects that have satisfied us are not beautiful.

***How do you use Needing Aesthetics to explain human aesthetic phenomena? What beautiful features in humans do you think are based on needing relationships?***

Needing relationships also determine human aesthetic tastes. For example, in the eyes of people who are often hungry, well-baked bread is very beautiful; in the eyes of people living in era of war and chaos, tense cities, or polluted industrial environments, quiet natural environments are very beautiful. Human beautiful features are those manifesting good qualities, including youth, health, kindness, and intelligence. However, humans do not mimic objects they like. The first reason is that humans have no feathers, which display colours not only by pigments but also by microstructures, and hence the cost is too high to mimic. The second reason is that humans have rich and unfixed needing objects. The third reason is that humans are rational so that the sense of beauty is affected more by contents instead of forms.

***Why do male birds display more beauty whereas in humans, women display more beauty?***

It is not certain. Both male and female Tufted Puffins have a prawn-like beak that is equally transferred to their sons and daughters. Both male and female Pheasant-tailed Jacanas have a pattern on their necks that seemly mimics the lotus leaf, but the female's is more vivid than the male's because the male is responsible for brooding. In this case, the male's preference selected the female appearance. Women often pay more attention to dress up while male birds mimic more. There seems to be a rule that the gender that – historically – contributed less to the family for survival competition will display more beauty.