

## Roundtable:

# The future of culture in more-than-human worlds of being

## Non-human animal cultures, co-cultures and conservation

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**Abstract:** Animal culture involves the transmission of behaviours through social learning, which plays a crucial role in species' survival and adaptability to changing environments. Co-cultures, which describe the mutual cultural evolution between species, underscore the importance of interspecies interactions in maintaining ecological balance and resilience. The loss of these cultural practices can lead to a decline in population viability, reduced genetic diversity, and destabilised ecosystems, ultimately impacting the services these ecosystems provide to human health and well-being. The preservation of cultural traits is essential for maintaining biodiversity, ensuring species' adaptive capacities, and supporting the overall health of ecosystems, which are critical for the survival of both non-human animals and humans. Integrating the conservation of animal cultures and co-cultures into broader conservation and One Health strategies is necessary to protect the delicate balance of life on Earth and ensure the well-being of all species.



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## **Non-human Animal Culture: Understanding the Phenomenon**

### **What is Animal Culture?**

Animal culture refers to the behaviours, practices, and traditions that are learned socially within a species and passed down through generations. These behaviours are not genetically inherited but rather acquired through social learning, where individuals observe and imitate others within their community. This concept challenges the long-held belief that culture is unique to humans and has profound implications for understanding animal behaviour, evolution, and conservation (Laland and Janik 2006; Whiten and Schaik 2007; Duboscq et al. 2016; Whiten et al. 2017; Whiten 2021).

The recognition of animal culture means acknowledging that animals, much like humans, have the capacity to develop and transmit traditions, techniques, and social norms within their groups. These cultural traits can vary significantly between different populations of the same species, much like human cultures vary across regions and societies. For example, some populations of chimpanzees (*Pan troglodytes*) use sticks to fish for termites, while others in different regions use stones to crack nuts – both practices being culturally transmitted behaviours that are not observed in all chimpanzee groups (Whiten et al. 1999, 2005, 2007; Biro et al. 2006; Matsuzawa 2017).

Animal culture extends across various domains, including foraging techniques, tool use, vocal communication, social customs, and even mating preferences. The study of animal culture is not just about cataloguing behaviours but understanding how these behaviours evolve, spread, and impact the survival and social structures of animal communities.

### **The Birth of Animal Culture With Primatology**

The concept of animal culture began to take shape in the mid-20th century, particularly through the field of primatology – the study of primates, including monkeys and apes (Matsuzawa and McGrew 2008; Matsuzawa 2015; Bonnefoy et al. 2016; Sueur 2024). Early primatologists made groundbreaking observations that challenged the assumption that culture was exclusive to humans.

One of the pivotal figures in the birth of animal culture studies was Kinji Imanishi (Matsuzawa and McGrew 2008), a Japanese ecologist and anthropologist. In 1948, Imanishi and his students from Kyoto University embarked on an expedition to Koshima Island to study Japanese macaques (*Macaca fuscata*), also known as snow monkeys (Imanishi 1957). This research was driven by a desire to understand the evolutionary origins of human society by studying these closely related primates.

During their observations, Imanishi and his team witnessed a young female macaque named Imo engaging in a novel behaviour: she began washing sweet potatoes in a stream before eating them (Kawai 1965). This behaviour, which had never been seen before, quickly spread through the troop as other macaques, particularly the younger ones, imitated Imo's actions. Over time, this potato-washing behaviour became a standard practice among the macaques on Koshima Island, marking one of the first documented examples of cultural transmission in non-human animals. This discovery was pivotal because it provided concrete evidence that animals could learn behaviours from one another and pass them down across generations, a key characteristic of culture.

Around the same time, in Africa, Jane Goodall was conducting her pioneering research on chimpanzees in Gombe Stream National Park, Tanzania. Goodall's work, which began in 1960, revolutionised our understanding of chimpanzees and their behaviours (Goodall 1986, 2010). She observed that chimpanzees used tools – a behaviour previously thought to be unique to humans. For example, chimpanzees were seen using sticks to extract termites from mounds, a practice that varied between different chimpanzee groups depending on their location. This tool use was learned socially,

with young chimpanzees observing and imitating their elders. Goodall's findings further solidified the idea that culture was not a human-only phenomenon and that other species, particularly our closest relatives, exhibited cultural behaviours (Whiten et al. 1999).

These early studies in primatology, particularly the work of Imanishi with Japanese macaques and Goodall with chimpanzees, laid the foundation for the broader recognition and study of animal culture. They demonstrated that culture could be found in non-human species and that these cultural traits could have significant implications for the survival, social structure, and evolution of animal populations.

### **Examples of Animal Cultures**

Since the pioneering work of Imanishi and Goodall, the study of animal culture has expanded to include a wide variety of species across different domains of behaviour. Animal culture is a complex and widespread phenomenon, evident in a variety of species, where behaviours are learned socially and passed down through generations. Among humpback whales, culture is reflected in their complex songs, which vary between populations and evolve over time, much like human musical trends (Garland et al. 2011; Allen et al. 2019). These songs are not only unique to specific groups but also spread rapidly as different populations adopt new versions during migration, serving as a form of communication and possibly playing a role in mating. Similarly, sperm whales exhibit cultural behaviours through their use of distinct vocal dialects, known as codas, which vary among different clans (Oliveira et al. 2016; Hersh et al. 2022; Whitehead 2024). These dialects are culturally transmitted within each clan, helping to maintain social cohesion and enabling clan members to identify and communicate with one another, thus structuring social groups and maintaining distinct population units.

In the avian world, New Caledonian crows demonstrate a remarkable example of cultural transmission through their sophisticated tool use (Hunt 1996; Rutz et al. 2018). These crows create and utilise tools, such as sticks and leaves, to extract insects from tree bark. The techniques for making and using these tools vary between populations, with young crows learning these skills by observing adults in their community, akin to how humans pass down knowledge through generations. Meerkats in southern Africa display another form of social learning where older, experienced meerkats teach younger members how to safely handle dangerous prey like scorpions. The adults initially remove the stingers from scorpions before giving them to the young meerkats, who then practise handling the prey, ensuring that these critical survival skills are transmitted across generations (Thornton and McAuliffe 2006).

Even fruitflies are capable of social learning (Battesti et al. 2015; Pasquaretta et al. 2016), leading to the establishment of persistent cultural traditions in mate choice, thereby expanding the understanding of culture to less cognitively complex species (Danchin et al. 2018). The recognition and study of animal culture have transformed our understanding of the natural world. What was once considered a uniquely human trait is now known to be a widespread phenomenon across many species. Animals demonstrate complex social learning behaviours that are passed down through generations, forming the basis of cultural traditions. These findings not only provide insights into the cognitive abilities of animals but also have significant implications for conservation, as preserving cultural diversity within species may be as important as preserving genetic diversity. As research continues to uncover new examples of animal culture, our appreciation for the rich social lives of animals deepens, offering a new perspective on the connections between humans and the rest of the animal kingdom (Sueur and Mery 2017).

## Co-Cultures: Exploring Interspecies Cultural Dynamics

The concept of 'co-culture' is an emerging framework in the study of animal behaviour and human-animal interactions (Sueur and Huffman 2024). It seeks to understand how different species, including humans and animals, can mutually influence each other's cultures through direct or indirect interactions within shared environments. Co-culture challenges the traditional view that cultures are species-specific and introduces the idea that interspecies interactions can lead to the development of shared cultural practices that evolve over time (Sueur and Huffman 2024).

### Defining Co-Culture

Co-culture is defined as the mutual cultural evolution and interaction between different species. It involves two or more populations of different species that share common spaces and engage in synchronised activities. These interactions can result in both species influencing each other's behaviours, leading to the formation of new cultural practices that are not only learned but also actively shape the cultural evolution of the other species. This concept extends beyond the idea of cultural niche construction (Laland et al. 2001; Laland and O'Brien 2011; Rendell et al. 2011), which focuses on how organisms modify their own and each other's niches. Co-culture emphasises the reciprocal and evolving behaviours that occur between species, showcasing a dynamic interplay across species boundaries (Sueur and Huffman 2024).

### Drivers of Co-Cultures

Several factors drive the formation and development of co-cultures, including interspecies learning, mixed species groups, and proximity within shared environments.

1. **Interspecies Learning:** Interspecies learning (Seppänen and Forsman 2007; Goodale et al. 2010) is a crucial mechanism in the development of co-cultures. This process involves individuals from different species observing and adopting behaviours from one another. For example, in urban environments, animals like herring gulls and ravens have been observed to mimic human behaviours, such as food choices and recognising individual humans, suggesting a high level of social cognition that allows these animals to navigate complex, human-dominated landscapes.
2. **Mixed Species Groups and Proximity:** Mixed species groups (Stensland et al. 2003), where two or more species cohabit the same environment and coordinate their activities, also play a significant role in co-culture formation. For instance, in Costa Rica's rainforests, mixed species groups of bats have been observed roosting together, indicating that their roosting choices are influenced by the presence of other bat species (Kelm et al. 2021). This interspecies proximity facilitates the exchange of information and behaviours, leading to cultural adaptations that benefit all species involved.

### Examples of Co-Cultures

Several examples illustrate the concept of co-culture in action, highlighting the complexity and depth of interspecies cultural interactions:

1. **Japanese Macaques and Sika Deer:** One of the most documented examples of co-culture is the interaction between Japanese macaques and Sika deer (Tsuji et al. 2007; Nishikawa and Mochida 2010; Pelé et al. 2017). Initially, these species developed a relationship based on proximity, where macaques dropping food from trees provided an additional food source for deer. Over time, this relationship evolved into more complex interactions, including grooming and even instances of macaques riding on deer. These behaviours, which vary across different regions of Japan,

demonstrate the development of a co-culture where both species have adapted their behaviours in response to each other (Sueur and Huffman 2024).

2. Cooperative Hunting: Cooperative hunting between different species is another example of co-culture. A well-known case involves humans and bottlenose dolphins (Ansmann et al. 2012; Daura-Jorge et al. 2012), where dolphins herd fish towards the shore, signalling fishermen to cast their nets. This cooperation enhances the hunting efficiency for both species and represents a deep-seated cultural exchange that has evolved over generations. Similarly, in Indonesia, the Erabu sea krait has been observed participating in communal hunting with other predatory fish (Somaweera et al. 2023), further illustrating the role of co-culture in enhancing survival strategies across species.

3. Medicinal Cultures: The shared use of medicinal plants between humans and animals is an example of co-culture in the domain of health and wellness (Huffman 2003, 2007; Álvaro et al. 2019). For instance, humans have learned to use certain medicinal plants by observing the self-medication practices of animals. This exchange of knowledge has led to the development of shared medicinal cultures, where both humans and animals benefit from the healing properties of these plants. This type of co-culture highlights the dynamic relationship between human and animal knowledge systems.

## **The Importance of Animal Culture and Co-Cultures in Conservation and One Health**

The concepts of animal culture and co-cultures represent significant developments in our understanding of biodiversity and ecosystem health (Brakes et al. 2019; Carvalho et al. 2022; Sueur et al. 2023). These concepts emphasise the importance of social learning and interspecies interactions in shaping behaviours and survival strategies, which are critical for the conservation of species and the health of ecosystems. The integration of animal cultures and co-cultures into conservation strategies and the One Health approach – an interdisciplinary strategy recognising the interconnectedness of human, animal, and environmental health – offers new avenues for safeguarding biodiversity and ecosystem resilience.

### **Animal Culture in Conservation**

Animal culture refers to the transmission of behaviours and knowledge through social learning within a species. These behaviours are not genetically inherited but are passed down through generations, often reflecting adaptations to specific environmental conditions. Recognising and conserving these cultural traits is crucial because they play a vital role in the survival and reproductive success of species.

One key example is chimpanzees' use of tools, which varies significantly between different populations (Whiten et al. 1999). Some chimpanzee groups use stones to crack nuts, while others use sticks to fish for termites, depending on their local environment. These behaviours are learned and passed down through social learning, and they are crucial for the survival of these populations in their respective habitats (Carvalho et al. 2022).

The loss of such cultural behaviours due to habitat destruction, climate change, or human interference can lead to a decline in population viability. For instance, if a population of chimpanzees that relies on nut-cracking for food is relocated or their habitat is destroyed, the loss of this culturally transmitted behaviour could result in malnutrition and decreased reproductive success (Carvalho et

al. 2022). Therefore, conservation efforts must go beyond protecting species at the genetic level and include measures to preserve the cultural knowledge that is essential for their survival.

Moreover, the cultural diversity within species contributes to their overall resilience. Populations with rich cultural behaviours may be better equipped to adapt to environmental changes. This is because these behaviours often include adaptive strategies that have evolved over time to cope with specific challenges. Protecting animal cultures, therefore, enhances the adaptive capacity of species, making them more resilient to changing environmental conditions (Sueur and Huffman 2024).

### **Co-Cultures and Their Role in Conservation**

Co-cultures, which involve the mutual cultural evolution between different species, add another layer of complexity to conservation efforts (Sueur and Huffman 2024). These interactions can create symbiotic relationships that are crucial for the survival of both species involved. For example, the cooperative hunting practices between humans and dolphins in Brazil, where dolphins herd fish towards fishermen, highlight the importance of co-cultures. These practices not only benefit humans but also ensure the survival of the dolphins, which have adapted their hunting strategies to this cooperative relationship (Ansmann et al. 2012; Daura-Jorge et al. 2012).

In urban environments, co-cultures can also play a significant role. Animals living in close proximity to humans often develop behaviours that are directly influenced by human activities. For instance, some bird species in urban areas have learned to use human-made structures for nesting or have adapted their foraging behaviours to exploit human food sources. These behaviours are a result of interspecies cultural transmission and highlight the adaptability of animals to human-dominated environments (Sueur and Huffman 2024).

The preservation of co-cultures is important for maintaining these intricate ecological relationships. When one species in a co-culture is threatened, it can have cascading effects on the other species involved. Therefore, conservation strategies must consider the preservation of these interspecies cultural relationships to ensure the stability of ecosystems.

### **Animal Culture, Co-Cultures, and the One Health Concept**

The One Health concept recognises that the health of humans, animals, and the environment are interconnected (Destoumieux-Garzón et al. 2018). Animal culture and co-cultures are integral to this framework because they reflect the complex interactions that sustain ecosystems. By preserving these animals' cultural practices, we are not only protecting individual species but also maintaining the ecological processes that support human health, which is called the animal capital (Sueur et al., 2023).

For example, the cultural practices of certain animal species can directly impact human health. The use of medicinal plants by animals, which has been observed in various species, can lead to the discovery of new medicines for humans (Huffman 2003, 2007; Álvaro et al. 2019). These behaviours are learned and passed down through generations within animal populations, and their loss could mean the loss of valuable knowledge that could benefit human health (Carvalho et al. 2022; Sueur et al. 2023).

Furthermore, the destruction of animal cultures can disrupt ecosystem services that are vital for human health. For instance, if a keystone species loses its cultural knowledge, it could lead to a decline in its population, which in turn could destabilise the ecosystem and reduce the services it provides, such as water purification, pollination, and disease regulation (Carvalho et al. 2022; Sueur et al. 2023).

The integration of animal cultures and co-cultures into the One Health approach emphasises the need for interdisciplinary conservation strategies that consider the health of all species, including humans. By protecting the cultural knowledge of animals, we are also safeguarding the ecosystems that humans depend on for their health and well-being.

### **The Urgent Need to Conserve Animal Cultures and Co-Cultures**

Given the rapid pace of environmental change and the ongoing biodiversity crisis, there is an urgent need to incorporate animal culture and co-cultures into conservation policies. Traditional conservation approaches that focus solely on genetic diversity and population numbers are insufficient to address the complexities of ecosystem health. The inclusion of cultural conservation can enhance the effectiveness of these strategies by ensuring that the behavioural adaptations crucial for species survival are preserved.

Conservation practitioners and policymakers must work together to develop frameworks that recognise the importance of animal cultures and co-cultures. This includes identifying key cultural behaviours and interspecies relationships that are essential for the survival of species and ecosystems, and integrating these into conservation planning.

Moreover, public awareness and education about the importance of animal cultures can help garner support for conservation efforts. By highlighting the cultural aspects of species, conservationists can create stronger emotional connections between the public and wildlife, which can lead to increased funding and political support for conservation initiatives.

In conclusion, the preservation of animal cultures and co-cultures is vital for the conservation of biodiversity and the health of ecosystems. These cultural practices are not just behaviours; they are integral components of the adaptive strategies that species use to survive in their environments. By integrating the conservation of these cultural traits into broader conservation and One Health strategies, we can better protect the delicate balance of life on Earth, ensuring the well-being of all species, including humans.

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