

## Intraspecific agonistic behavior of *Tursiops truncatus* (Cetacea, Delphinidae) during dolphin-human cooperative fishing in southern Brazil

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### Resumo

Apresenta-se uma análise dos comportamentos agonísticos intraespecíficos de *Tursiops truncatus* durante as interações com a pesca artesanal de tainhas no sul do Brasil. Estas manifestações agressivas foram executadas tanto por machos quanto por fêmeas, apenas nas proximidades da linha de pescadores. Os coeficientes de Schaller demonstraram que o nível de associação entre pares de delfins, interagindo com a pesca de tainhas no sul do Brasil, é extremamente baixo. Isto nos leva a duas hipóteses complementares: há uma relativa dominância intraespecífica durante as interações com a pesca de tainhas e esta leva a uma exclusividade temporária na utilização dos recursos.

**Unitermos:** comportamentos agonísticos, *Tursiops truncatus*, Cetacea, sul do Brasil.

## Summary

Intraspecific threat behavior of *Tursiops truncatus* during dolphin-human cooperative fishing of mullets in southern Brazil, are described and discussed. These aggressive manifestations were observed only near the line of fishermen and were equally performed by males and females. Schaller's coefficients demonstrate that the level of intraspecific association between pairs of dolphins, interacting with the mullets fisheries in southern Brazil is extremely low. This allows two complementary hypotheses: there is a relative degree of intraspecific dominance during the interactions; this promotes a temporary exclusiveness in the use of food resources.

**Key words:** aggressive behavior, *Tursiops truncatus*, Cetacea, southern Brazil.

Associations between coastal bottlenose dolphins, *Tursiops truncatus*, and the artisanal fishing of mullets (*Mugil* spp.) in southern Brazil, were first described by Pryor et al. (1990) and Simões-Lopes (1991). Recently, these interactions have been re-described and quantified, showing optional mutualist bonds (Simões-Lopes, 1995). Direct and systematic observations were focused in two areas: The Laguna (28°30'S) and Imbé/Tramandaí (30°S) inlets, totalling 1,024 hours. The conditions for observation were excellent, and the distance ranged from 4 to 25 meters. The samplings were carried out from land stations.

During dolphin-human interactions, it was possible to detect intraspecific threat behavior of *Tursiops truncatus* in front of the line of artisanal fishermen. Those behaviors included tail slaps and forced exhalations producing large bubbles (similar to a "cough" and "big underwater bubble" described by Shane, 1990). Presentations of open mouth, jaw claps and marked arching of the body with head and tail down ("arch/hump" from

Östman, 1991) were also observed. These threatening displays were sufficient to move other individuals away. The threatening exhibitions were observed only in the proximities of the line of fishermen, and did not involve long chases. Aggressive manifestations were performed equally by females, but in this case the targets were also other females. Photo-identified females #L<sub>6</sub> and #L<sub>8</sub> were seen a number of times moving other dolphins away. #L<sub>8</sub> (named Caroba) used to turn to another dolphin while inflating her thorax and making forced exhalations above or below the surface. The local fishermen corroborate such behavior and consider it to be very frequent.

The associations between pairs of dolphins (side by side and parallel) during the interactions were quantified by Schaller's coefficient of association =  $2J/(a + b)$ ; where  $J$  is the number of sightings of the pair of dolphins;  $a$  is the total number of sightings of dolphin A, and  $b$  is the total number of sightings of dolphin B (Wells et al., 1987). The coefficient varies from 0.00 for dolphins which were never seen together to 1.00 for those pairs which were always observed together.

Schaller's coefficients clearly demonstrate that the level of intraspecific association between pairs of dolphins interacting with mullets fisheries in Southern Brazil is extremely low, and is probably casual (Table 1). In both localities, individual interactions with artisanal fishing constituted a remarkable majority of the events, ranging from 90% to 93% of the cases, respectively (Figure 1).

Aggressive behavior occurs in varied contexts, including hierarchical dominance, defense of offspring or food items (Shane et al., 1986). Particular individuals are more aggressive than others when close to each other. Norris and Dohl (1980) argue that the dominance can be expressed in terms of hierarchy in captivity or positioning of free individuals, and Corkeron et al. (1990) has verified the priority of the adult males in their

access to food close to trawling nets. The displays of menace close to the line of artisanal fishermen in Lagunas's and Imbé/Tramandaí's inlets, permit two complementary hypotheses: a) there is a relative degree of intraspecific dominance during the interactions; b) dominance promotes a temporary exclusiveness in the utilization of food resources.

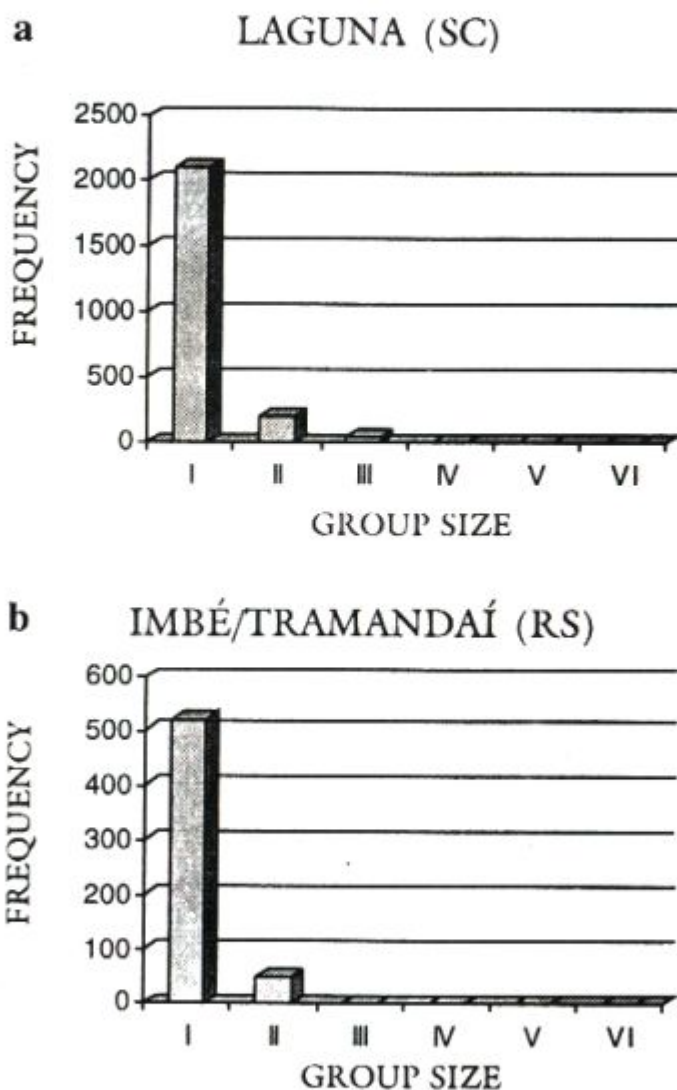


FIGURE 1 - Group size of dolphins (*Tursiops truncatus*) during interactions with artisanal fishing of mullets in southern Brazil: a) Lagunas's inlet (28°30'S) and b) Imbé/Tramandaí's (30°S) inlet.

TABLE 1 - Coefficient of association for pairs (side by side and parallel) of photo-identified dolphins (*Tursiops truncatus*) observed during interactions with artisanal fishing of mullets in southern Brazil. The higher coefficients correspond to the shading boxes in the upper half of the matrix: a) Lagunas's inlet (28°30'S) and Imbé/Iramandaf's (30°S) inlet.

	L.02	L.05	L.06	L.07	L.08	L.09	L.10	L.11 B	L.12	L.14	L.15	L.17	L.18	L.19	L.20	L.21	L.28	L.37	L.35	
L.02	--																			
L.05	--	--																		
L.06	0,050	--	--																	
L.07	0,012	0,014	--	--																
L.08	0,030	0,028	0,030	0,006	--															
L.09	0,009	0,019	0,019	0,027	0,053	--														
L.10							--													
L.11 B	0,004							--												
L.12	0,011	0,032	0,032	0,006	0,006				--											
L.14	0,021	0,028	0,028	0,004	0,065	0,011		0,005	0,004	--										
L.15	0,006					0,016	0,022		0,086	--										
L.17											--									
L.18	0,004				0,006				0,061											
L.19	0,006	0,065	0,013	0,005	0,005			0,011	0,020					--						
L.20					0,014				0,015						--					
L.21		0,013			0,006				0,096	0,043										
L.28	0,011				0,228				0,079	0,014				0,322						
L.32	0,062	0,050	0,015		0,043	0,019			0,007					0,158						
L.35												0,130								0,079

	I01	L 11 B	I05	I06	I07	I08
I01	--					
L 11 B		--				
I05	0,038	0,018	--			
I06	0,007			--		
I07	0,015	0,019	0,034	0,017	--	
I08			0,008	0,053		--

A

B

## References

- Corkeron, P.J.; Bryden, M.M.; Hedstrom, K.E. 1990. Feeding by bottlenose dolphins in association with trawling operations in Moreton Bay, Australia. *In*: Leatherwood, S. and Reeves, R.R. (eds). **The Bottlenose Dolphin**. Academic Press, San Diego, CA, p.329-336.
- Norris, K.S.; Dohl, T.P. 1980. The structure and functions of cetacean schools. *In*: Schusterman, R.J.; Thomas, J.A.; Wood, F.J. (eds). **Dolphin Cognition and Behavior: A Comparative Approach**. Lawrence Erlbaum Assoc., Publ., London, p. 211-261.
- Östman, J. 1991. Changes in aggressive and sexual behavior between two male bottlenose dolphin (*Tursiops truncatus*) in a captive colony. *In*: Pryor, K.; Norris, K.S. (eds). **Dolphin Societies: Discoveries and Puzzles**. University of California Press, Berkeley, p. 305-317.
- Pryor, K.; Lindbergh, J.; Lindbergh, S.; Milano, R. 1990. A dolphin-human fishing cooperative in Brazil. **Mar. Mamm. Sci.**, 6 (1): 77-82.
- Shane, S.H. 1990. Behavior and ecology of the bottlenose dolphin at Sanibel Island, Florida. *In*: S. Leatherwood; Reeves, R.R.(eds.). **The Bottlenose Dolphin**. Academic Press, Inc. San Diego, CA, p. 245-265.
- Shane, S.H.; Wells, R.S.; Wursig, B. 1986. Ecology, behavior and social organization of the bottlenose dolphin: a review. **Mar. Mamm. Sci.**, 2 (1): 34-63.
- Simões-Lopes, P. C. 1991. Interaction of coastal populations of *Tursiops truncatus* (Cetacea, Delphinidae) with the mullet artisanal fisheries on Southern Brazil. **Biotemas**, 4 (2): 83-94.
- Simões-Lopes, P.C. 1995. **Ecologia comportamental do delfim, *Tursiops truncatus* (Montagu, 1821), durante as interações com a pesca artesanal de tainhas (*Mugil* spp.) no sul do**

**Brasil.** Tese de doutorado, PUCRS, Porto Alegre, RS, Brasil, 200 pp.

Wells, R.S; Scott, M.D.; Irvine, A.B. 1987. The social structure of free-ranging bottlenose dolphins. *In*: Genoways, H.H. (ed.). *Current Mammalogy*, Plenum Press, New York, p. 247-305.