

## **Short- and long-term impact of cognitive enrichments on dolphin welfare**

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Dolphins live in complex societies where social behaviours have important roles in finding food, looking after the young ones, building and maintaining alliances. Thus having opportunities for engaging and practicing collaborative actions may be considered key components of dolphin welfare. Environmental enrichments provide great tools for that, their value have repeatedly documented with animals under human care. The evolution of a special group of enrichment devices have taken the enrichment programmes one step further; cognitive enrichments have provided novel opportunities of linking welfare and science. The utilisation of cognitive enrichments not only allows the assessment of activity budgets, but it also facilitates the investigation of species-specific cognitive processes.

In our study, we developed a series of cognitive enrichment devices with a focus on mutualistic and altruistic cooperation in a group of male Indo-pacific bottlenose dolphins. The devices were provided in between feeding sessions without specific training regarding their manipulation. The devices were constructed of PVC pipes, caps and rope handles, allowing simultaneous interactions for the dolphins. Besides recording the outcome of the trials, we were also interested in the welfare impact of these novel enrichments. Therefore, seven welfare indicators were monitored for a 3-year observation period. The occurrence of affiliative, aggressive and potentially stereotypical behaviours was assessed and compared between ‘Session days’ (when the cognitive enrichments were utilised) and ‘Non-session days’ (only regular enrichments were used).

The analyses revealed that ‘Play with enrichment’, ‘Affiliative tactile’, ‘Social play’ and ‘Synchronous swim’ were significantly higher, while ‘Aggression’ was significantly lower on Session days than on Non-session days. Moreover, the individual and the social network analysis further supported our findings. Positive welfare indicators increased for all dolphins during Session days and aggressive interactions in the network decreased.

The project was launched in 2016 and due to its success it continued even after 2019. Up till today over 260 sessions were conducted and no sessions were recorded without interactions, proving the value of the devices to the dolphins. Four research papers were published on the outcomes of cognitive research, including the first description of a novel affiliative behaviour. The results with regards of the welfare impact are currently under consideration for publication. We truly believe that cognitive enrichments are the key for advancing both welfare and science simultaneously in cetaceans.