A BIOCULTURAL EXAMINATION OF STUDENT LEARNING BEHAVIORS IN LARGE UNDERGRADUATE LECTURES [1]


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Humans rely on culturally acquired information. Survival and reproductive success often hinge on whether or not individuals are culturally adapted to the environment they live in. These cultural variants can include important local social norms, foraging or hunting techniques, how to construct boats, among countless other examples. Given the importance of culture to human success, the field of Gene Culture Co-evolution suggests that humans have social learning strategies shaped by natural selection to preferentially adopt adaptive cultural variants while avoiding maladaptive ones. These predicted strategies can dictate when, how, and from whom to learn socially, with the fitness benefits of each defined by the state of the environment, the type of information being learned, and attributes of the individuals available to copy. This dissertation empirically examines the social learning behaviors of college students longitudinally throughout a large lecture classroom. The first study examines who students identify as knowledgeable peers; identifying culturally competent individuals is a prerequisite ability to use a payoff-based bias, so students should be particularly attuned to who is doing well around them. Results reveal that students are more likely to be nominated as strong in the course material if they are performing well in the class, indicating a general student ability to know who knowledgeable peers are. However, it is also found that male students overrate their male peers after controlling for performance in the course and participation in class. Potential biological and cultural roots for this gender bias are discussed. Using the perception networks from the first study, the second study examines whether students form learning relationships with peers they previously identified as strong in the material. This would indicate study group formation follows payoff-based biases. This study also tests whether student study groups follow homophily-based biases, a bias both predicted in social learning literature and supported in previous sociological research. These learning biases are supported; students are more likely to study with peers they previously identified as strong in the material, and students of the same ethnicity are also more likely than chance study together. As implied in its name, the use of payoff-based biases is expected to benefit the learner by giving them access to someone who is particularly skilled or knowledgeable. However, no evidence is found that student exam scores increase from having a study partner that was nominated as strong in the material. The last study examines biocultural roots of learning preferences for social or individual learning. Here, social learning is described by passive learning through listening, while individual learning is more exploratory and involves more active work in having the learner self-discover information. Specifically, this study tests for an impact of a well-studied polymorphism of the gene Dopamine Receptor D4 (DRD4). The 2R and 7R alleles of DRD4 show positive selection in human migratory populations despite links to inattention, hyperactivity, different types of risk taking, and sensitivity to local norms and environments. This study lends evidence that these alleles may differentially impact learning preferences of students depending on the ethnic background of the student, suggesting a gene by environment interaction for the formation of learning styles, and a possible role of social learning dynamics to the evolution of DRD4. This dissertation contributes to growing literature empirically testing human learning strategies. It also contributes to a small field of work applying evolutionary thought to improving educational practices, as well as work that examines social networks in classrooms. Thus, this work integrates several fields of research, and represents the value of interdisciplinary work.