

EDITED BY

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Zoo Animal Learning and Training



WILEY Blackwell

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This book is dedicated to bridging the gap between those working within the zoo profession and academia; all of whom share a common goal to improve the welfare of animals.

We have been lucky to study animal learning principles and work to practically apply this information in practice within animal training programmes in zoos. With this perspective and respect for the importance of both the art and science of animal training, we hope this book will facilitate greater cooperation and support evidence-based practice.

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Notes on Contributors

Kirstin Anderson-Hansen is currently a postdoc at the University of Southern Denmark and in cooperation with the University of Veterinary Medicine Hannover, where she trains grey seals and aquatic birds, currently cormorants and common murres to investigate the effects of underwater noise on marine life. She started her career at the University of California in Santa Cruz over 25 years ago, working with cetaceans as a research assistant and trainer. Later, she followed some of the dolphins to the Shedd Aquarium in Chicago, where she worked and trained Pacific white-sided dolphins, beluga whales, harbour seals, sea otters, and penguins. In 1998, she was offered a trainer position at the Fjord and Baelt in Denmark, training harbour porpoises and harbour seals for research and public demonstrations. From 2003 to 2013, she was the training coordinator and zoological curator at Odense Zoo, where she had the opportunity to expand her training experience to all types of animals, including lions, tigers, giraffes, tapirs, birds, and manatees. Kirstin is the co-chair for the Training Committee at the Danish Association for Zoos and Aquariums (DAZA), as well as an expert advisor for the Animal Training Working Group at the European Association of Zoos and Aquariums (EAZA), where she is also an instructor for the animal training and management courses for both DAZA and EAZA.

Cristiano Schetini de Azevedo is a Brazilian biologist interested in zoo animals, animal behaviour, and animal conservation. This

author has been studying the effects of environmental enrichment on the behaviour and welfare of zoo animals, especially birds. In addition, antipredator training techniques for captive-born animals are being tested with the aim of increasing reintroduction success. Finally, aspects of animal personalities are being investigated to increase the efficiency of the environmental enrichment and for conservation purposes.

Kathy Baker works for the Whitley Wildlife Conservation Trust and her main role is to manage the zoo-based research and higher education delivery for Newquay Zoo. She coordinates and supervises student projects from FdSc to MSc level. Her research focus covers a wide range of behaviour and welfare related topics. In particular, cross species comparisons of animal personality, the evaluation of personality as a management tool for captive animals, and multi-institutional research to inform management practices for captive animals. Kathy's also a committee member of SHAPE – UK-Ireland, the regional division of The Shape of Enrichment, Inc. that is dedicated to furthering enrichment efforts in the UK and Ireland, and she is also a member of the Primate Society of Great Britain.

Gordon B. Bauer is professor emeritus of psychology at New College of Florida where he held the Peg Scripps Buzzelli chair in psychology until his retirement. He received an MS from Bucknell University and a PhD from the University of Hawaii, where he

studied under Louis M. Herman at the Kewalo Basin Marine Mammal Laboratory. He is a fellow of the American Psychological Association (Division 6) and Association for Psychological Science. He has studied animal senses, cognition, and behaviour in a variety of species including manatees, bottlenose dolphins, humpback whales, sea turtles, honeybees, and humans. In recent years he has focused on a broad survey of manatee senses, including vision, hearing, and touch. He has also investigated magnetoreception by cetaceans and sea turtles, hearing by dolphins and sea turtles, imitation and synchronous behaviour of dolphins, humpback whale behaviour, and memory in honeybees.

Sabrina Brando is director of animal welfare consulting company AnimalConcepts and 247 Animal Welfare. Sabrina is trained as a human psychologist, has a MSc in animal studies, and is currently completing a PhD in human and non-human animal welfare. Sabrina's research interests are welfare, behaviour, effecting change, advocacy, and storytelling. She has presented extensively as an invited and keynote speaker at animal welfare and advocacy conferences globally and is a reviewer for various animal behaviour and welfare journals. Sabrina is passionate about animals and the natural world, and focuses on promoting positive animal welfare and good human–animal interactions and relationships, to facilitate excellent animal care and protection and with the aims to effect behaviour change and challenge the status quo. Sabrina uses stories and storytelling as a means to connect, share, encourage, and empower.

Culum Brown is an associate professor at Macquarie University and has made a significant contribution to the study of behavioural ecology of fishes over his research career. His research niche lies in the study of fish behaviour with his most significant contribution being enhancing our understanding of fish cognition and behaviour. Culum is a well-known champion of fish intelligence and welfare.

Gordon M. Burghardt is alumni distinguished service professor in the Departments of Psychology, and Ecology and Evolutionary Biology at the University of Tennessee. He received his PhD in biopsychology from the University of Chicago and his research focus has been on comparative studies of behavioural development in species as diverse as turtles, bears, lizards, stingrays, spiders, crocodylians, and, especially, snakes. He has worked on many topics involving snakes including sensory perception, foraging, and prey capture, antipredator behaviour, sociality, multiple paternity, sexual dimorphism, colour and pattern variation, environmental enrichment, learning, genetics, conservation, ethical treatment, and mating systems. He has served or is serving as editor or editorial board member of numerous journals including, *Ethology*, *Herpetologica*, *Herpetological Monographs*, *Journal of Comparative Psychology*, *Animal Learning and Behaviour*, *Zoo Biology, Society and Animals*, *Journal of Applied Animal Welfare Science*, and *Evolutionary Psychology*. He is a past president of the Animal Behaviour Society and Division 6 (Neuroscience and Comparative Psychology) of the American Psychological Association. He has edited or co-edited 7 books, including *The Cognitive Animal: Empirical and Theoretical Perspectives on Animal Cognition* (MIT Press, 2002) and the *APA Handbook of Comparative Psychology* (APA, 2017) and authored *The Genesis of Animal Play: Testing the Limits* (MIT Press, 2005). Besides his reptile research, his current research involves play in animals and responses of primates and other animals to snakes.

Jackie Chappell's research interests focus on the ways in which the environment shapes intelligence through evolution, the ways in which animals (including humans) understand their physical environments, and how this changes during development. For example, how do animals integrate information about their physical environments and properties of objects discovered during

exploration with their pre-existing knowledge? Her current research as head of the Cognitive Adaptations Research Group primarily focuses on great apes (in collaboration with Dr Susannah Thorpe), but she is also interested in avian and human cognition, and the design of behaviourally flexible, interactive robots, able to explore and learn about their environment.

Fay Clark is an animal welfare scientist based at Bristol Zoo Gardens, who specialises in the assessment and enhancement of captive animal welfare in traditional zoos, safari parks, sanctuaries, and aquariums. Fay received her PhD from the Royal Veterinary College and Institute of Zoology (Zoological Society of London/University of Cambridge) after an MPhil at the University of Cambridge. Prior to joining Bristol Zoological Society in 2013, Fay worked for and studied at the Zoological Society of London for six years, examining gorilla welfare and how the welfare of bottlenose dolphins and chimpanzees could be enhanced by providing them with cognitively challenging activities. Fay has a special interest in how technology and advanced statistical techniques can be used to improve the validity of zoo-based research. Fay project leads internal (zoo-based) health and welfare research at Bristol Zoo Gardens, including two longitudinal studies on primate cognition and enrichment, and animal welfare assessments.

Cynthia Fernandes Cipreste is a biologist in the Animal Welfare Sector of the Belo Horizonte Zoo in Brazil and is responsible for the environmental enrichment and animal conditioning (training) activities. She has a keen interest in animal behaviour and animal learning as well as in laws and ethics applied to animal welfare.

Nicole R. Dorey is a Senior Lecturer at the University of Florida, where she teaches courses in psychology and animal behaviour. In addition to her teaching, Nicole is founder of the undergraduate Animalia research

laboratory, which has published many peer reviewed papers on a variety of species and has earned her a faculty/mentoring award. Dr. Dorey is a Certified Applied Animal Behaviourist (CAAB), has served as a board member for professional organisations, consulted on animal research and training at a variety of zoos, and has been an invited speaker to a number of national and international conferences and workshops. Nicole holds a BS degree in both zoology and psychology from the University of Florida, an MS degree in behaviour analysis with a minor in biology from the University of North Texas and a PhD in animal behaviour from the University of Exeter (UK).

Richard Gibson has vast herpetology experience from a variety of zoos across the world. He began in Jersey Zoo, UK where he was responsible for several world-first breeding successes, and for the planning and delivery of numerous field research and conservation initiatives. He then moved to Mauritius where he took up the role of fauna manager for the Mauritian Wildlife Foundation. In 2003, he became curator of herpetology for the Zoological Society of London. He implemented significant upgrades to the herpetological facilities and husbandry practices and over-saw the first UK breeding of Komodo dragons and the subsequent discovery and publication of parthenogenesis in this species. Between 2005 and 2011, Richard devoted much of his time to helping establish and develop the Amphibian Ark (AARK). When he relocated to Chester Zoo to take up the position of curator of lower vertebrates and Invertebrates. Currently Richard is the curator of ectotherms and birds at Auckland Zoo where he is responsible for a department of 18 full-time staff dedicated to the care of the native species-focused ex situ collection and to a growing portfolio of in situ field conservation programmes.

Heidi Hellmuth has been involved in the animal care and training field for over 30 years, since graduating from the University

of Cincinnati in 1987. She started out as a marine animal trainer, working for facilities including Mystic Aquarium, Sea World of Florida, and the Brookfield Zoo. She then spent several years as a zoo keeper with carnivores and large hoofstock at Zoo Atlanta. Heidi managed education animal collections and a wildlife education programme, as well as gaining experience as a supervisor and zoo curator. She spent over six years as the curator of enrichment and training for Smithsonian's National Zoo and is currently the curator of primates at the Saint Louis Zoo. During her career Heidi has worked with a wide array of species and diverse taxa. She has been actively involved in the fields of animal training, enrichment, and animal welfare and is a founding director and past president of the Animal Behaviour Management Alliance. Heidi has authored numerous articles and presented at a wide variety of conferences, including instructing at several animal training, enrichment, and welfare-related workshops, and being an invited keynote speaker at the 1st International Animal Training Conference hosted by Twycross Zoo.

Betsy Herrelko is the assistant curator of animal welfare and research at the Smithsonian's National Zoological Park (NZIP). Within the 'WelfareLAB' (Welfare Laboratory of Animal Behaviour), she focuses on research, practice, outreach, and compliance. As a behavioural scientist, Betsy's interests focus on the pursuit of advancing animal welfare science with an emphasis on animal management and how animals think. She started her tenure at NZIP as the David Bohnett cognitive research fellow studying primate cognition (cognitive bias, a measure of emotional affect) in zoo-housed apes and husbandry and welfare topics with various species around the zoo.

Geoff Hosey was principal lecturer in biology at the University of Bolton until his retirement in 2005, and is now honorary professor there. His experience of undertaking research and supervising students has mostly been in

behavioural biology, animal welfare, and primatology, and he is still involved in research on zoo animal welfare, particularly about human-animal relationships in the zoo. He is a member of the BIAZA Research Committee and is one of the authors of the textbook *Zoo Animals: Behaviour, Management and Welfare* (Oxford UP, 2nd edition 2013).

Sarah L. Jacobson is a PhD student in cognitive and comparative psychology at the Graduate Center of the City University of New York. She received her BA in neuroscience from Colorado College in 2013. She is interested in the behaviour and cognition of social species including elephants, and the application of that knowledge to conservation and wildlife management.

Neil Jordan is a lecturer in the Centre for Ecosystem Science, University of New South Wales (Sydney) and conservation biologist at Taronga Conservation Society Australia. His current research focus is in applying behavioural ecology to conservation management problems, particularly in using animal signals to resolve human-wildlife conflicts involving large carnivores in Botswana and Australia.

Jim Mackie was appointed The Zoological Society of London's (ZSL)'s first animal training and behaviour officer in 2012 having previously demonstrated the value of trained behaviours to improve husbandry and welfare in the zoo's living collections. Jim's interest in animal behaviour began when he trained his own raptors for educational demonstrations 25 years ago. This led to an opportunity to join ZSL's animal display department where he worked for 10 years developing the zoo's visitor education programme. Jim's passion for sharing information in the field of operant learning and behavioural enrichment led to the formation of ZSL's Behaviour Management Committees, at both London and Whipsnade Zoo and later the BIAZA British and Irish Association of Zoos and Aquaria (BIAZA) Animal Behaviour and Training Working Group which he chairs.

Khyne U. Mar is a veterinarian and conservation biologist, with more than 30 years of experience at academic, research, and administrative positions. Recipient of various research grants, fellowships, and scholarships. Specially trained for elephant management, elephant breeding, conservation medicine, and biology. Extensive work experience in South-east Asian countries as a consultant veterinarian.

Steve Martin is president of Natural Encounters, Inc. a company of over 50 professional animal trainers who teach animal training strategies and produce educational animal programmes at zoological facilities around the world. He spends over 200 days each year on the road serving as an animal behaviour and visitor experience consultant at zoological facilities worldwide. Steve teaches several training workshops each year and is an instructor at the AZA Animal Training School, an instructor at the Recon – Elephant Training Workshop, a trustee with the World Parrot Trust, and a member of the AZA Animal Welfare Committee. He is also president of Natural Encounters Conservation Fund, Inc. a non-profit company that has raised and donated over \$1.3 million to in situ conservation programmes. As a core team member of the California Condor Recovery Team, Steve helped guide the release of the captive-bred condors back into the wild.

Lindsay R. Mehrkam is an applied animal behaviourist, animal welfare scientist, and doctoral-level board certified behaviour analyst (certificate number: 1-15-17919, certified February 2015). Her primary research interests focus on the benefits of human–animal interaction, enrichment, and training for improving the welfare of both animals and people in society. As the director of the Human & Animal Welfare Collaboratory (HAWC) and the faculty representative for the Six Flags Field Experience Programme, her teaching and research programmes in applied animal behaviour, learning, and well-being have led to grants, publications, work-

shops, internships, and service learning opportunities in animal shelters, zoos, aquariums, and animal sanctuaries, amongst others. Dr Mehrkam’s research has been published widely in peer-reviewed scientific journals and has been presented at national and international conferences. She has been recognised through popular media outlets, grants, and scholarly and industry awards, including the Association for Professional Dog Trainers, Maddie’s Fund, and the Animal Behaviour Management Alliance. In addition to teaching and research, Dr Mehrkam serves as the vice president for the Applied Animal Behaviour Special Interest Group for the Association for Behaviour Analysis International (ABAI) and as an advisory board member for Big Oak Wolf Sanctuary.

Vicky A. Melfi is a Professor at Hartpury University, Gloucestershire, UK. She has almost 30 years’ experience working within the zoo profession, focusing on animal welfare and conservation, in appointments within the UK, Ireland, and Australia. She has also held various academic appointments, notably at the Universities of Exeter, Plymouth, and Sydney. Vicky is a passionate advocate of professional–academic collaborations, which serve to gather data which can underpin evidence based practice, and improve our understanding of animal and human behaviour and their interactions, both of which can lead to great animal welfare and conservation outcomes.

Erik Miller-Klein is a founding partner of A3 Acoustics, a licenced acoustical engineer, and is board certified by the Institute of Noise Control Engineering in the United States. His background in science and music gives him a finely tuned ear to noise issues and a general curiosity to understand the fundamental impact of noise and vibration. His work focuses on designing environments that acknowledge the complex nature of acoustics, whilst integrating in solutions that address the role sound plays in the way we communicate, relax, and interpret our world.

Joshua M. Plotnik is a comparative psychologist and conservation behaviour researcher who has studied elephant cognition since 2005. Recently, Josh has been working in Thailand to understand how research on animal thinking can be applied directly to the mitigation of human/wildlife conflict. He is a faculty member in the Department of Psychology and the animal behaviour and conservation programme at Hunter College, and in the cognitive and comparative psychology graduate programme at the Graduate Center of the City University of New York. He is also the founder and executive director of Think Elephants International, a US non-profit charity working to bridge the gaps between research, education, and conservation by using elephants as a conduit. Dr Plotnik was previously a Newton international fellow at the University of Cambridge, and has earned degrees from both Emory University (MA and PhD) and Cornell University (BS).

Gary Priest 'Growing up on a ranch in Southern California, I have been around animals all my life. For as long as I can remember, I have been fascinated by the ways both animals and people learn.' For over four decades, Gary Priest has enjoyed a career that has taken him all over the world to work with all types of animals and train all sorts of people to understand and use operant conditioning to improve animal care and welfare. A senior manager with San Diego Zoo Global for 35 years, Priest is curator of animal care training with San Diego Zoo Global Academy www.sdzglobalacademy.org. Gary received his BA (natural science) from Western Illinois University and his MA (management) from National University in San Diego. Gary's patient wife has managed to expertly shape his behaviour from their first encounter at 14.

Ken Ramirez is the EVP and chief training officer for Karen Pryor Clicker Training where he helps to oversee the vision, development and implementation of training edu-

cation programmes. Previously, Ken served as EVP of animal care and training at Chicago's Shedd Aquarium. A 40+ year veteran of animal care and training, Ramirez is a biologist and behaviourist who has worked with many zoological organisations and dog programmes throughout the world. He hosted two successful seasons of the TV series *Talk to the Animals*. Ramirez authored the book *Animal Training: Successful Animal Management through Positive Reinforcement* in 1999 and *Better Together: The Collected Wisdom of Modern Dog Trainers* in 2017. He taught a graduate course on animal training at Western Illinois University for 20 years. He currently teaches at ClickerExpo every year, offers hands on courses and seminars at the Karen Pryor National Training Center (the Ranch), and teaches online courses through Karen Pryor Academy.

Marty Sevenich-MacPhee is an animal behaviour and husbandry professional who has devoted her career to animal training, enrichment, and welfare. Since earning her bachelor's degree from the University of Illinois in 1984, Marty has held leadership positions responsible for programming in behavioural husbandry at Chicago's Brookfield Zoo and Walt Disney World. In addition to her contributions to the betterment of animal husbandry, Marty also specialises in the education of animal trainers as an active consultant and is the author of publications on animal husbandry. Marty has also served as a board member and/or on committees for IMATA, IAATE, and AZA. She has been an instructor for various AZA courses on training and enrichment of animals that include managing animal enrichment and training programmes, crocodylian biology and management, and animal training applications in zoos and aquariums.

Andrew Smith's main areas of expertise are behavioural ecology and primate colour vision. His work looks at how animals, from aardvarks to goldfish, interact with each other and their environment. Much of his

work involves primates and the ecological influences of perceptual capabilities and resource partitioning. Using a mixed approach of captive and field studies he investigated the evolution and advantages of trichromacy.

Sarah Spooner has been working in zoos and zoo education for the past decade. She is currently education and research manager at Flamingo Land, UK, where she is working on updating and implementing the zoo's conservation education strategy. Her current research investigates the impact of animal encounters and handling animals on visitor attitudes and knowledge. Her doctoral research at the University of York, 'Evaluating the effectiveness of education in zoos', examined the roles of live animal shows, zoo signage, and educational theatre as a means of educating zoo visitors about animal facts and conservation messages. She holds post graduate degrees from the University of York and the University of Cambridge and an undergraduate degree from the University of Cambridge. She has worked in formal education as a primary school teacher and as a lecturer in evolutionary biology, ecology, and statistics. She has taught in informal settings including museums and zoos to a wide range of ages and abilities. Additionally, she has experience as a zoo keeper and as an animal trainer, predominantly working with parrots and birds of prey.

Tim Sullivan has been employed by the Chicago Zoological Society at Brookfield Zoo for the last 38 years. He spent 16 years as a keeper in the marine mammal department training and caring for the zoo's dolphins, walrus, sea lions, and seals. In 1997, Tim was asked to implement an elephant protected-contact behaviour management programme in the Pachyderm department. In 1998, he was offered his present position as the zoo's curator of behavioural husbandry. Tim's primary responsibilities are to manage the zoo's animal training and environmental enrichment programmes. Tim

oversees the behaviour of the zoo's large and diverse animal collection – from aardvarks to zebras – and is responsible for developing the skills of over 100 animal keepers who care for them. Tim consults on animal training and environmental enrichment at other zoological institutions and conducts international training workshops. Tim is currently on the Instructor team of the Association of Zoo and Aquariums (AZA) annual animal training applications course. He is active in international training organisations and has been an officer on the board of directors of both the International Marine Animal Trainers Association and the Animal Behaviour Management Alliance; an organisation he cofounded.

Greg A. Vicino is the curator of applied animal welfare, San Diego Zoo Global. Mr Vicino studied biological anthropology at UC Davis where he focused on non-human primate husbandry, behaviour, welfare, and socialisation. Mr Vicino focuses on integrated management strategies, in which all animals receive the benefit of every specialty at each facility. By emphasising the frequency and diversity of behaviour, he and his team have worked on developing integrated management strategies that exploit the adaptive relevance of behaviour and making behaviour meaningful for managed populations. This strategy is designed to be applicable to all species both captive and wild and he has extensive experience in the Middle East and East Africa applying these concepts to in situ conservation programmes and rehab/re-release sites. Greg has continued to work towards his institute's mission of ending extinction, and has staunchly stood by the idea that all animals should be given an opportunity to thrive.

Samantha J. Ward is a Senior Lecturer in Animal Science at Nottingham Trent University. Previously Sam worked as a zoo animal keeper of various hoofstock, primate, and macropod species and was a zoo conservation and research manager with animal

record (ZIMS), animal transportation, and studbook responsibilities. Sam completed an MSc in Animal Behaviour and a PhD in Animal Behaviour and Welfare. Sam's research focuses on zoo animal welfare and the impacts that human–animal interactions, human–animal relationships and zoo animal husbandry and management techniques impact and improve captive animal welfare. Sam is a member of the BIAZA Research Committee and also sits as the Welfare Expert on Defra's Zoo Executive Committee.

Gerard (Gerry) Whitehouse-Tedd has over 35 years' international experience working in zoos, private and government animal collections, and theme parks. He is a professional animal manager, trainer, and zoo supervisor, with specialisation in the husbandry, training, and management of exotic and domestic species. This includes management of animals for captive breeding programmes, medical husbandry, rehabilitation, public display, and presentations, as well as visitor experience, encounter, and outreach programmes with zoo animals. Gerry has held senior zoo management roles for the past 20 years and is currently the operations manager for the Kalba Bird of Prey Centre in the United Arab Emirates, a position he has held since 2012.

Katherine Whitehouse-Tedd is a senior lecturer at Nottingham Trent University, specialising in human–wildlife conflict, zoo conservation education, and carnivore husbandry. Kat teaches on undergraduate and postgraduate degrees in zoo biology and conservation, and supervises a range of student research projects both locally in the UK and abroad. Kat's research interests are currently concentrated on the use of livestock guarding dogs as mitigating tools for promoting human–carnivore coexistence, as well as vulture conservation, and the use of ambassador animals in zoos for promoting conservation behaviours in visitors. Kat holds a PhD in nutritional science (investigating bioactive dietary compounds in large

felid zoo diets) from Massey University in New Zealand, and has previously worked as a conservation manager, research scientist, and education programme coordinator for zoos in the UK, South Africa, and the United Arab Emirates.

Jonathan Webb is an associate professor in conservation biology with a background in applied research focusing on actions for recovering threatened fauna and mitigating the impacts of invasive species. His recent research has centred on using behavioural techniques to reduce the impacts of cane toads on northern quolls. Jonathan has published more than 120 scientific papers and he currently teaches wildlife ecology at the University of Technology Sydney. He believes that scientists should communicate their research to the wider public, and his research on northern quolls was featured extensively in the media, including the BBC documentary, *Attenborough's Ark*. Jonathan is a keen wildlife photographer and he lives with his wife and two children on a wildlife friendly acreage on the NSW central coast.

Heather Williams began SCUBA diving at 14 and first helped in an aquarium at 16 with work experience at Scarborough Sealife Centre. She has volunteered with pilot whale photo-ID work (Projecto Ambiental, Tenerife), and cetacean distribution research (Organisation Cetacea). She studied ocean science with marine biology at the University of Plymouth, during which time she volunteered at the National Marine Aquarium (NMA), completing her honours project there focusing on seahorses (*Hippocampus kuda* specifically). After university, she was offered a job within the animal husbandry department at the NMA. Following this, she moved to Grand Cayman to work in a relatively new tourist attraction – Boatswain's Beach. This is where she first became interested in training the animals in her care. A move to The National Sealife Centre in Bray, Ireland for a couple of years meant she could implement a simple training programme

there for some of the animals. she was lucky enough to be able to spend a month volunteering at the Monterey Bay Aquarium where she got to see how important training was in encouraging feeding in an ocean sunfish (*Mola mola*) with only one eye in a large exhibit. Moving back to the NMA in 2010 meant she had the experience and knowledge to push forwards with a training programme and now the aquarium has a large number of animals trained for various purposes. She was also lucky enough to be a founding committee member of the BIAZA (British and

Irish Association of Zoos and Aquariums) Animal Behaviour and Training Working Group as an aquarium liaison officer.

Robert John Young is a British professor of wildlife conservation who divides his research time between working with animals in captivity (principally the welfare of zoo animals) and conservation fieldwork in countries such as Brazil. He is the author of the book, *Environmental enrichment for captive animals*.

Foreword

I was delighted to be asked to write the forward for this important book and, as I read through the chapters, that delight turned to sincere appreciation for the wealth of knowledge presented by all the authors and editors. Time and time again I would write in my notes 'clearly explained', 'really great applied examples', and 'good use of relatable real-life situations'. What makes this even more impressive is that the experiences and examples are drawn from across the world. This not only demonstrates the widespread utilisation of training but, also where there are commonalities and differences in approaches. I cannot recommend this book highly enough and hope the readers will allow me a few paragraphs to expand on why

Many years ago, at the start of my career I was employed to be a course manager for a new BSc (Hons) in Applied Animal Behaviour and Training. This degree was one of the first of its kind and reflected the increasing interest in not only understanding why animals behave in the ways that they do, but also how we can use that knowledge to shape and train different behaviours. Although this course focused mainly on training of companion animals it was also forward thinking enough to include modules on wild animals as well; and oh, what myself and my fellow course tutors would have given for this book to be available at that time!

Managing that course not only reinforced my deep fascination with animal behaviour (and my enjoyment at having opportunities to be able to pass that fascination onto others) but also opened up the brand new world

of animal training to me. Through my interactions with other tutors and our students it quickly became apparent to me that the theoretical knowledge of animal learning and how it could best be practically applied to training was still at an early stage. I was also made painfully aware of my own lack of training ability; put bluntly, although I had a good grasp of the theoretical knowledge I struggled with the practical skills to quickly see nuances in behaviour and then adjust my timing to respond effectively and provide a good learning environment for the animal. Having now read this book, I have been given new hope and inspiration that I would be able to do better if I tried again.

The authors provide an excellent range of applied examples across varied species and situations. They are able to take complex topics and write about them in an easily accessible way. We are quite rightly reminded that as the field of animal training expanded so did the range of terms and techniques being used. This has the potential to be at the least confusing, and at the worst conflicting. In turn this will result in poor technique and negative welfare, and that is before you even get into the complexities of translation into different languages. This provides me with yet another reason to recommend this book; in addition to consistency of terms used and clear explanation of them (the differences between positive and negative reinforcement and punishment being just one example), there is also an excellent glossary that I am sure will be utilised again and again by readers.

There is a clear value in reading this book chapter by chapter as each builds on the other and opens up a new and relevant aspect of animal learning and training. However, I can also see that each chapter can be taken on its own merit, either to introduce the reader to a new topic, act as a refresher for a topic already known, or as a handy reference guide when you want to check back on x or y or search for solutions. There is such a lot to know about learning and training that it is difficult to keep it all in ones' head. Having it here in handy reference format allows the trainer to get on with the important task of noticing small changes in the behaviour of their animals and adapting aspects of training to this.

I will leave the reader to discover each chapter for themselves however, I couldn't resist the opportunity to share a few aspects that particularly caught my attention. Having used Pavlov as an example in various 'introduction to animal behaviour' modules for more years than I can count, it was lovely to be reminded of Twitmyer's related work classically conditioning students to exhibit a knee jerk reaction at the sound of a bell. Chapters 2 and 3 reminded me of all the fascinating and complex ways animals learn and gain information over and above classical and operant conditioning. They also served to provide a clear reminder of the benefits that can be gained by studying animals in zoos and aquariums compared to the wild ones, whilst also giving reasons why we shouldn't always directly compare one to the other. At a more individual level, there was also some thought-provoking research shared on how early environments and individual experiences shape adult behaviours. Chapter 4 is excellent at making the reader think about ethical considerations related to training and just because we can train something doesn't necessarily mean we should. Chapter 5 has some fascinating examples about all the different learning opportunities that are available to animals in human care from the embryonic stage through all subsequent phases and life experiences.

As my career developed I found my way to the European Association of Zoos and Aquaria (EAZA) and was employed in the newly developed position of EAZA Academy Training Officer; sadly, my role did not involve training wild animals but the much more challenging species of 'zoo and aquarium staff'! All jokes aside, what became very apparent was the strong desire from the community for the development of a course on animal training. To this day, this course is consistently one of our most popular and has expanded to additional courses looking at different applied aspects. Humans are an essential ingredient in the training of the animals in our care and so I was especially interested in Chapters 7, 8, 9, and 13 which all touch on different aspect of the human(s) involved in learning and training interactions. Whether this be the influence, on both sides, of motivation, trust, and control (Chapter 7); how to engage staff in training programmes so that they see it as an opportunity rather than a burden (Chapter 8); human animal interactions (Chapter 9); or ways to make sure staff and animals stay safe (Chapter 13). Chapter 10 on the different ways animals are used in 'shows' left me with a clear understanding of the varied situations and nuances that are often grouped together under this one title. It also left me with a strong desire to go back and cross check our EAZA Guidelines for the use of animals in public demonstrations with the information given here.

The authors of Chapter 11 couldn't have said it better when they wrote 'considering the impact of training on animal welfare is an epic challenge' however, they prove they are more than up to this challenge. Their chapter provides some excellent queries about the terms we use, as well as serving as an important reminder that we should always come back to considering welfare from the individual animals' perspective and not how we might perceive the situation. Challenges between welfare and training are further considered in Chapter 12. We are asked to consider the ethics of situations where we

might use our knowledge of learning and training to actively compromise short-term welfare for a long-term welfare gain when returning animals to the wild. As the threats to wildlife continue to increase we will need to be more and more sure of our ability to understand and balance ethical and welfare decisions relating to aiding increased survival post-release.

We have come an awfully long way since my early days managing that course on behaviour and training. This book provides a great overview of how far we have come, yet there is still much to learn, especially when it comes to some taxa and situations. Consequently, I

wholeheartedly share the desires expressed by the authors and editors throughout this book that it will act to encourage more evidenced based research and publications to help our expanding knowledge. I encourage anyone interested in the field of animal learning, training, and welfare, from student, to zoo professional, to academic, to read this book. There is so much to learn from, and be inspired by, here.

Myfanwy Griffith, Executive Director,
European Association of Zoos and Aquaria
(EAZA)
March 2019

Preface

Zoo Animal Learning and Training (ZALAT) has been inspired to fill a need: a need to bridge the gap between those studying animal learning theory and those using these principles to implement training programmes in zoos. In creating ZALAT we hoped, and believe we have succeeded, in bringing together expert academics and zoo professionals, so that you the reader can benefit from their shared wisdom. This unified approach brings together the art and science of animal training. Consequently, we're proud to present a book written by experts in their fields, with academic and professional knowledge and experience operating worldwide.

ZALAT provides a clear, easy to read and concise introduction to basic animal learning theory, alongside tangible application of this theory when training animals in zoos and aquaria. We hoped to clarify the jargon, the different terms used between academic disciplines, and different professional settings to bridge the barriers to implementing and understanding the consequences of training in zoos.

We invited academic and professional experts working in zoo animal learning and training to provide content, from the principles of animal learning theory (Chapters 1–4), to the application of this theory (Chapters 5–9), all the way through to practical considerations of implementing zoo animal training programmes (Chapters 10–13). Given the magnitude of the subject and implications for translating theory into practice, we soon realised that it would also be great to include text boxes. The first set of text boxes consider the modalities animals employ to communicate,

as communication is key to successful training. Thereafter follow a series of boxes which focus on taxa specific information, providing information about what is known about a taxa's cognitive abilities and what considerations might need to be thought about when training those animals in zoos; thus we organised the boxes into two groups, those including an academic and professional perspective. For elephants there is an exception to this pattern, as we have three boxes relating to them, as with the other taxa we detail the current knowledge of their cognitive abilities, but we have included two boxes related to their captive management, one relates to zoos and one relates to their training and management in elephant camps. We then have the final set of boxes, which relate to 'other' aspects of training, which were not explicit within the chapters. In this section, we consider training more than one animal at a time; often a necessary practical consequence of socially housed animals and/or few staff allotted to training. Finally a box is included which provides a general view of zoo animal training, where the art started, and what it has been able to achieve; a bite size introduction, overview, and view to the future.

We have referred to zoos throughout, even in the title, not to exclude aquaria but as shorthand for a profession which operates to care for and conserve species in captivity whether that be a zoo, aquaria, or sanctuary. To improve accessibility of the theoretical background to animal learning theory, a rouge guide for translation has been included in the form of a handy glossary.

This indispensable collation of terms recognised for their scientific foundation, along with definitions, will hopefully provide clarity in an area which can sometimes be mind-boggling; even to the seasoned trainer. Our no-nonsense approach based both in science and practical experience, will hopefully demystify the complexities of training zoo

animals and enable all readers to clearly understand how to effectively train animals and understand the consequences implementing these training actions might have on the lives of the animals in your care.

Vicky A. Melfi, Nicole R. Dorey, and
Samantha J. Ward

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The book has been brought to life not only by the talent and enthusiasm of our authors, but also by the photographs provided by Kirstin Anderson-Hansen, Gordon M. Burghardt, Sabrina Brando, Elisabeth S. Herrelko, Katherina Herrmann, Jim Mackie, Steve Martin, Joshua Plotnik, Jereon Steven, Heather Williams, and Ray Wiltshire.

We're grateful to Myfanwy Griffith (CEO EAZA) for taking the time to support this publication by writing our foreword; as someone who has a personal connection and passion for animal learning theory and

training, Myfanwy has supported its scientific study and professional implementation.

We'd also like to acknowledge the support of the staff at Wiley, especially David McDade who supported the publication proposal and Andrew Harrison who was part of the publication team in its final year, during which time Athira Menon facilitated the editorial needs and the publication requirements. We are also grateful to the production team for making this project into a book.

From a personal perspective Vicky Melfi would like to thank Edward Pickersgill and Isabel MP for their love support. Nicole Dorey would like to thank Michael for supporting her "garage band" as well as Xander and Aria for all the hugs, kisses, and cuddles as well as only hiding under her desk a few times. Samantha (Sam) Ward wishes to thank Jonathan Hatton and Connie for always being there and supporting her when taking on "these exciting projects".

