Diving Deeper into the Ethics of the Containment of Orcas for Entertainment Purposes

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Writer's Statement

My goal for this article is to bring to light the intelligence of orcas. I wanted to focus on the physical attributes of orcas, as well as highlight the effects that captivity has on orcas, to advocate for their freedom. My passion for orca freedom was sparked by the movie *Free Willy*, which I watched as a kid, and I wrote this article in hopes of raising awareness about orca containment.

Introduction

Did you know that there have been no documented cases of wild orcas killing humans, but there have been four cases of captive orcas killing humans? Orcas, or killer whales, are toothed whales that are part of the oceanic dolphin or *Delphinidae* family. Their unique color scheme, large size, and creative intelligence have made orcas popular attractions in aquariums. Debates on whether the confinement of orcas is ethical began when orcas started being captured and put on display in the 1960s. While California passed the California Orca Protection Act in 2016 to prohibit the captivity of orcas for purposes such as entertainment, there are no federal laws in America that prohibit the confinement of orcas (Seaside, 2023). Although there was a bill introduced in Congress in 2017 that prohibited the capturing and breeding of orcas for the purpose of entertainment, it was never passed (H.R., 2018). Orcas should not be kept in enclosures for entertainment purposes because they have highly developed cognitive abilities and are capable of complex emotional interactions.

Neuroanatomy

The social complexity of orcas can be attributed to their impressive brain structure. Lori Marino, author of "Cetaceans Have Complex Brains for Complex Cognition," noted that cetaceans have large insular and cingulate cortices, which are consistent with high-level cognitive functions such as attention, judgment, intuition, and social awareness in primates (2007). Orcas have a brain composition that contains structures that are similar to primate brains. This suggests that orcas have similar cognitive abilities to humans in areas such as attention, judgment, intuition, and social awareness.

The ratio of brain-to-body size of animals is recorded in the form of the encephalization quotient (EQ), which is used to compare the cognitive function of different species. "The EQ for orcas is 2.57, which means that even when their large body size is taken into account, their brains are still two and a half times larger than expected. Orcas, therefore, have more brain tissue available to serve complex cognitive functions, such as self-awareness (a sense of personal identity), social cognition, culture, and language" ("A Summary,"" n.d.). Humans have an EQ of 7.4 and bottlenose dolphins have an EQ of 5.3; this puts orcas in third place in terms of EQ (Anderson, 2016). While EQ isn't a direct measurement of emotional intelligence, it strongly suggests that orcas are capable of higher-order thinking, as well as emotional intelligence.

Along with having a high EQ, orcas have large parts of the brain that correlate with communication. MRI scans analyzed in the article "Neuroanatomy of the Killer Whale (*Orcinus Orca*) From Magnetic Resonance Images" revealed that orcas have a very large and developed

insular cortex and temporal operculum (Marino, 2004). In humans, the operculum is associated with speech, so it is not a stretch to suggest that the same area in orcas is associated with communication (Marino, 2004). If that is the case, orcas would have a highly complex form of communication. Orcas produce a wide range of clicks and whistles for communication and echolocation, which supports the idea that orcas can have complex relationships with one another.

Along with an impressively large brain, orcas also have a high level of gyrification, which is how wrinkly the brain is. According to Michelle Bender, who serves on the Advisory Board for the Global Alliance for the Rights of Nature and is a member of the IUCN's World Commission on Environmental Law, the gyrencephalic index of orcas is 5.7 compared to human beings' 2.2 (2024). The gyrification of the brain relates to the processing speed and capacity of the brain. Because orcas exhibit a higher level of gyrification than humans, it is reasonable to infer that they can process information more rapidly. The impressive makeup of an orca's brain gives it the ability to process information and feel complex emotions.

The brains of orcas are indeed complex. Their brains are built to succeed in an aquatic environment and within an expansive social network. The authors of "The harmful effects of captivity and chronic stress on the well-being of orcas (*Orcinus Orca*)" wrote that, "As a group, modern cetaceans, and therefore orcas, possess the neurobiological foundations of complex psychology, emotion, and behavior: 1) large relative brain size, 2) an expanded neocortex, 3) well-differentiated cortical cytoarchitecture, and 4) an elaborated limbic system" (Marino, 2020). These characteristics not only support intelligence and emotions but also suggest that orcas are conscious of their existence on this planet.

Other areas of the brain also contribute to the social complexity of orcas: "The anterior cingulate and insular cortices, the temporal operculum, and paralimbic regions (all situated deep within the forebrain) are well developed in orcas and other cetaceans" (Marino, 2020). These areas of the brain are associated with "…social functions such as attention, prediction, social awareness, and empathy" (Marino, 2020). These functions allow for the formation of complex social connections within a pod, which orcas in captivity don't have access to.

Demonstrate Theory of Mind

Orcas' ability to demonstrate Theory of Mind (ToM) shows that the confinement of orcas is unethical. Theory of Mind is the ability to understand what others are feeling, and it is the ability to predict the behaviors of others in response to certain stimuli. In the study, "Orca Behavior and Subsequent Aggression Associated with Oceanarium Confinement," the behaviors of orcas Canuck, Katina, Kasatka, and Kotar were observed. These orcas were all caught from Icelandic waters, so they were all part of a wild pod for at least a year.

The orcas in this study demonstrated ToM on multiple occasions. "Hockins describes an incident in which Kotar seemed to perform a test of human frailty on him. At first, Kotar bit down hard enough on Hockins to induce pain, and Hockins signaled Kotar to stop. Kotar eased the bite pressure but did not release Hockins. Then Kotar slowly reapplied the bite pressure. When it reached the limit of comfort, Hockins repeated the stop signal. Kotar let Hockins go, but (as interpreted by Hockins) registered surprise at the difference between the two bite pressures… Hockins notes that thereafter, none of the other orcas in the pool ever bit down harder than this level that Kotar established, although none of the other orcas performed this sort of test on Hockins" (Anderson, 2016). Cognitive empathy was shown in this test because the orcas recognized Hockins's pain/comfort tolerance and didn't surpass that level again.

The authors also found that the orcas went out of their way to form connections with certain humans. “Typically, the orcas would stay with most visitors just long enough to accept fish, and then move along to the next visitor. However, the orcas seemed to spend longer periods of time interacting with people who did not feed them. The authors interpret this as an effort on the orcas’ behalf to interact with certain humans at a level of friendship… This could be a reflection of affective ToM (comprehending feelings in another—in this case feelings of affection directed at the orcas by humans)” (Anderson, 2016). Although many animals maintain strong bonds with humans, the orcas in this study went out of their way to build and maintain relationships with certain humans, not just the ones that feed them. This shows that orcas depend heavily on social bonds, and confining them to an aquarium prevents them from forming the extensive social network that orcas have in the wild.

John Hargrove, a former orca trainer, describes a time when Takara, an orca, demonstrated empathetic behavior. “Immediately after the accident, Takara proceeded to use echolocation throughout his body in a way he had not experienced before. Then, Takara very gently pushed him to the edge of the pool in a way she had never been trained to do. Hargrove was later discovered to have broken ribs and soft tissue damage. This could be interpreted as reflecting cognitive ToM, affective ToM, and possibly affective empathy” (Anderson, 2016). This is yet another situation where a captive orca has demonstrated its ability to understand the feelings of humans.

Reconciliation as Proof of Higher Thinking

The capability of orcas to reconcile after agonistic behaviors demonstrates their complex social relationships. The authors of the research article, “Social interaction analysis in captive orcas (*Orcinus orca*),” found that “first-affiliative behaviors occurred earlier after aggressions (on average within the first 3 min) than in control periods” (Sánchez–Hernández, 2019). This means that orcas demonstrated friendly behavior just three minutes after conflicts. The author also noted that reconciliation in primates is thought to be linked to cognitive abilities like memory and individual recognition (Sánchez–Hernández, 2019). This shows that orcas demonstrate cognitive abilities similar to primates. The ability of orcas to reconcile after fighting shows that they understand empathy and have the capacity to reflect upon their actions.

Ability of Orcas to Mourn

The ability of orcas to mourn demonstrates their empathic ability and processing of emotions. Observations of orcas in the wild have shown the ability of orcas to feel deep emotions and form strong social bonds. “These observations include reports of long-range contact calling when separated from others, grieving behaviors, and helping (epimeletic) behaviors.

In addition to assisting individuals in distress, “epimeletic behavior often involves adult individuals attending to a dead individual by keeping them afloat, lifting or pushing the individual, performing attempts that look like ‘resuscitation,’ and carrying them around by the mouth or on the body” (Marino, 2020). Observation of orcas mourning in the wild proves the ability of orcas to form complex social relationships that go beyond survival. The most serious account of this was observed in 2018 when “A 20-year-old orca known as J35 or Tahlequah gave birth to a female calf who died within 30 minutes. The calf was carried on J35′s back, rostrum, and in her mouth for 17 days. When the body slipped off, she retrieved it” (Marino, 2020). Although not beneficial for the survival of the pod, the mother orca carried around her dead calf for an extended period of time, showing that orcas are able to feel deep emotions.

Effects of Captivity on Orcas

The captivity of orcas has drastic effects on their physical and mental health. Orcas in captivity can become victims of malnutrition, poor oral health, and the signature collapsed dorsal fin. As with the case of many captive animals, "There have been numerous reports of oral stereotypies in captive orcas, including biting and chewing on hard tank surfaces, hard toys, and the steel gates used to separate the whales. These behaviors lead to extensive and chronic dental pathologies" (Marino, 2020). These behaviors are caused by the stresses that are brought about by confinement. Also, due to the nature of the tanks and the role of the orcas in entertainment, "100% of captive adult male orcas have collapsed dorsal fins" (End Captivity, n.d.). Under the water, the dorsal fin is supported by the surrounding water pressure, but in captivity, orcas spend a lot of time at the surface, which causes their dorsal fin to collapse to the side. Although the collapsed dorsal fin doesn't seem to cause pain, it is a sad characteristic of captive orcas.

Orcas in captivity are more prone to diseases. "Between 1971 and 2017, there have been 35 documented orca deaths at SeaWorld facilities alone. When causes of death were available, the most commonly implicated conditions were viral, bacterial and fungal infections, gastrointestinal disease, and trauma" (Marino, 2020). The reason why captive orcas are so prone to diseases isn't clear, but it could be due to having a weakened immune system, exposure to harsh chemicals in the pools, trauma, improper use of antimicrobials, or an imbalance of microbiota in the tank environment (Marino, 2020). Regardless, orcas in captivity seem more prone to suffering from lethal diseases.

Captivity also invokes aggressive tendencies in orcas. Though orca-to-orca aggression has been observed in the wild, the occurrence of orca-to-orca aggression is higher amongst captive orcas (Marino, 2020). This could be due to the tight confinement of the tank in which orcas are kept. In the wild, orcas are able to distance themselves from one another to de-escalate a situation, whereas captive orcas do not have any way to separate themselves from one another. Along with orca-to-orca aggression, orca-to-human aggression is higher in captive orcas. There are no accounts of a wild orca killing a human, but there are four accounts of captive orcas killing humans, and there are many other instances of injuries (Marino, 2020). Perhaps the most famous of these accounts is the death of Dawn Brancheau by the orca, Tilikum. Tilikum had taken three lives during his time in captivity. Though the reasons for his aggressive behavior are unknown, they could've been due to abusive treatment, frustration, or a decline in mental health. Along with aggressive behavior directed at others, captive orcas have also been observed to harm themselves. Captive orcas have been observed to bang their heads against the walls and gates of their tanks, breach themselves on the edges of the pool, and refuse to eat (Marino, 2020).

The captivity of orcas deprives them of an extensive social network, which decreases the survival rate of captive-born calves. Female orcas depend upon the support of their pod to raise a calf. In captivity, female orcas have been observed to neglect their young after birth, causing a high infant mortality rate (Marino, 2020). This leads to human intervention being required to raise a calf, which involves separating the mother from her calf. Not only does this prevent the mother from teaching her calf, but it also implants a strong human-orca bond on the calf, making the chances of a successful release into the wild slim if it were to happen.

The tanks that orcas are kept in deprive them of certain sensory inputs. An important sense of orcas is their auditory sense. Orcas are capable of interpreting a large variety of natural sounds and using echolocation, something that a concrete tank deprives them of. It was found that "…exposure to excessive or unnatural levels or types of acoustic input can cause a number of impacts to cetaceans, including but not limited to decline in reproductive success (due to

physiological and behavioral changes), accelerated aging, suppression of the immune response, as well as premature hearing loss" (Marino, 2020). The amount of noise from crowds of people, water pumps, construction, and other miscellaneous sources can overstimulate orcas, leading to developmental stress.

The tanks also lead to boredom in orcas. Wild orcas are used to being able to move around and travel, viewing a variety of scenery and interacting with different things in the environment. Being in a tank confines an orca to an unchanging, boring environment. This promotes a "logging" behavior, which is when the cetacean just floats on the surface of the water, interacting with no one and nothing (Marino, 2020). Although there are attempts at enrichment to stimulate orcas, they do not compare to the stimulation that freedom provides.

Potential for Orca Rehabilitation and Release

There have been 15 successful orca releases from sea pens, which are netted enclosures that are submerged in ocean water to simulate a semi-natural environment. One of the most famous orcas that has been released from captivity is Keiko, who played the role of Willy in *Free Willy*. Though the success of Keiko's release is up for debate, it is indisputable that Keiko was able to survive in the open ocean after being in captivity. The main issue with the release of Keiko was that he was in captivity for so long that he sought out human connection more than connections with other orcas. Though attempts were made, Keiko was never successfully integrated into a wild orca pod.

This introduces a problem with releasing orcas that have been in captivity for long periods of time or that were bred in captivity. Orcas have strong social bonds and culture within their pod. "Pods typically consist of a few to 20 or more animals, and larger groups sometimes form for temporary social interactions, mating, or seasonal concentrations of prey" (Killer Whale, 2025). These pods are led by a matriarch. "Within each pod, there are several family units that each descend from a single female ancestor. These units, called matrilines, are typically composed of an adult female, the 'matriarch', and her female and male offspring" (Southern Resident, 2025). The integration of captive orcas, especially those bred in captivity, into wild pods is difficult because a wild orca pod consists of a family. This means that the integration of a captive orca into a pod would likely only be the consequence of breeding, and there is insufficient research on the breeding success of released captive orcas with wild orcas. There is one orca, Springer, that has successfully given birth to a calf since her release, though she was only in captivity for 31 days (Orca in Seapens, n.d.).

Another reason why the integration of captive orcas into wild pods may be difficult is that each pod of orcas has a unique set of calls that they use to communicate with each other. Orcas use calls to find food, coordinate hunts, and socialize. Among the complexity of the calls themselves, there are a large number of pod-specific calls that an orca must learn in order to communicate effectively within the pod. These calls are important for the formation and maintenance of relationships within a pod. "Although many discrete calls may have little context-specific meaning, the call repertoire as a whole may be important in determining and maintaining the social organization of the pod and its community" (Ford, 1989). For a wild-born orca, learning a pod's language is relatively simple, but for a captive orca, it would be more difficult. It would likely be similar to the difficulty of a human trying to learn a second language.

So, should captive orcas be released? It really depends on the view of the public. While it is possible to capture and release orcas back into the wild, long-term captivity creates a reliance of orcas on humans, as shown in the case of Keiko. Keiko was able to be free, but was unable to integrate into any pod. This could be because of the cultural differences and language barrier between Keiko and the wild orcas, or it could be because Keiko simply preferred human

companionship over orca companionship after being in captivity for so long. Orca releases also take a lot of time and money. In the case of captive-born orcas, they would have to be slowly integrated into the ocean environment and taught how to hunt and survive. There would also be backlash from aquatic animal entertainment businesses like SeaWorld that generate a large income from orca attractions.

On the bright side, these businesses have started to phase out the use of orcas for entertainment, with SeaWorld ending its orca breeding program in 2016 due to public backlash, especially after the release of the movie *Blackfish*, a documentary released in 2013 that highlighted the dark side of orca captivity following the death of orca trainer Dawn Brancheau during a routine with the orca Tilikum at SeaWorld. While the release of orcas from captivity is unlikely, the ending of orca breeding programs is attainable, and with the right publicity, the captivity of orcas could be completely ended in the near future.

Conclusion

Orcas are remarkable creatures that demonstrate complex social and emotional needs that captivity does not provide. Captivity has a large range of physical and psychological effects on orcas that decrease their lifespan and have led to serious cases of aggression, some resulting in death. Overall, the intelligence and social complexity of orcas give them the right to be treated with respect and appreciated in their natural environment, as should be the case with all intelligent animals.

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