Hegemony and homogeneity accelerate the extinction of cultural traits in biased populations

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Cultural diversity is crucial to maintain healthy societies and is related to economic growth, social cohesion, productivity and biodiversity indexes. But little is still known about how the interactions between individual cognitive biases, hegemony and homogeneity of the cultural system affect cultural diversity. Hegemonic cultural systems -dominance of one cultural variant over the others- and homogeneity -a uniform cultural structure across the population-, may accelerate the extinction of cultural traits. Following previous research (Segovia-Martín, Walker, Fay, & Tamariz, 2019), we use agent based models to simulate an interactive micro-society in which individuals play recurring games. We look at the spread dynamics of *n* competing variants of a specific cultural trait within a micro-society and then we borrow from information theory and biology well-established alpha diversity indexes to estimate cultural diversity (Shannon, 1948; Simpson, 1949). Two conditions were compared: homogeneity, where all the subpopulations used the same variant quality distribution; and heterogeneity, where each subpopulation used an independent variant quality distribution. For each condition, three scenarios for quality dispersion across variants were tested: a) One-takes-all (OTA), where one variant had the highest value (hegemonic) and all other variants the lowest; b) competition (C), where two variants had the highest value; and c) pseudo-random (PR), where intrinsic values were randomly assigned to the variants (this condition served as a null model against which the other conditions could be compared). Our results show that both hegemony and homogeneity of the cultural system systematically accelerated the extinction of cultural variants in biased populations (Fig. 1), and in turn, a massive extinction of cultural variants can increase the uniformity of the abundance of surviving variants. Our study extends previous work showing that, in moderate and highly content biased populations, strong external constraints may dramatically affect the way in which cultural evolution proceeds.

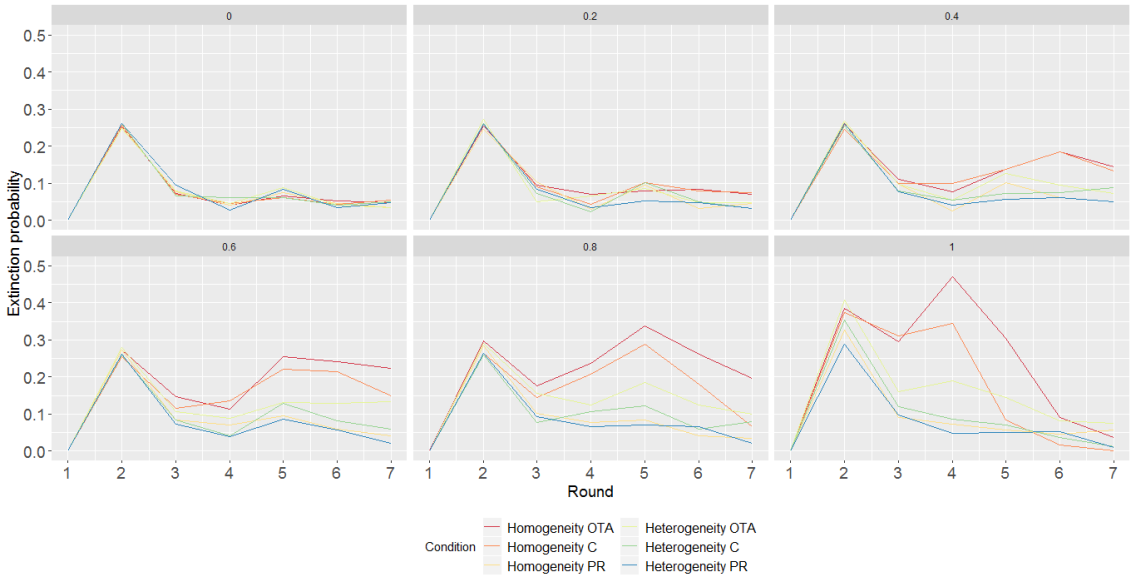

Figure 1: Extinction probability by round averaged over each level of content bias and variant quality system. Drift models are shown in the top-left (content bias = 0). We ran 1000 simulations for each parameter combination.

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Simpson, E. H. (1949). Measurement of diversity. Nature, 163 (4148), 688.