DISABLED BUT NOT DISCOUNTED: A CASE STUDY OF TWO *TURSIOPS TRUNCATUS*

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Zoological facilities and aquariums have housed disabled animals for years, but they are rarely integrated into educational shows or public interactions. As the prevalence of disabled animals in human care increases, their trainers and zookeepers are challenged with the task of creating new and innovative animal care, training, and enrichment techniques (Hepting 2006). The training staff at Dolphins Plus (Key Largo, Florida) has developed unique integration programs for two special needs dolphins (*Tursiops truncatus*) in their care.

Dolphins Plus is a marine mammal research and education facility located approximately 60 miles south of Miami in Key Largo, Florida. The facility lies on a canal, immediately adjacent to the Atlantic Ocean. The proximity to the ocean produces a 0.6 - 0.9 m tidal exchange that acts as a natural filtration system. The dolphin habitats resemble a mangrove ecosystem, with typical flora and fauna and a limestone/soft sediment substrate. This natural seawater setting provides an enriching environment for the resident dolphins (*T. truncatus*) and sea lion (*Zalophus californianus*).

The Dolphins Plus population consists of 15 Atlantic bottlenose dolphins distributed amongst two dolphin habitats (approximate depth and area: 4.5 m and 3000 m^2) that are separated by the canal. The first case study involved a visually impaired, female *T. truncatus* named "Jessica", who is estimated to be approximately 25 years old and lives in an enclosure containing 3.5 dolphins. The second case study involved a deaf, visually impaired, neurologically challenged, female, offshore *T. truncatus* named "Castaway", who was rescued in 2007 and is estimated to be approximately 35 years old. Castaway lives in an enclosure containing 1.6 dolphins.

CASE STUDY 1: JESSICA

Background

Jessica is a member of the first generation Dolphins Plus population collected in 1987 from Sarasota Bay, Florida. Though she was a founding member of the natural swim program at Dolphins Plus, her formal training began in late 1999. Jessica participated in her first interactive platform session in January 2000, involving three to five behaviors, with customers kneeling on a floating dock. By 2001, Jessica was fully integrated into the Dolphins Plus Structured Swim Program, which is a deep-water interactive program. Subsequently, she spent 2 years at Dolphin Resorts, an affiliate of Dolphins Plus in the Caribbean, where the public swim interaction was minimal and intermittent, thus limiting the development of her interactive behavior repertoire. Jessica sustained eye trauma during the transport back to Dolphins Plus on May 17, 2003 that resulted in significant visual impairment.

The predominant training obstacles that required attention included: procuring nourishment, stationing, adapting previously established behavioral criteria to address Jessica's visual deficit, introducing unique, new training protocol to encourage session participation, developing and

implementing tactile and underwater S^ds, and training voluntary administration of topical ophthalmic medication.

Feeding, Stationing, and Targeting

Upon reintroduction to the Dolphins Plus population, Jessica was placed in an enclosure with 0.4 Atlantic bottlenose dolphins, one of which was part of the Dolphin Resorts population. Jessica presented with bilateral blepharospasm and would not come to control. Diagnosis of Jessica's opthalmic conditioned was initially hampered by her persistent bilateral blepharospasm which was indicative only of ophthalmic irritation of unknown etiology. The initial challenge arising from her ophthalmic condition was providing nourishment for an animal that refused to come to station. Prior to her eye trauma, Jessica was trained to station heads up at a floating platform in front of a trainer to receive food/primary reinforcement. The tactics utilized to feed Jessica during the first week post-trauma included tossing fish towards Jessica from a distance, positioning a trainer with food underwater on SCUBA, and offering tactile reinforcement from the water for approaching the platform.

Once Jessica was stabilized, the training staff maintained consistent feed times and stations in order to establish a pattern. During the initial phase, the criteria for stationing were reduced, and Jessica was not expected to stay at control. Her trainers tackled the challenge of fish delivery to a visually impaired dolphin by implementing "on the fly feeding", which had been used historically at Dolphins Plus for post-parturition females. Trainers were able to establish a precursor of tapping the water's surface with the fish prior to administration. This precursor was developed into an S^d for an open mouth and the receipt of primary reinforcement, which is still utilized today.

Once Jessica successfully targeted at station (hand target on the surface of the water), trainers re-established platform stationing criteria and maintained a continuous primary reinforcement schedule. Jessica was required to have her rostrum focused towards the platform, her ears and eyes underwater, and was permitted to break station occasionally to scan her surrounding environment.

On June 9, 2003, Jessica targeted with her eyes above water for the first time since the transport. Trainers used a hand slap on the water as an S^d for Jessica to stationary target. Once a target was established, the trainers lifted their hand above the water, encouraging Jessica to follow, and reinforced approximations. To date, this S^d is utilized to obtain a heads up body position at station.

With stationing established, a concerted effort was made to limit Jessica's training team to three members. Each member of Jessica's team had a long-term training relationship with her and extensive knowledge of her behavior repertoire, body language, propensity towards frustration, and effective secondary reinforcers.

Development of Modified Training Regime: Mimicking and S^ds

Seven days post-trauma, Jessica's trainers introduced tactile stimulation to elicit a pectoral presentation. While maintaining a hand target with her rostrum, her trainers initiated a tap on Jessica's shoulder to encourage her to raise her pectoral fin out of the water. Approximations

eventually resulted in the same criteria previously established for a pectoral presentation. The tap on Jessica's shoulder was the first tactile S^d developed for Jessica, and is currently used as the S^d for bilateral pectoral presentations.

The next step in her training involved a reintroduction to the Structured Swim program. In order to encourage mimicry, Jessica was paired with a fully trained, juvenile, female Atlantic bottlenose dolphin named "Tracey". Using Tracey as a lead, in conjunction with the controlled body positioning of the swim participants, resulted in an increased response rate of previously trained behaviors, such as body rubs and foot pushes. The placement and positioning of program participants were distinguished as being crucial to Jessica's willingness to participate and success with behaviors, so strict protocol was established regarding participants.

As Jessica's participation in the structured program increased, new training applications and expectations were developed to address Jessica's visual deficit (e.g. allowing for echolocation by submerging training and session tools). In addition, sets of underwater and tactile S^ds were developed that corresponded to the original, visual, above water S^ds. Once the new S^ds were established, Jessica's anticipation of behaviors and dependence upon Tracey were extinguished. From that point forward, Jessica was expected to remain at station, receive the S^d, and then perform the desired behavior.

The "cradle kiss" was the first new interactive behavior introduced to Jessica post-trauma that was modified to address her disability. The original kiss behavior, in which a dolphin would target directly on the cheek of the program participant, was established as potentially unsafe for both Jessica and the participant, due to Jessica's inability to see. Therefore, participants were asked to present their hands in a cradle position directly in front of their mouth, and Jessica was trained to place her rostrum in the hand cradle. This behavior has proven to be safe and reproducible for the entire dolphin population, and thus has been incorporated as a key component in the Structured Session.

Diagnosis and Treatment

On June 10th and June 21st, 2003, Jessica opened her left and right eye, respectively. The veterinarians described corneal opacity, typical of keratitis, and determined that Jessica did not respond to visual stimulation. Jessica was diagnosed as functionally blind and treatment began with topical ophthalmic medication. Training for eye drop administration was initiated with a pectoral presentation and a rostrum hand target, thus positioning her eye above the water. Jessica's inability to see the medication bottle was an advantage, because she did not exhibit the blink reflex. An extended target was used to keep her positioned appropriately with her eyes above the water, and the length of time she was expected to maintain target was gradually lengthened.

Modified Integration Into Existing Programs

Over the next few months, Jessica's program participation gradually increased. During this time, her trainers noted a pronounced resistance to participation in response to ambient noise and erratic customer behavior. In order to ensure the safety and security of both Jessica and the program participants, the total number of people she interacted with each day was limited, and strict criteria for their participation were established. Specifically, participants were required to

have a good working knowledge of the English language, be able to explicitly follow directions, be confident and comfortable in the water, and have the capacity to be calm and respectful. By September of 2003, Jessica was fully integrated into the structured program with a 90% rate of participation. At this stage of her development, any deviation from that rate of participation, given the program guest criteria were upheld, resulted in a terminated session. To increase rate of success the training staff began to introduce new behaviors to Jessica's interactive repertoire. The use of follow and body targeting were two critical tools utilized in her training regimen. However, frustration was a limiting factor for Jessica, and consistency in her training was crucial to minimize the effect this had on her learning curve. Therefore, a single trainer was designated to introduce and train new behaviors.

In conclusion, the predominant tools utilized in Jessica's initial post-trauma training and development were: consistency in station location, strict criteria for customer positioning, consistent dolphin pairing, and fixed ratio reinforcement. To date, Jessica's behavioral inventory has increased by over 100%. She currently performs all of the structured swim behaviors with equal success to her sighted cohorts. Jessica's training regimen now includes change of station location, variability in customer positioning, changes in dolphin pairings, and variable-ratio reinforcement and variety. Jessica's participation no longer depends on her customers' abilities thus the customer limitations have been lifted. As a result of the dedication and determination of the training staff, Jessica is one of the most consistent and dependable interactive session dolphins at Dolphins Plus.

CASE STUDY 2: CASTAWAY

Background

Castaway was found stranded on Castaway Cove beach, Vero Beach (Florida, USA) on November 11th, 2006. Harbor Branch Oceanographic Institute (HBOI) responded *in situ*, and she was subsequently transported to Mote Marine Laboratory (Mote) in Sarasota, Florida. After 79 days of rehabilitation, 4 unsuccessful release attempts on January 30th, 2007 culminated in her transport to the Marine Mammal Conservancy (MMC) in Key Largo, Florida. During her extensive rehabilitation at the Marine Mammal Conservancy, she was diagnosed as deaf via two passive auditory tests, with neurological deficiencies and limited vision. Castaway was transported to Dolphins Plus in July 2007. In lieu of her special needs, the animal care staff at Dolphins Plus established that her immediate challenges were to adapt to life under human care, establish feeding patterns, and build a relationship with her trainers (Sayre et al. 2007).

Eight months after her arrival at Dolphins Plus, Castaway's trainers began to develop criteria for a unique interactive swim program designed specifically for her. This new program enables the staff to educate the public about rehabilitation and rescue in a personal, hands-on way, while concurrently adding enrichment to Castaway's daily life.

The many training obstacles that needed to be addressed included: introducing Castaway to a shallow water environment, developing criteria for stationing in a full contact scenario, training stationing at control with maintained focus on the trainer, Castaway's propensity towards mouthing (presumably a byproduct of limited vision and deafness), training the concept of body awareness, establishing proficiency in changing topography during sessions, conditioning Castaway to S^{d}s delivered from varying locations and trainer positions, establishing a tactile

bridge, transferring Castaway's focus between trainers and participants, and developing new behaviors to address Castaway's mental and physical abilities.

Training in a Shallow Water Environment: Targeting and Stationing

The initial training for the "Cuddle with Castaway" program began in April of 2008. This program is a wade program, which had not historically been offered at Dolphins Plus. The decision to develop a wade program for Castaway was based on her inability to follow her trainers' commands from a distance and her deficient short-term memory. The nature of Castaway's disabilities required a strong knowledge of her personality, cognitive and physical abilities, and body language. Thus, two animal care staff members were chosen to be Castaway's trainers, allowing for strict training criteria and trainer continuity.

The program is conducted on a mechanical platform that is lowered into Castaway's enclosure to a depth of approximately 1.5m. Using small approximations and a hand target, Castaway successfully maneuvered up over the wade platform in just 2 weeks. The relationship established with her trainers contributed to Castaway's comfort and ease in the shallow water environment.

The shallow water working environment allowed Castaway the opportunity to interact with a trainer in a full contact scenario. She was very forceful, often displacing her trainers while exhibiting dominant behaviors. However, establishing inter-individual boundaries with an animal that cannot see well, hear, or echolocate proved to be a difficult task. To begin to overcome Castaway's aggressive tendencies, an extended hand target was implemented in a start position at the edge of the platform (i.e. keeping Castaway in deeper water). Once Castaway was stationed and calm for an extended target, she was positively reinforced by being invited onto the platform with her trainer. The criteria for the invitation required that she remain on the extended hand target when both on and off the platform. Pushing and shoving while on the platform resulted in Castaway being moved back to the edge of the platform and back into the deeper water. The extended hand target created an effective personal working space around the trainer that Castaway was not permitted to enter.

Development of S^ds, Focus, and Awareness

With the trainers' spatial parameters in place, S^ds were delivered from varying locations and trainer positions. This was a substantial challenge, because prior to shallow water training, Castaway had always received S^ds from a trainer kneeling on a floating platform from a distance of approximately 0.3m. The transition in the position of the trainer altered the visual context in which she had been accustomed to receiving her S^ds. After many repetitions and adjustments of her S^ds, Castaway was performing all of her formally trained behaviors while on the wade platform within two months.

Castaway's horizontal positioning while on the wade platform resulted in her eyes remaining submerged for the majority of each training session, which made it difficult to apply the already established visual point bridge (Sayre et al. 2007). Therefore, a double tap was developed as a tactile bridge, which elicited an immediate return to station and was conditioned to be used on any part of her body.

The next challenge was to introduce Castaway to program participants. Dolphins Plus animal care staff members were utilized during the first few months of approximations, because Castaway had a propensity towards exploratory mouthing behaviors. The training began with maintaining Castaway's focus on her trainer as new individuals entered and exited her visual range. Castaway was secondarily reinforced for remaining at station and maintaining her focus on her trainer by allowing her to interact with the participants through specific, tactile behaviors.

As the wade platform became more crowded with the addition of multiple participants, Castaway's limited body and spatial awareness became pronounced. At approximately 3m in length and 270kg, Castaway dominates the wade platform space, and the potential for participant injury was high. Therefore, Castaway was reinforced for making tight circles on the platform, which ensured that she would not collide with a participant. Castaway was also trained using a hand target to weave around participants while coming onto and off of the platform. This body awareness training was new to the Dolphins Plus staff, as they had never encountered this type of challenge in the past.

Training the "Cuddle with Castaway" Program

The behavioral repertoire for the new wade program incorporated previously learned behaviors such as tactile behaviors (as part of a hands-on anatomy lesson), dorsal and ventral body rubs, a toy retrieval, and a handshake. New behaviors included a hug, a kiss, a dance, tail thumps, "tickle", "shimmy", and vocals, which were all trained in the new, shallow water environment.

Conditioning Castaway to focus her attention on her trainers resulted in active avoidance of the participants and thus, the interactive behaviors. To resolve this issue, the animal care staff demonstrated the interactive behavior to the guest, and then moved to a standing position behind the participant. By requesting the behavior from Castaway in the shadow position, and essentially becoming invisible to her, she began to interact with the participants in a safe, controlled manner. Eventually, the staff extinguished the trainer's position behind the participant and replaced it with a hand target, which was used effectively to direct Castaway towards the participant. The S^d was only delivered when her focus on the participant was identified. Upon completion of the behavior and deliverance of a bridge, Castaway was directed back to her trainer by a slap on the water, which acted as a visual cue. However, due to Castaway's deficient cognitive abilities, specifically her difficulty with identifying patterns, this continues to be one of the most difficult concepts for her.

Castaway's training team developed strict parameters for the "Cuddle with Castaway" participants, in order to maintain a safe environment for both Castaway and the guests. To participate in the program, guests must be 10+ years old, have a good working knowledge of the English language, have the ability to follow directions, and be comfortable in the water.

Just three short months after wade training began July 2008 marked the official opening of the "Cuddle with Castaway" program. As a result of the persistent efforts of the Dolphins Plus animal care and training staff, Castaway is the only rescued, deaf, partially blind, neurologically challenged, offshore Atlantic Bottlenose dolphin currently participating in an educational, interactive program. Furthermore, Castaway's story provides important background knowledge on rescue and rehabilitation, as well as inspiration for our guests.

CONCLUSION

Jessica and Castaway are disabled members of the Dolphins Plus *T. truncatus* population and are contributing in interactive swim programs beyond expectation. Since her injury, Jessica has successfully raised a calf, participates in the Natural Swim Program, and developed an extensive behavioral repertoire, in conjunction with a multifaceted system of S^ds, as part of her participation in the Structured Swim Program. Castaway quickly adapted to life under human care, and while living in a soundless world, learned the "training game", and became the only dolphin to participate in a unique wade program at Dolphins Plus. Beyond the scope of training, the inspiration both Jessica and Castaway offer our guests, specifically those with special needs, is paramount and enduring. With a staff of dedicated trainers, a limitless vision, and a little ingenuity, animals with special needs can play a prominent role in education and interactive programs. Don't discount the disabled!

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