



## SQAB 2018: Biobehavioral processes



Although it is a truism that behavior is determined by multiple factors with nested levels of complexity, the best strategies to investigate how behavior emerges from the interaction among these factors are far from settled. The 2018 meeting of the Society for Quantitative Analyses of Behavior (SQAB) focused on this problem, with a particular emphasis on the interaction among multiple levels of biological organization of behavior. To accomplish this goal, a diverse group of speakers contributed their expertise on the evolution, genetics, neurobiology, development, and behavioral economics of choice and learning. This special issue collects their contributions, aiming at drawing connections among seemingly disparate perspectives on a common concern.

Colwill reviews a series of studies on the simplest form of learning, that which results from repeated exposure to a stimulus, in zebrafish larvae. In contrast, Petrillo and Rosati focus on more complex decision-making processes in non-human primates. Their work addresses the problem of how evolutionary constraints shape the mechanisms that govern choice, examining decision processes from an ecological-rationality perspective. Developmental and evolutionary constraints on choice mechanisms are reflected in our genes; Gray, Sanchez-Roige, de Wit, MacKillop and Palmer review the literature on the genetic basis of a particular decision-making domain: choosing between smaller but more immediate rewards versus larger but more delayed rewards. The discounting of economic value of rewards as a function of their delay governs choice in this domain. Through a psychiatric disorder characterized by steep delay discounting (attention-deficit hyperactivity disorder, or ADHD), Killeen examines how neural malnutrition may contribute to dysfunctional decision making.

Hart and Izquierdo review the behavioral and neurobiological mechanisms governing a different but related tradeoff, that between economic benefit (expressed as higher quantity or quality of a good) and effortful costs. Kearns examines the issue of effort and economic value from the perspective of economy type. In his paper he shows converging evidence that reinforcers have higher value in closed economies, in which the organism must work for every reinforcer, than in open economies, in which free reinforcers are also available.

Regardless of the particular tradeoff in a choice situation, explanations of how neurobiological mechanisms control choice are necessarily couched in terms of models. Soto warns us about the potential pitfalls of unconstrained abstract modeling of neural processes underlying learning and behavior, advancing an approach that imposes neurobiological guardrails to such modeling. A common construct in biobehavioral models is the internal state of the behaving organism. Langdon, Song and Niv review the neurobiological and behavioral evidence to characterize the nature of internal states that guide learning and decision making. Finally, Jarmolowicz, Reed, Bruce and Bruce highlight the practical implications of quantitative models, in a

narrative account of their experience investigating the behavioral economics of medication choice and treatment adherence in multiple sclerosis.

We would like to dedicate this Special Issue to our friend and colleague, Tony Nevin, who passed away last year. Tony was a founding member and former President of SQAB, and a wonderful person. He impacted so many of our lives and careers. We have named the student presenter series in Tony's honor – they will be known as the Tony Nevin Student Presenter Series. Tony will be greatly missed but he lives on for many of us in our memories and our research.

#### Acknowledgements

We would like to thank a number of people who contribute to the success of SQAB. We thank Brian Greer who serves as the SQAB Executive Coordinator. We also thank Carla Lagorio as Treasurer, who agreed to serve a second term as Treasurer. Adam Fox will be stepping down as Secretary but we thank him for his invaluable contributions to SQAB. Shawn Gilroy serves as Webmaster – we thank him for developing our new website and poster-submission portal over the past year. Many students from the student council contribute to the success of SQAB. Ally Salzer will be stepping down as Membership Coordinator. Gabriela Eugenia, Social Media Coordinator, and Ryan Kimball, Student Representative, have graduated and will be moving on. Finally, thank you to all the contributors and reviewers (listed below) for devoting time and effort to making the special issue possible.

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<https://doi.org/10.1016/j.beproc.2019.103938>

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