

ABSTRACTS

helping them learn about evolution and human variation incorporated DNA. We present these data and provide examples of the relevant lab activities.

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Time Preferences, Risk Preferences, and Climate Change Adaptation

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Human livelihood adaptations involve investments in the present that yield payoffs in the future. Food production, for example, involves substantial delay from the time of investment to consumption. Delayed payoffs entail both opportunity costs and risk. Understanding adaptation therefore requires that we consider people's preferences for both time and risk. However, a growing literature in behavioral economics suggests that people aren't very good at managing either, presenting a paradox: How is it that *Homo sapiens* emerged as a globally dominant species when our capacity to manage these two crucial features of adaptation is apparently faulty? Using novel models that combine fitness maximization and economic preferences, I show that both the observed inconsistencies in time and risk preferences have been misinterpreted and that this evolutionary approach helps resolve the paradox. With a simple Bayesian learning model I show that present bias arises in people with otherwise time-consistent preferences in the presence of uncertainty. With a hierarchical evolutionary model of preferences, I show distortions in people's risk preferences arise from selection acting indirectly on economic preferences by way of their effect on fitness. I discuss these results in light of livelihood adaptations to anthropogenic climate change. The evolutionary perspective on human time and risk preferences turns several pieces of conventional policy wisdom on their head. For instance, using an expanded Ramsey equation, I show that social discount rates should be far lower than they are typically set and that more aggressive mitigation policies are optimal.

Genetic adaptations to potato starch digestion in the Peruvian Andes

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With few local food sources available, potatoes are a highly significant crop in the Andes and were cultivated as early as 8,000 years ago. Ancient populations that primarily relied upon high-starch foods to survive may have developed genetic adaptations to digest starch more efficiently, and these adaptations may still be present in modern-day descendant populations. Here, we analyzed genomic data from two candidate genes associated with starch-digestion, *AMY1* and *MGAM*, in Peruvian populations. Peruvian populations were derived from both highland Quechua individuals (n=580) and 1000 Genomes Peruvians from Lima (n=40). Control populations from the 1000 Genomes project included: Han Chinese (CHS, n=63), Mende in Sierra Leone (MSL, n=87), and Gambian Mandinkas (GWD, n=60). Although these control populations consume starch, potatoes were more recently introduced to their diets (>500 years), with MSL/GWD populations among the lowest consumers of potatoes worldwide. Therefore, we hypothesized that these populations will not have developed the same starch-digestive genetic adaptations present in highland Peruvians. We calculated LSBL and Tajima's *D* to identify selection, as well as an odds ratio measure as a proxy for starch digestion. Our results indicate that *MGAM*, (rs10246939, OR=15.29, p<0.01), shows the strongest signature of selection in Peruvian populations, which may have aided with starch digestion in this population. Given that potatoes are one of the most important domesticated crops in the world, these results indicate there is global variation in human ability to digest this high-starch food, adding further support to diet being a driver of human evolutionary change.

Poor Memory and Depression in Older Adults: Results from the Study on global AGEing and adult health (SAGE)

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Worldwide, over 20% of older adults suffer from a mental health disorder. The most common mental health disorders are dementia and depression, affecting 5% and 7% of the world's older adult population, respectively. It is sometimes difficult to distinguish between the two conditions, which leads to a misdiagnosis of early-stage dementia as depression. In our research, using Wave 1 data from the World Health Organization's Study on global AGEing and adult health (SAGE), we found that poor memory predicted the presence of depression in every country except India. Poor self-rated memory predicted depression in China, Ghana, Mexico, and Russia (ORs = .42 to

.62, p's <.001) and backward digit span or verbal recall predicted depression in China, Ghana, and South Africa (ORs = .43 to .49, p's <.01). Our results demonstrate a close association between poor memory and depression in middle-income countries. Here, we examine this and discuss its implications for the potential misdiagnosis of early-stage dementia globally.

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Examination of magnitudes of integration in the catarrhine axial skeleton

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This study examines the magnitude of integration in the axial skeleton in catarrhines. It is hypothesized that hominoids will show relatively lower magnitudes of integration than cercopithecoids, and that the evolution of 'novel' axial skeletal morphology in hominoids may have been facilitated by the reduced constraint of lower magnitudes of integration.

For this, 3D scans of the cranium, mandible, vertebrae (13 elements), and sacrum of 30 *Cercopithecus*, 32 *Chlorocebus*, 39 *Macaca fascicularis*, 45 *Hylobates lar*, 31 *Pan troglodytes*, and 86 *Homo sapiens* were used. Variation attributable to sex, species, identity of the last thoracic or lumbar vertebrae, and/or the number of sacral vertebrae was controlled by mean-standardization within genera. Magnitudes of integration were calculated using the integration coefficient of variation (ICV) from inter-landmark distances. A resampling method was applied for generating distributions of ICV for each axial skeletal element. Comparison of ICV scores of axial skeletal element (i.e., combination of cranium, mandible, vertebrae, and sacrum) between taxa were conducted using Mann-Whitney U tests with Bonferroni adjustment.

The results support the hypothesis as hominoids showed significantly lower magnitudes of integration than cercopithecoids (p<0.0033 for all comparisons). Mean ICV scores in the axial skeleton were 1.899 in *Chlorocebus*, 1.844 in *Macaca*, 1.7442 in *Cercopithecus*, 1.5298 in *Hylobates*, 1.4703 in *Pan*, and 1.4233 in *Homo*. These results indicate that hominoids have lower levels of integration than cercopithecoids, which likely led to reduced constraints on the evolution of axial skeletal morphology in the clade.

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