





Dr. DUSTIN PENN THE HANDICAP PRINCIPLE: HOW AN ERRONEOUS HYPOTHESIS BECAME A SCIENTIFIC PRINCIPLE

Monday, 01.03.2021, 13:00 GoToMeeting 892-531-013



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The most cited explanation for the evolution of honest signaling is Zahavi's Handicap Principle. We recently published a critical overview of the Handicap Principle to explain how it was developed, why it is erroneous, and how it nevertheless became widely accepted. Zahavi argued that honest signals evolve because and not despite of their costs, and that his idea provides a general principle for biological communication. He assumed that signals are wasteful, and that they evolve through a non-Darwinian 'signal selection' that favors waste rather than efficiency. Zahavi's radical proposals became accepted after Grafen (1990) published a model, which he claimed validated the Handicap Principle. His model shows how sexual signals can be honest indicators of quality if high-quality males pay lower viability costs for signalling than low-quality ones. Critics have since found other ways that honest signals might evolve, and argue that the model does not provide a general principle. We show that this model is much more limited than most assume, and moreover, we show that it is not a model of the Handicap Principle (e.g., signals are efficient rather than wasteful and they evolve despite and not because of their costs). We propose that the Handicap Principle should be ushered into an "honorable retirement," and we examine several possible reasons why Grafen's misinterpretations were widely accepted.

Dustin Penn is a Senior Scientist and Group Leader at the Konrad Lorenz Institute of Ethology, Department of Interdisciplinary Life Sciences, University of Veterinary Medicine, Vienna. He completed his undergraduate studies in Biology in Oklahoma, his Masters at the University of Florida. He received a PhD in Biology from the University of Utah, where he also conducted his Post-Doctoral research. He completed his Habilitation at the University of Vienna. His research is largely focused on sexual selection and animal communication, and particularly chemosensory and acoustic communication in wild house mice. He has broad interests in Behavioral Biology and Evolutionary Biology. He lectures on Darwinian medicine and is an Associate Editor for *Proceedings of the Royal Society*.