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MOTHER-INFANT SPATIAL RELATIONS IN CAPTIVE BOTTLENOSE DOLPHINS, *TURSIOPS TRUNCATUS*

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ABSTRACT

The prolonged nursing period and strong, extended mother-infant bond observed among bottlenose dolphins may reflect social and physical ontogeny critical for infant survival. This study was conducted to quantify ontogentic changes in mother-infant contact time and the amount of time infants spent in specific spatial states with their mothers from birth to age 12 mo. These behaviors were studied through a systematic, longitudinal study of six mother-infant pairs of captive bottlenose dolphins from three different social groups. There was a significant decrease in the time infants spent with their mothers (logistic regression, $P < 0.001$), following the general mammalian pattern of increasing independence with age. When with their mothers, the probability that infants would be found in "echelon" position, flanking the mother, decreased as the calf aged (logistic regression, $P < 0.001$), possibly due to anatomical and hydrodynamic factors. The probability that infants would be found in "infant" position, underneath the mother, increased with calf age (logistic regression, $P < 0.001$). Results obtained in this study are consistent with similar studies of wild bottlenose dolphin mother-infant pairs, indicating a suite of ontogenetically comparable behaviors between wild and captive bottlenose dolphins.

Key words: bottlenose dolphin, *Tursiops truncatus*, ontogeny, development, social behavior, mother-infant, spatial relations.

Studies of bottlenose dolphin societies indicate a long-lived, highly social species with a fission-fusion-type social system (Shane *et al.* 1986, Connor *et al.* 1992). The dolphin social system, like other mammalian social systems, is centered around the core unit of a mother and her offspring (Eisenberg 1986). Female dolphins, like other mammalian females, are bound by their physiology to provide most of the care required by their offspring (Vaughn 1978). Typically, an extended period of offspring dependence upon the mother is followed by increasing independence until the offspring leaves the mother.

Observations of mother-infant pairs of bottlenose dolphins have indicated that the first year is critical for both physical and social development (Cornell *et al.* 1987, Cockcroft and Ross 1990). The prolonged nursing period and strong, extended mother-infant bond observed among bottlenose dolphins are crucial for infant survival. The mother-infant bond appears to remain strong for many years even after the calf has achieved independence (Essapian 1953, Tavolga and Essapian 1957, Wells *et al.* 1987).

Although the development of social and behavioral characteristics has not been studied extensively, observations on infant independence have been generally consistent across studies (Chirighin 1987; Cockcroft and Ross 1990; Reid *et al.* 1995; Mann 1997; Mann and Smuts, in press). In a captive study of a mother-infant pair, Cockcroft and Ross (1990) concluded that there is increased independence from the mother as the infant ages, due to physical changes and the acquisition of behavioral skills. Similarly, common to all free-ranging mother-infant bottlenose dolphin pairs studied in Australia by Mann and Smuts (Mann 1997; Mann and Smuts, in press) was decreasing "contact time," the amount of time infants spend with their mother, as infants matured.

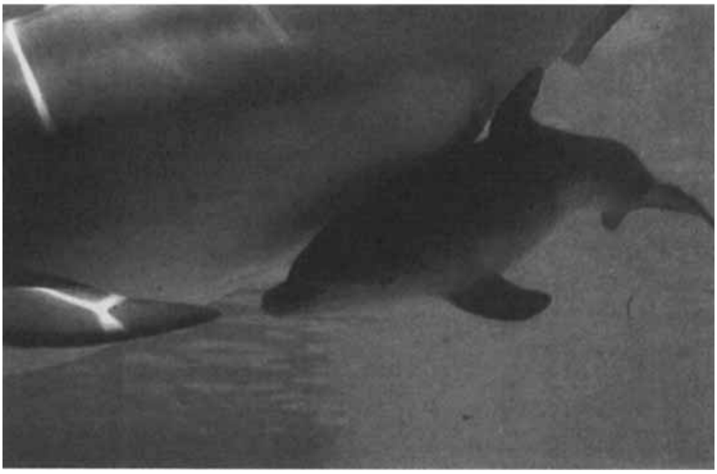

Figure 1a. Mother and infant bottlenose dolphin in P2, or "echelon," position. Infant swims at mother's side within 0.5 m.

Figure 1b. Mother and infant bottlenose dolphin in P23, or "infant," position. Infant swims under mother's tail region, with no genital orientation.

When together, captive and wild bottlenose dolphin infants have most commonly been observed in two specific and predominant spatial states with mothers (Essapian 1953; Tavolga and Essapian 1957; Cockcroft and Ross 1990; McCowan and Reiss 1995*a*; Reid *et al.* 1995; Mann 1997; Mann and Smuts, in press). In one state, commonly referred to as "echelon" position, the infant is at the mother's side, near the dorsal fin region (Fig. 1a). In the other position, usually termed "infant" position, the infant is below the mother with its dorsal fin near the mother's genital area (Fig. 1b). Thus, a synthesis of studies of captive and free-ranging dolphins suggests a general decrease in contact time between female bottlenose dolphins and their offspring and also the prevalence of specific mother-infant spatial states that might be of significance to infant development and survival.

This paper reports results of a systematic, longitudinal study of several captive mother-infant bottlenose dolphin pairs from different social groups that was conducted to describe and quantify mother-infant contact time and spatial relations from birth through 12 mo of age. This work was part of a larger ongoing study of the ontogeny of vocal and non-vocal behavior of several groups of captive-born dolphins (Reiss 1984; McCowan and Reiss 1995*a*,*b*, 1997). Although other studies of captive bottlenose dolphin mother-infant behavior have been conducted, they have focused on only a single infant (Eastcott and Dickinson 1987, Cockcroft and Ross 1990, Peddemors 1990, Peddemors *et al.* 1992) or two infants (Chirighin 1987, Reid *et al.* 1995) or were conducted for a shorter length of time (Reid *et al.* 1995).

We hypothesized a general decrease in the amount of time that mothers and infants would spend together, following the general mammalian pattern, as well as that reported for mother-infant pairs from field observations of bottlenose dolphins (Mann 1997; Mann and Smuts, in press). Documentation of duration or frequency of occurrence of the mother-infant spatial states were not found in the literature, although many authors cited these states as part of mother-infant behavior (Eastcott and Dickinson 1987, Cockcroft and Ross 1990, Peddemors 1990, Chirighin 1987, Reid *et al.* 1995). Thus, no theoretical *a priori* hypotheses were made regarding the effects of time or infant age on the frequency of occurrence of these spatial states. In the present study we documented the frequency of occurrence of specific spatial states to reveal and quantify developmental trends.

METHODS

Facilities and animals—Three distinct social groups of bottlenose dolphins, each with two mother-infant pairs, were observed during the course of this study. The first group was observed at Marine World Africa USA (MWAUSA) in Redwood City, California, July 1983–July 1984. Two mother-infant pairs of Atlantic bottlenose dolphins included Circe and her infant Delphi and Terry and her infant Panama. Also in this pool was Gordo, a Pacific bottlenose dolphin which was the father of both infants. In 1988, MWAUSA moved from Redwood City to Vallejo, California, where the second and third social groups of Atlantic bottlenose dolphins were observed. Chelsea and her infant Liberty and Stormy and her infant Norman were observed July 1990–May 1992 in holding tanks attached to a main exhibition pool. Also housed with these two mother-infant pairs were two adult males, Bayou and Schooner, and one adult female, Sadie. In the third social group, two other mother-infant pairs, Chelsea and her infant Brisbee and Jasmine and her infant Avalon were housed in separate pools at the dolphin research facilities. They were observed June 1994–June 1995. During this time, Circe, Terry, and Sadie were in adjoining, but gated, pools. All of the infants were males. Housing information and capture site locations are provided in Table 1.

Table 1. Summary of individual life history information for three different social groups of bottlenose dolphins at Marine World Africa USA. Calves were focal individuals during data collection, thus observation hours noted only for each calf for duration of study.

Social group	Individual	Capture/captive birth location	Capture date	Birth date	Total hours observed
1	Circe	Compano Bay, TX	6/7/78	unknown	—
1	Gordo	Pacific Coast, Mexico	7/8/71	unknown	—
1	Terry[a]	Compano Bay, TX	1/5/80	unknown	—
1	Panama	Marine World Africa USA	—	7/30/83	134
1	Delphi	Marine World Africa USA	—	8/2/83	134
2	Bayou	Compano Bay, TX	6/7/78	unknown	—
2	Schooner	Compano Bay, TX	6/7/78	unknown	—
2	Chelsea	Mississippi Sound, MI	8/23/83	unknown	—
2	Stormy	Compano Bay, TX	6/7/78	unknown	—
2	Liberty	Marine World Africa USA	—	7/4/90	34
2	Norman	Marine World Africa USA	—	5/18/91	36
3	Chelsea	Mississippi Sound, MI	8/23/83	unknown	—
3	Jasmine	Gulf of Mexico, MI	8/92	unknown	—
3	Avalon	Marine World Africa USA	—	4/23/94	15
3	Brisbee	Marine World Africa USA	—	5/15/94	17

[a] Originally collected by SeaArama, Galveston, Texas.

Ethogram—Dolphin activity was coded using an ethogram which described behaviors and 33 spatial positions of mother-infant pairs (Appendix 1) (McCowan and Reiss 1995*a*,*b*, 1997). An infant was considered to be with its mother if it was within 1.5 m of her. The two most common positions, and the two discussed in this paper, were termed P2 and P23 for this study (Fig. 1). P2 position is also commonly called the echelon position; the infant is next to its mother, just below her dorsal fin and within 0.5 m of her. P23 position is also commonly called infant or baby position; the infant swims under the mother's peduncle (tail) region, with no genital orientation.

Data collection—Point sampling was used to record mother-infant spatial state with each infant as the focal individual (Altmann 1974). Sampling interval differed slightly for each of the three social groups. In Social Group 1, the spatial states of both mother-infant pairs were recorded using 1-min interval sampling for the first 16 min of each hour, 0800–1600, two days per week. For Social Group 2, data were collected at 2.5-min intervals during a 1-hr observation session two days per week. Spatial data for Social Group 3 were collected at 1-min intervals for one hour, two days per week. There was, however, variation from this schedule and in some months more or less sampling was conducted (Table 1).

Analyses—The number of data points for which the calf was with its mother (in any of the 33 positions), in P2 position, and in P23 position were totaled for each week and total number of observations recorded. Using mixed-effects logistic regression in Egret Statistical Software for the PC (Egret 1997), the spatial states of P2, P23, and total time mother and infant were together were each analyzed across infant development (age of infant in weeks). In each analysis the random effect (or repeated measure) was designated as individual.

Fixed-effects logistic regression was used to test and quantify the association between spatial state and age of infant (Egret 1997). The asymptotic likelihood ratio test was performed for each factor in order to test the null hypothesis that all logistic regression coefficients were simultaneously zero (odds ratios = 1) for the specified term. Since we collected repeated measures on multiple individuals, and the interest was in developmental response trends (and not in individual differences), we tested the fixed effects logistic regression model for random effects using mixed-effects logistic regression with individual subject as the random effect.

The mixed effects logistic regression model was as follows:

$$P(D_{ij} \backslash \alpha, \beta_k, \sigma) = \frac{1}{1 + e^{-(\alpha + \Sigma_1^k \beta_k X_{ijk} + \mu_i \sigma)}}$$

where $P(D_{ij} \backslash \alpha, \beta_k, \sigma)$ was the predicted probability of spatial state j of subject i, α was the natural logarithm for the odds of spatial state in the reference population, β_k indicated the change in the natural logarithm of the odds for spatial state for a unit change in predictive factor X_k, and μ_i was the random component and σ its standard deviation estimated from the data. Significance testing for addition of the random effect term was obtained by comparing twice the likelihood ratio statistic to a χ^2 table for 1 df (Egret 1997). When random effects were present, the consequence was that there existed uncertainty surrounding the predicted probability of spatial state given a set of predictive factors. The range of this uncertainty for the central 68% of the subjects was calculated as ± 1 standard deviation of the random effect; for the central 95% of the subjects, one needs to use ± 2 standard deviations. The probability of spatial state with the subjects located in the middle of the random effect distribution was calculated by setting $\mu_i = 0$.

In the event that random effects were present (intrasubject correlation of spatial state status), fitting a mixed-effects logistic regression model would adjust the Type-1 error to properly reflect this clustering of spatial state status by subject. We calculated goodness-of-fit (GOF) terms for the variables in LR as follows:

$$R^2 = 1 - (\text{likelihood function of null model/likelihood function of model with added terms})2/n.$$

RESULTS

The associations between infant age and the amount of time spent in the three spatial relationships: (1) mother-infant together, (2) P2 position, and (3) P23 position were evaluated using logistic regression with random effects. In order to account for possible non-linear trends in these spatial positions across development, both age of infant in weeks and age of infant in weeks squared were evaluated with the model. Because both terms were significant, they were included in the final model.

Infants showed a decrease in time spent with their mothers over the first year of development (Fig. 2). Logistic regression revealed that the probability that infants were found together with their mothers gradually decreased with infant age but stabilized at 0.56 around week 37 (age in weeks, β coefficient $= -0.119$, $P < 0.001$; age in weeks^2, β coefficient $= 0.001$, $P < 0.001$). The two most predominant spatial states, P2 and P23, accounted for up to 75% of all observations of mothers and calves together, although several other spatial states were observed throughout the first year. When together with their mothers, the probability that infants would be found in P2 position gradually decreased as the calf aged but again stabilized at 0.25 around week 37 (age in weeks, β coefficient $= -0.076$, $P < 0.001$; age in weeks^2, β coefficient $= 0.001$, $P < 0.001$). In contrast, the probability that infants would be found in P23 gradually increased with calf age and stabilized at 0.4 around week 37 (age in weeks, β coefficient $= 0.1006$, $P < 0.001$; age in weeks^2, β coefficient $= -0.001135$, $P < 0.001$). GOF for mother and infant together was $R^2 = 0.44$; for P2, $R^2 = 0.50$, and for P23, $R^2 = 0.29$. The random effect (individual calf) was significant for each analysis, but small (mother and infant together, $P < 0.001$, $\rho = 0.008025$; P2, $P < 0.001$, $\rho = 0.0006114$; P23, $P < 0.001$, $\rho = 0.0027285$.

Our results indicate that infants gradually spent less time in P2 and more time in P23 when mother and infants were together over the first year of development. The frequency of P23 increased over development from about 7% (week 1) to 38% (week 52) of the time, while the frequency of P2 decreased from 67% to 23%. All other spatial states combined seem to become increasingly important over development (week 1 = 26%, week 52 = 39%).

Discussion

The results of our study were consistent with results of past studies, which reported a significant decrease in time that infants spent with their mothers as they aged, following the general mammalian pattern of increasing independence of infants from their mothers. Cockcroft and Ross (1990) reported a similar pattern over a similar time frame for one captive mother-infant pair. Reid *et al.* (1995) also found that the two infants in their captive study spent less time with their mothers as they aged, although the study was conducted over only a nine-week period. Similarly, Mann and Smuts (in press) reported a decrease in the time free-ranging mothers and infants in Shark Bay, Australia spent together in the first 10 wk of the infant's life. Mann (1997) also reported a general increase in the time infants spent alone from birth through their third year. Our results indicate an ontogenetic pattern of increasing infant independence that is general across distinct social groups and is similar for several infants.

The predominance of the two spatial states, P2 and P23, during the critical

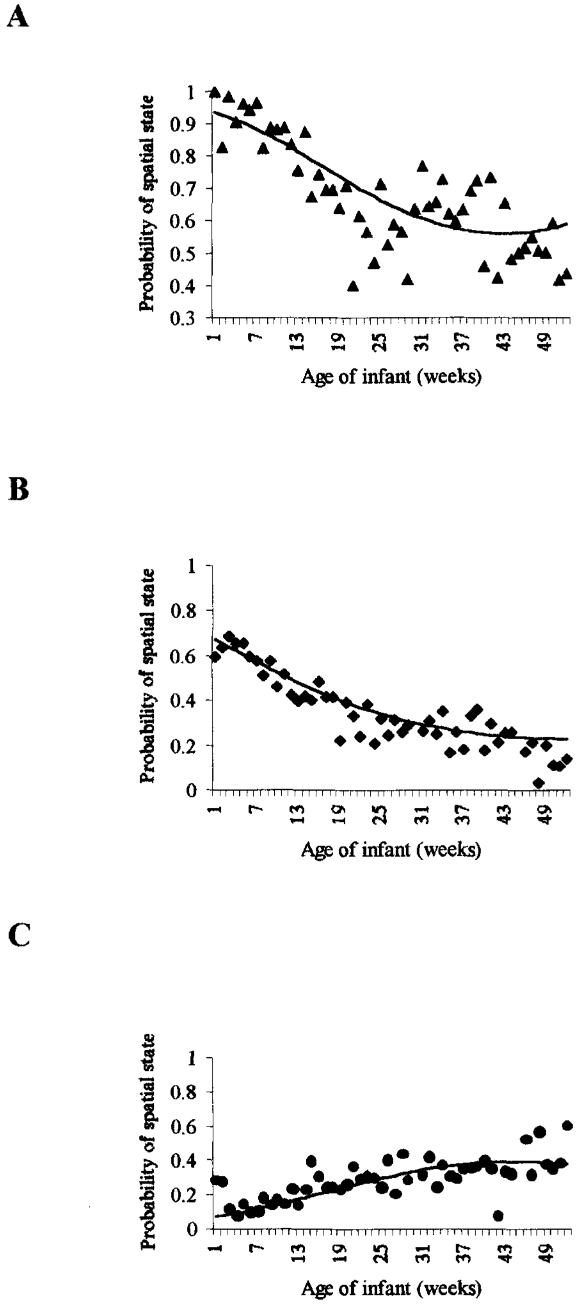

Figure 2. Probability of bottlenose dolphin infants being (A) with mother (in any of the 33 mother-infant spatial states), (B) in P2 position, and (C) in P23 position as function of calf age, as calculated by mixed-effects logistic regression. In order to illustrate goodness of fit of the data, closed triangles, diamonds, and circles represent the averaged raw data for all six infants for each week of development in each category, respectively.

first year of development may have adaptive significance and contribute to infant survival. Other spatial states were observed throughout the year, and although they also may have ontogenetic and social significance, we focus on the results of the two predominant spatial states in this paper. In the P2 position, the predominant swimming position observed during the postpartum period and during early development, an infant dolphin has a reduced cost of transport and is carried by the pressure wave created by its mother's larger body as she moves through the water (Williams *et al.* 1992, Denny 1990). When the infant is young, the relatively high proportion of blubber to muscle (Cockcroft and Ross 1990) and the presence of rostral vibrissae (McBride and Kritzler 1951) may actually help the infant attain and maintain this position (Tayler and Saayman 1972, Cockcroft and Ross 1990). The significant decline in time spent in P2 position as the infants grew likely reflects the diminishing ability of the mother to "carry" the calf in her slipstream due to its increasing size. At the same time that transport costs increase for this position, the infant is developing physically, becoming better able to swim on its own (Cockcroft and Ross 1990).

The probability that infants were in the P23 "infant" position increased during the first year of development across infants and was consistent with the behavior reported by Reid *et al.* (1995) for one of their focal infants. Mann and Smuts (in press) reported an increase in time spent in "infant" position for newborn dolphins in their study, as well as a significant increase between year one and year two and a non-significant increase between years two and three. In our study the onset of the P23 position was observed later in both mother-infant pairs in Social Group 1 than in the other two social groups. Two possible explanations for this result, which are not mutually exclusive, are differences in composition (and dynamics) of the social groups and the effect of social influences on behavior.

Differences in social group composition can influence behavior. For example, in one reported case, a change in group composition (the removal of a dolphin) was responsible for changes in the relationship and the occurrence of aggressive and sexual behaviors between two male dolphins (Östman 1991). There were distinct differences in the composition of the social groups we observed. In our Social Group 1, the two infants were born within 72 h of each other, while the other social groups had 1–12-mo intervals between births. Social Group 1 consisted of a stable group of animals composed of the two mothers, the two infants, and the father of both infants. In contrast, Social Groups 2 and 3 were less stable, with more animals and shifts in group composition due to the requirements of performances and husbandry. We believe that these changes may have influenced behavioral development of calves in different social groups in our study.

Alternatively, *social facilitation*, also known as *contagion* (Thorpe 1963), could account for differences between the social groups and the behavioral similarity within Social Group 1. It is possible that the behavior of one mother-infant pair could act as a stimulus to elicit the same behavior of the other mother-infant pair. Walther (1984) has suggested that "when an animal is (presumably) very ready to perform a given behavior due to its internal or external situation, apparently the visual, acoustical, or olfactory perception of the performance of that behavior by another animal provides enough stimulation to bring it 'above the threshold' in the first animal." Social influence may have important functions in dolphin social groups, as it has for gregarious terrestrial ungulates (Walther 1984) and non-human primates (for review see Whiten and Hall 1992), contributing to the synchronization and cohesiveness of group members. In Social Group 1, the short interval between births is likely to have contributed to the potential synchronization of behaviors between the two mother-infant pairs. Thus, either factor, group composition or social influence, or both, could account for the differences observed among social groups.

Theoretical Considerations

We propose four hypotheses to account for the prevalence of P23 position in our study and in field observations. These hypotheses are not necessarily mutually exclusive, and in fact, it is likely that a combination of two or more factors determine the development of mother-infant spatial relationships over time.

Hypothesis 1: Protection from predators—When viewed from below, the common position for sharks attacking dolphins (Cockcroft *et al.* 1989), the white ventral surface of the infant in P23 position blends in with the white of the mother's underside and the bright water surface. In this position, the infant is camouflaged, because the mother and infant appear to be one large animal due to disruptive coloration (Cockcroft and Ross 1990, Würsig *et al.* 1990). Next to the mother, in P2 position, although camouflaged from the side, the infant might be visible to predators below. However, predator avoidance through fast escape may be enhanced in the P2 position (Cockcroft and Ross 1990, McCowan and Reiss 1995*a*).

Hypothesis 2: Nursing facilitation—It is possible that P23 is a predominant position because it facilitates nursing. During our observations, infants were nearly always in P23 position prior to nursing. An exception to this was during the first few days postpartum when the infant was swimming in the P2 position and the mother would turn on her side, presenting mammaries to the infant in order to initiate nursing. Notably, the occurrence of P23 position did not always coincide with nursing behavior; infants spent more time in this position than they did nursing. Due to the nature of our sampling methods, however, nursing was underrepresented in our data. Therefore, we were unable to determine directly whether a correlation exists between the frequency of P23 and the frequency of nursing. Since nursing is a relatively frequent behavior with a short duration, scan samples at each interval simply missed the behavior (Altmann 1974). The dearth of spatial and nursing data in the literature and the possibility that this common position is related to nursing behavior suggest that this might be a promising avenue of research in future studies.

Hypothesis 3: Phylogenetic conservation—Considering the close phylogenetic relationship between aquatic cetaceans and terrestrial ungulates (Graur and Higgins 1994, Milinkovitch *et al.* 1994), the P23 position might be a conserved homologous trait. Similar to dolphins, ungulate offspring are often observed underneath their mother and toward the rear of her body (Lent 1974). Conversely, many terrestrial animals appear to be underneath their parent when close together simply due to the difference in their sizes. The divergent strategies used by various female marine mammals of different evolutionary lineages to keep their offspring with them may further reflect this phylogenetic relationship. Sirenian calves, for example, swim above the mother and rest or are carried on her back.

Hypothesis 4: Social significance—Studies of free-ranging dolphins generally rely on spatial proximity as a measure of social relations indicating "affiliations" or "coalitions" (*e.g.*, Connor *et al.* 1992). In captive situations, affiliative relationships can be expressed by delphinids through synchronized swimming and breathing, close interanimal distance, the frequency and duration of swimming together, and physical contact (Pryor and Shallenberger 1991). In addition, Bateson (1974) reported the occurrence of close spatial proximity and stereotypic swimming formations between specific individuals during periods of rest within a social group of dolphins in captivity. Dominant dolphins were at the top of the group near the water surface, while the most subordinate animals were at the bottom. Bateson suggested that these spatial relations represented a "diagram of relations" among individuals.

It is possible that specific spatial positions in other behavioral contexts may indicate social relationships when dolphins are in close proximity. The "infant" position is aptly named. In the present study, the P23 position was almost exclusively observed between mothers and offspring, and was rarely observed between an infant and other adults. Tavolga and Essapian (1957) noted that infants assume the "infant" position when startled or tired, and we observed this as well. This position might provide a "safe" place for the infant, and the infant's presence in this mother-infant position might signal their relationship to the group or even to an antagonist.

The two infants in Social Group 1, Delphi and Panama, continued to be observed at irregular intervals through their sixth year, and the two calves in Social Group 2, Liberty and Norman, were observed at irregular intervals through their second and third years. Notably, the P23 position persisted between the mothers and their male offspring during rest periods as long as the mother-infant pairs were housed together, even through the (postweaning) juvenile years. It was also observed that Delphi and Panama would occasionally swim in the P23 position with each other during rest periods after they had been permanently separated from their mothers and were housed together during their fifth and sixth years (Reiss, personal observation).

The persistence of the P23 position between maturing offspring and their mothers or other conspecifics (Tavolga and Essapian 1957, Mann 1997, present study), and the use of this position by calves when frightened, threatened, or tired (Tavolga and Essapian 1957; Reiss, personal observation; McCowan, personal observation) suggests it may have a social function as well. We speculate that the mother and calf are reinforcing their own bond by participating in this specific spatial state, as well as advertising the relationship to others. Between non-mother-calf pairs, the P23 position may also represent role relationships or expressions of dominance and subordination that might be a derivative of the early mother-infant relationship. Östman (1991) found that the relative dominance of two males changed over time and that this relationship was expressed in which role (dominant or submissive) the animals took in sexual interactions. Role in this case was determined by the exact behavior, as well as the relative position of the dolphins above or below each other. Future studies of social behavior should take into consideration the possibility that specific spatial states may express role relationships, status, or position in fluid social hierarchies. This will be particularly important in social groups in which it is possible to observe the course of social interactions between maturing infants, their mothers, and other members of their social group.

Implications for Field Research

The pattern of decreasing mother-infant contact time has implications for researchers conducting population surveys of dolphins in the field that rely on individually identified juveniles. Infants in our study were spending roughly 50% of their time in very close proximity to their mothers at twelve months of age. This trend might affect results of researchers in the field unable to discern the exact size of a calf (and thus its age) when not in association with its mother. Thus, surveyors in the field might have only a 50–50 chance of recognizing the age or identity of a one-year-old with no distinguishing marks who was previously known only by its close proximity with its known mother. Repeatedly missing this one-year-old could lead to errors in estimation of survivorship, age class structure, social relationships, population closure, dispersal, or parentage. Although occurrence of the "infant" position between a juvenile and its mother might aid the population biologist in identifying the presence of a calf, most studies of bottlenose dolphins occur in waters with low visibility where the researcher cannot see the specific spatial states of mothers and infants. In other instances, it is not always possible to stay with a group long enough to see whether a juvenile assumes the infant position with its mother. Our results suggest that these studies should be carried out with an effort towards staying with groups for as long as possible in order to determine age and identities of group members and with the caveat that identifying and recognizing juveniles is problematic at best.

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Appendix 1.
Ethogram of Specific Mother-Infant Spatial States Used in This Study

Code	Description
P0	Infant in front of mother
P1	Rostra parallel
P2	Infant at mother's side within 0.5m
P2X	Infant crosses over mother P2 to P2
P2D	Infant P2 next to mother's dorsal fin
P3	Infant alongside mother from genital-flukes
P4	Infant behind mother
P5	Infant at mother's side, distance >0.5m
P6	Infant under mother other than genital-mammary orientation
P7	Infant above mother
P8	Infant circling mother
P9	Mother beak to infant genital
P10	Mother ventral up next to or under infant
P11	Infant and mother ventral to ventral (mother below, infant above)
P12	Dead man's float, infant perpendicular across mother's rostrum
P15	Infant porpoising sequence
P16	Infant breaching sequence
P17	Mother chasing/following infant around tank, usually M-I contact
P18	Mother holds infant on bottom
P19	Infant ventral under mother
P20	Mother and infant side by side, ventral to ventral
P21	Infant on surface, beached between mother's pectoral fins
P22	Infant spyhop
P23	Infant swims under mother's tail region, no genital orientation
P23BUM	P23 position, mother or infant bumps other
P23CON	P23 position, contact between infant's melon and mother's underside
P24	Mother with two infants
P36	Infant alone
P44	Mother in P17 with two infants
P50	Two M-I pairs in P23's next to each other
PN	Infant nurses
PG	Infant beak to mother's genital region
SEX	Sociosexual behavior