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Nature-nurture interaction is ubiquitous, essential, but elusive

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Hicks and Leonard (2014) are correct in focusing on the challenge of incorporating political, economic and historical impacts in studies of human biology. There is one fundamental reason that political economy is and, indeed, must be, compatible with evolutionary approaches: phenomena in both fields run on the same fuel, namely that of actions of selfish agents maximizing their individual success. The structural similarity of both fields led to the unifying development of evolutionary theory of cooperation (Axelrod and Hamilton 1981), stemming from the theory of games (developed originally for economics).

Hicks and Leonard (2014) argue that “cultural norms are actively constructed”. However, behaviors which may be perceived as expressing cultural norms to “reinforce or magnify existing inequalities” may, in fact, have nothing to do with ideology, but instead be outcomes of complicated and often counterintuitive dynamics of network-based social phenomena (Watts 2003). For example, the process of competition for limited resources occurring among agents who exhibit natural variation in their abilities, inevitably leads to a skewed distribution of success (Łomnicki 1988). There is no political machiavellianism here, only mathematical inevitabilities, with profound implications for many ecological processes. Having said that, we do not mean to sound socially insensitive and complacent and we agree with Hicks and Leonard (2014) that critical evaluation of “cultural constructions that naturalize poverty” is essential.

To make matters more complicated, however, genes themselves may become vehicles which help propagate these “cultural constructions” and maintain e.g. multigenerational health disparities observed between racial categories (whether they be defined culturally or biologically; Jasienska 2013). The latest discoveries in epigenetics bring to the forefront the notion of striking cultural influences that may reverberate across generations through not only cultural transmission, but also genetic effects. Trauma (due to partner violence) experienced by women during pregnancy may impact the methylation status of genes of their adolescent children, with potential lifelong effects on psychosocial health (Radtke et al. 2011).

But the transgenerational effects could be more profound than that. Dias and Ressler (2014) showed that F₁ and even F₂ progeny of male mice exposed to both a scent and an electric shock showed increased sensitivity to that scent and increased expression of genes responsible for scent detection. It means that epigenetic programming of genes may be inherited paternally, independently of maternal effects. Psychosocial

and nutritional stresses may therefore affect not only the health of people who experienced deprivation, but also health of their distant descendants. Low birth weight (Jasienska 2009) and high risk of cardiovascular diseases (Kuzawa and Sweet 2009) in contemporary African Americans have been suggested to result from conditions experienced by their ancestors during slavery.

An important methodological issue is how to implement a research paradigm in which biological and cultural factors are explicitly taken into account. This is more difficult than to liberally advocate the inclusion of a multitude of factors, sometimes for ideological, rather than scientific, reasons, and often with a lot of hand waving and lip service paid to “the complex interactions between these inputs”. The crucial word here is “explicitly”, i.e. building research approaches where it is clearly stated what the dimensionality of the problem is (Lewontin 1969) and what types of interactive effects between causal factors are being postulated. Are the interactions multiplicative or do they have more complex, nonlinear forms which cannot be easily simplified with appropriate transformations? Lewontin (1974) argued that numerically the same analyses of variance models may hide qualitatively different types of interaction between nature and nurture.

Next, what empirical design should be applied (Jasienski 1996)? When true experimental approach is impossible, we are left with a daunting task of untangling the Gordian knot of nature-nurture effects through cross-sectional or longitudinal studies. For example, level of paternal education is an important variable influencing the direction of relationship between number of father’s children and his testosterone concentration (Jasienska, Jasienski, and Ellison 2012); also, high average level of education of women in a village influences fertility decisions even of women who are not themselves highly educated (Colleran et al. 2014).

Finally, we must use appropriate quantitative methods of analysis to protect us from mathematical or statistical artefacts (Jasienski and Bazzaz 1999). Scientists tend to rely on indexes which are meant to capture the essence of the processes but, unfortunately, such indexes are very often ratios of several measurable variables. This gives us an illusion of simplicity by reducing the number of variables, but makes statistical analyses less powerful and, more importantly, sweeps under the carpet the actual form of interaction between the variables comprising the ratio index. Alas, disentangling nature from nurture allows no conceptual or methodological shortcuts.

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