A Comparison of the Behavioral Development of Biological and Surrogate Bottlenose Dolphin (Tursiops truncatus) Mother-Calf Pairs

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Abstract
As both wild and captive dolphin calves develop, they spend less time with their mothers and more time engaged in independent activities. In this study, the social development of two captive dolphin calves was examined from the time the calves were born until they were 17 months of age. One of the calves was placed with a surrogate mother shortly after birth due to neglect by the biological mother. The other was reared by its biological mother. Focal animal behavioral ethogram data were collected using 30 second scan sampling. The predominant swim position and individual behaviors were recorded. Chi-square results showed a significant difference in frequency of swim position for each dolphin calf (P< 0.01). The calf paired with a surrogate mother swam in infant position more so than the other calf. The calf reared by its biological mother was more likely to engage in solo swimming than was the other calf. However, there were a number of general developmental patterns: (1) an increase in the percentage of time that both calves engaged in solo swimming, (2) an increase in infant position, and (3) a decrease in echelon position. The calves engaged in similar amounts of solitary and social behaviors, with 65% of their individual behaviors recorded as social. The shift in primary swim position and increase in independent (solitary) behaviors exhibited over the 17-month period was consistent with other studies on calf development. The basis for the difference in predominant swim position by each calf could be a result of the type of mother (surrogate or biological), the unique personalities in the calves, or a combination of both.

Introduction
• As they develop, dolphin calves spend less time with their mothers and more time independently in both wild and captive settings.
• Adult females placed (accidentally or intentionally) with newborn calves without mothers, will begin lactating and nurse the orphan calves.
• Adoption or surrogate behavior has been documented in several captive mother-calf bottlenose dolphin pairs (i.e., Smolders, 1988; Kastelein, Dokter, & Zwart, 1990; Ridgeway, Kammolick, Reddy, Curry, & Tarpley, 1995).
• Recently there has been a documented case in the wild of non-offspring adoption by a foster mother, and a captive bottlenose dolphin (Howells et al., 2009).
• The purpose of the current study was to determine if there were differences in calf behavioral development based on placement with a surrogate mother or a biological mother.

Methods
• Subjects: two bottlenose dolphin (Tursiops truncatus) mother-calf pairs at the Navy Marine Mammal Program in San Diego, CA
  • Shasta - biological mother to Seaweed
  • Snapper - surrogate mother to Phantom
  • Slooper – biological mother with a history of rejecting and neglecting calves
  • Seaweed: male - born on March 29, 2009
  • Phantom: male - born on July 1, 2009
• Observations were collected from August 2009 through January 2011.
• Focal animal data were collected using instantaneous scan sampling every 30 seconds (Altmann, 1974).
• Predominate swim position and individual behaviors (solitary and social) were recorded for each dolphin.

Results
• A Chi-square test showed a significant difference in frequency of swim position for each calf, $X^2 (4, N = 200) = 15.241, p = 0.01$.
• Phantom, the calf paired with a surrogate mother, swam in infant position more often than the other calf, Seaweed.
• The calf reared by its biological mother (Seaweed) was more likely to engage in solo swimming as demonstrated in Figure 1.
• In general both calves increased the percentage of time engaged in solo swimming, and decreased the time spent in echelon position. (See Figures 1 and 2).
• During the first few months of life both calves showed an increase in the percentage of time engaged in infant position. Between 8 and 12 months of age infant swimming decreased for both animals.
• The calves engaged in similar amounts of solitary and social behaviors, with 65% of their individual behaviors recorded as social.

Figure 1. Solo swimming generally increased over time as the calves developed. Seaweed spent a higher percentage of time solo swimming as his predominant swim position.

Figure 2. As the calves developed they both showed an overall decrease in echelon position swimming.

Conclusions
• The shift in primary swim position over time was consistent with findings with wild (Mann & Smuts, 1999) and captive bottlenose dolphins (Reid, Mann, Weiner, & Hecker, 1995; Gubbins, McGowan, Lynn, Hooper, & Reiss, 1999).
• There was an increase in independent or solitary behavior over time which was consistent with research on other captive bottlenose dolphins (Reid et al., 1995).
• The difference in predominant swim position in this study could have been a result of the type of mother (surrogate or biological).
• It may be possible that based on attachment theory with human children (Bowlby, 1969; 1990), there was a more stable relationship between the biological mother and calf allowing for a secure base to return to when learning to explore the world. This may account for Seaweed’s larger percentage of solo swimming independently.
• The individual differences in swim position could also be attributed to the dolphins’ personalities. The development of stable and unique personalities is something which is currently under investigation with these individuals.

References

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