Enrichment for aging Bottlenose dolphins (Tursiops truncatus) in human care

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Introduction

It is well established that an enrichment program is an important tool for improving the mental and physical well-being of animals in human care (e.g., Mason, 1991; Swaisgood & Shepherdson, 2005). In the case where animals are compromised in some way, the attention to this type of program is even more important. Because the dolphins in aquariums and oceanariums around the world are an aging population, we can expect additional challenges in enriching their lives and maintaining health and avoiding stress and negative behaviors in these older animals (e.g., Frankis, Lyn, Klein, & Ross, 2009; Rumbaugh, Washburn, & Savage-Rumbaugh, 1989). There has been a recent upswing in the institution of enrichment programs in zoos and aquaria, but unfortunately, not a corresponding upswing in the scientific monitoring and assessment of these programs (e.g., Lyn, 2009).

Recent projects have shown that even the best-intentioned enrichment projects may have unintended consequences. For instance, the introduction in a stereotypical head-pressing behavior in a beluga whale at the Georgia Aquarium resulted in a shift of habitat usage that drove the other two belugas into small, off-display areas (Lyn, 2009). Similarly, giving enrichment to a group of sea otters at the New York Aquarium on a variable schedule decreased antagonistic behaviors, but when the enrichment was given regularly and daily, the antagonistic behaviors increased (Fisher, 2005).

Two dolphins currently housed at IMMS were tested with A-B-A-C-(etc.) design with multiple enrichment items. All data were taken between feeding sessions and included habitat usage, object interaction, social interaction (between the dolphins and/or with people), as well as unwanted behaviors, for instance, regurgitation. Successful interventions included enrichment in multiple modalities and social interactions and suggested the future plans for choice and control over enrichment. These new data provide additional information for caretakers to appropriately care for an aging population within the world’s aquaria.

Methods

Participants

Two bottlenose dolphins, Bo and Buster, both approximately 33 years old.

Procedures

Observations were taken on an iPad at poolside twice daily (once on weekend days) for 15 minutes.

Observation times were pseudo-randomized from one of six time slots, including one before trainers arrived and one after trainers left for the day.

Conditions were interspersed in an A-B-A-C-A-D-A design with three different types of Enrichment provided.

Enrichment 1 (the “B” condition) included tactile and floating enrichment, for example, barrels covered in AstroTurf.

Enrichment 2 (the “C” condition) explored the effects of social interaction with 5 interaction sessions of at least 15 minutes throughout the day.

Enrichment 3 (“D”) included underwater enrichment such as large blocks of ice and sinking kelp.

Results

Because circle swims are frequently characterized as the default behavior of cetaceans with nothing else to do, the number of intervals coded as non-circle swims may be considered one measure of the effectiveness of the enrichment. The proportion of intervals coded as non-circle swims was significantly higher during the enrichment conditions for Bo (t(1258) = 3.38, p<.001), but not for Buster (t(1258)=1.02, p=.31). An ANOVA and associated post-hoc tests showed that both Bo and Buster did more non-circle swimming in Enrichment 3 (Bo (F(6,1253)=5.79, p<.001); Buster (F(6,1253)=4.31, p<.001). This may be due to the novelty and multi-modal nature of the items included in Enrichment 3, which included the most items that the dolphins did not approach. This may suggest that extreme novelty of Enrichment items, although necessitating more habituation time, may be a necessary ingredient to change behavior.

Pair swimming and Social behavior initially decreased during Enrichment sessions, possibly due to increased attention to novel enrichment items (Pair Swims were less likely in enrichment sessions (t(1258) = 2.44, p = .02). However, During Enrichment 3, again, possibly due to the novelty of the items introduced in Enrichment 3, both pair swimming and social behaviors increased (Social behaviors were significantly different between conditions F(6,1253)=4.87, p<.001). After the Enrichment 3 items were removed, social behaviors dropped back to lower levels, although pair swimming increased further.

Buster showed very little Object Play during the observation sessions, although he was recorded outside observation times performing novel behaviors and trained behaviors with enrichment objects (see pictures).

Object Play was more likely in Enrichment conditions for Bo (t(1258) = 2.46, p<.01), although it decreased following Enrichment 2. This may have been due to the social nature of Enrichment 2 and the increase in social behaviors associated with Enrichment 3, as well as the extreme novelty of the items presented in Enrichment 3.

Importantly, there was no increase in undesirable behaviors during Enrichment 3 for instance agreement with which showed no differences in any conditions (F(1,1253)=0.83, p=.34) or regurgitation in Buster which actually showed a significant bump in Baseline 2 (F(1,1253)=8.66, p<.001). This finding suggests that the novel items, while instigating behavioral change, did not negatively impact the animals.

Bo showed increased attention during social interactions day-to-day during Enrichment 2 (Social Enrichment; t(31)=0.58, p<.01). Buster did not show the same level of increased attention. Note also that both dolphins showed more attention to novel social partners than to trainers.

Conclusions

Enrichment seems to positively affect behavior, however, as is often the case, the true outcome of enrichment is difficult to predict and to assess. The greatest increases in social behavior and non-circle (non pattern) swimming were seen during Enrichment 3, when fewer bouts of Object Play were recorded. It may be that the more novel an item, the more dramatic the behavioral change and possibly, the more useful said item is as enrichment. However, a longer habituation phase would be required to see if the dolphins would begin to approach and interact with the novel items and if the positive behavioral changes can be maintained. Strong increases in Bo’s social interactions with people during Enrichment 2 may also indicate the possibility of behavioral change that was not realized due to the short window for enrichment.

Many studies (see Blum, 2002 for a review) have shown that environmental challenges are necessary for animals to mature into healthy, curious, individuals. For example, young rats who were briefly removed from their mothers showed less fear and more curiosity and therefore, greater cognitive flexibility than those who had not. Similarly, several studies have suggested that control over one’s environment lead to more adaptable animals (e.g. Weiss, 1971). With this study, we attempted to monitor ongoing and novel enrichment with two aging dolphins, with mixed results. More choice and control may eliminate negative responses to novel enrichment while maintaining the positive behavioral changes associated with novelty (e.g. Blum, 1997).

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References


