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The Legacy Lives on, a Year Later: Dr. Stan A. Kuczaj A Special Issue – Part 2

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The scientific community has mourned the loss of Dr. Stan Kuczaj, Professor at The University of Southern Mississippi and Director of the Marine Mammal Behavior and Cognition Laboratory, for the past year. In this time of grieving and reminiscing, his scientific legacy has continued to live on through students, collaborators and trusted colleagues. Stan's passing has acted in part as a motivator to continue to publish works that he invested time and energy in as a tribute, seeing his visions through to fruition. In addition to publishing droves of literature, his colleagues within the development and comparative fields have bound together for the common goal of advancing the science through new collaborations, merged resources, and tackling innovative topics in comparative studies. This second commemorative special issue is a testament to the vast scope of Stan's impact on the scientific community, as well as his legacy that each of his students and colleagues continues to cultivate.

A community was forged between Stan's colleagues and remaining students from the Marine Mammal Behavior and Cognition Laboratory. Inspired by his commitment, enthusiasm and excitement for studying animals and cultivating young scientists, the group set forth to continue Stan's work and honor him with finalizing projects from the lab. Since his passing, seven students have acquired their Masters of Arts degree and four received their Doctorate degrees, eight additional students successfully proposed their theses and dissertations and are on track for graduating in the near future. The first several projects featured in this special issue represents collaborative works between Stan and these students.

Cognitive work was Stan's true passion, regardless of the species, gaining information about cognitive processes of varying species influenced decades of his and the students' works. Stan promoted research with managed care animals, collaborating with countless facilities, including Six Flags Vallejo, on various projects. Stan, an avid supporter of environmental enrichment, loved creating devices to be cognitively enriching for the animals. His work with Pepper Hanna and collaborators examined a killer whale (*Orcinus orca*) response to visual media in the form of video recordings played on a television screen in an underwater viewing area. Examining behavioral laterality, as well as the video content that promoted the greatest response rate not only provided enrichment for the subject, but also gave insight into its cognitive processes. Additionally, this project promoted the synergistic relationship between trainers and researchers within the managed care environment.

Through his comparative work, Stan gained a keen interest in individual differences of non-human species. Stan assessed personality and individual differences through creativity, problem solving, developmental play, environmental enrichment, and social interactions. Formulating an approach to measure dolphin personality through the Five Factor Model with Lauren Highfill across varying contexts has continued to influence works and more fine scale analysis. In collaboration with Kelsey Moreno, personality characteristics and how they affect the formation of bonds between individuals were investigated, furthering the understanding of how personality may contribute to shaping bonds between individuals. This work continues to fulfill one of Stan's missions to gain a greater comprehension of personality characteristics and influencing factors in varying contexts.

Stan's passion extended beyond cognitive, behavioral and acoustic investigations with various species. Traveling to all corners of the globe, Stan gained a strong appreciation for different cultural views, as well as promoting positive change. As a scholar practitioner for non-human species, he sought to promote conservation through research. Stan, along with Maria Zapetis and coauthors continue to dedicate efforts on the effects and efficacy of conservation-focused educational efforts directed towards ecotourism tour operators. This collaborative effort intersected humans and animals to promote optimal conservation initiatives. Motivated by the positive effect their research, integration, and education could have upon the ecotourism industry in Columbia, Stan fueled this project with support for the purposes of conserving this unique ecosystem. This project validates the key role of education to the advancement of conservation and will continue to drive responsible wildlife ecotourism.

Investigating the sounds dolphins use to communicate was a passion of Stan's, especially in regards to those produced in varying behavioral contexts. In collaboration with Audra Ames and colleagues, building upon the works of McCowan and Reiss (1995), the "thunk" sound was further analyzed between a mother calf dyad, identifying a low harmonic range and a high harmonic range thunk, each varied in frequency, and how they were used (discipline versus separation). Ames explains, "Stan contributed his genius to a number of areas in the comparative psychology field", understanding the functions of dolphin sound in various contexts has been greatly advanced with many of his works.

Roatan Institute for Marine Sciences (RIMS) was a preferred study site for Stan and his students, mainly due to the large, diverse population, and ample enclosure size. Stan's curiosity to understand sounds produced in different social and behavioral states was further investigated with Christinea Perazio. Sound exchanges associated with varying mouth action displays, aggressive and non-aggressive, with this population of bottlenose dolphins were investigated. Sounds accompanied these behaviors more frequently, but results revealed the flexibility of sounds associated with different mouthing behaviors, supporting the need for additional investigations.

The next series of studies represents works Stan collaborated on or influenced the examination of certain topics by his former students and colleagues. Many of these works required years to come to fruition and their dissemination would be very pleasing to Stan.

Although Stan was the director of the Marine Mammal Behavior and Cognition Laboratory, he never passed up an opportunity to investigate other species, especially elephants, routinely exposing his graduate students to their cognitive prowess. Radhika Makecha, a former graduate student, conducted her graduate work with elephants and now strives "to take information on animal cognition to the public with the goal of significantly impacting attitudes towards animals". In conjunction with Ratna Ghosal, they created a cognitive based education program to influence and enhance conservation attitudes, especially in the native ranges of

elephants and where Human Elephant Conflict is high. Makecha states, “the work submitted to this issue pays homage to Stan and everything he stood for”.

Stan was an advocate for research in managed care, comprehending the significant gain researchers may acquire of the species through continuous and up close monitoring. Rachel Walker and Lance Miller, long time colleagues, friends, and former students, report on seasonal and diel changes within a grouping of bottlenose dolphins in this issue. The ability to observe and document behavior 24-hours a day, throughout a year affords the scientific community a greater understanding of the variables that influence behavior. Their results highlight congruencies between free ranging dolphins and those in managed care; also, that varying environmental factors have an impact on dolphin behavior.

Stan’s first collaborative work with Dolphins Plus began with a stranded, rescued, deaf, partially blind, pregnant, offshore bottlenose dolphin named Castaway in 2004. He was fascinated to learn about her cognitive and acoustic abilities. It was here that he met with the Holli Eskelinen and colleagues to establish a lasting scientific relationship and personal bond. Stan loved all things new, pushing the science, especially on unique behaviors, animals, or social groupings. It was here he joined in the investigation on male bottlenose dolphins (*Tursiops truncatus*) that participated in the rearing of calves, even when other viable females were present. The clearly affiliative paternal male care-giving type association with the calf fascinated Stan.

Stan’s interest in behavioral laterality further influenced the work by Kelley Winship and her colleagues. Using the framework of handedness indexes, thought to be uniquely human, the study examined pectoral behavioral asymmetries in a population of bottlenose dolphins during social interactions. Age related differences, as well as individual variation accounted for the results. Stan was captivated by comparative investigations, possessing an appreciation of how each furthered the understanding of the mental processes of non-human animals and development of behavior.

This interest in laterality and cross-species comparisons is also represented by a study on the eye preference used by bottlenose dolphins, Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), and belugas (*Delphinapterus leucas*) during a free-swim discrimination task between familiar and unfamiliar objects. Heather Hill and Deirdre Yeater, early students of Stan, as well as long-time collaborators and friends, along with Sara Guarino, a recently admitted student into the Marine Mammal Behavior and Cognition Laboratory, continue to examine the role of laterality in experiencing visual stimuli from a comparative perspective.

Each of these collaborative works highlights Stan’s wide-ranging interests and impact on his students, colleagues and the scientific community. Part 2 of the special issue on Stan’s legacy is a true testament of his diversified contribution to the field with both species, as well as topics, which is evident in this issue. Stan continues to be at the core of our scientific community influencing works, inspiring researchers, and living on within each of us. He is greatly missed!

To continue his legacy of encouraging enthusiastic and young researchers in the field of comparative psychology and marine mammals, a fund has been established to support a student to attend the annual Comparative Cognition Conference held in Melbourne Beach, Florida each spring. Tax-deductible donations may be made through the National Marine Mammal Foundation at any time.

<http://www.nmmf.org/kuczaj-memorial-fund.html>

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Reference

McCowan, B., & Reiss, D. (1995). Maternal aggressive contact vocalizations in captive bottlenose dolphins (*Tursiops truncatus*): Wide-band, low-frequency signals during mother/aunt-infant interactions. *Zoo Biology*, *14*, 293–309.

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