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# **Adam Smith on the future of experimental evolution and economics**

Maria Pia Paganelli

Experimental evolution is difficult to apply to humans because of the need to study possible changes over many generations. A similar method, though, may see history as a substitute for experiments. The 18<sup>th</sup> century economist Adam Smith uses methods compatible with the logic of experimental evolution, through the assumption of human homogeneity and the study of history, to explain endogenous variations of preferences and institutions.

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## Adam Smith on the future of experimental evolution and economics

Experimental evolution studies how genes are affected by their environments over multiple generations. For instance, to follow an example of Terence Burnham et al. (2015), the same population of birds could be experimentally divided into two groups, one in an environment with big seeds and the other in an environment with small seeds. We might expect that the environment with big seeds will select for bigger-beak birds over several generations. Experiments of this kind are generally conducted with organisms such as bacteria, fruit flies, and rodents, since their lifespan is short compared to the researcher's, who can then study many generations over a relatively short time.

While purposely performing evolutionary experiments on people is immoral and impractical, human inventions have altered the evolutionary trajectory of the species. Perhaps the most famous example is the adult ability to digest the sugar in milk, lactose; an ability that is argued to have evolved along with the domestication of milk-producing animals (Gerbault, P., Roffet-Salque, M., Evershed, R. P., & Thomas, M. G. 2013). This genetic evolution in humans, in a relatively short time period, might make us rethink, among other things, the idea that preferences are exogenous (Burnham, Dunlap, and Stephens 2015). Different environments with genetically identical starting populations would produce different “beaks”, that is, different preferences and different institutions would adapt to the differences in environments. Preferences and institutions would therefore be endogenized.

Human evolution can take place by biological or cultural evolution, or some combination. Some aspects of interpersonal preferences may have evolved culturally (eg. Henrich et al. 2004; Henrich and Henrich 2007; Ensminger and Henrich 2014). Using economic field experiments such

as the Dictator Game, the Ultimatum Game, and the Third-Party Punishment Game, Joseph Henrich and co-authors find that levels of cooperation and fairness vary significantly depending on how large a society is, and how much a society is exposed to markets (and world religions). The authors argue that the observed between-culture variation reflects cultural evolution because genetic variations between these populations are too limited to explain the difference. Cooperation is culturally dependent instead; it is learned. These authors argue that that larger a society, the weaker its kin relations; the more individuals need to rely on norms of behavior that ensure cooperation, the stronger the willingness to share and the stronger the willingness to punish non-cooperative behaviors (see also Al-Ubaydli et al. 2013).

Natural experiments are also increasingly used to analyze endogenous preferences and institutions (e.g. Levitt and List 2009). While experimental evolution cannot and should not be applied to humans, the idea that preferences have been shaped by evolution may provide insight. In fact, one can view Adam Smith, the 18<sup>th</sup> century alleged father of economics, as seeing history, rather than human volition, as naturally performing a sort of experiments in human economic evolution.

Smith begins with the assumption that all individuals, in all cultures, have a homogeneous “genetic” nature. When he observes variation between individuals, and between cultures, he looks for environmental variation to explain the observed differences. With this method, he is able to explain how human behaviors and institutions change—endogenously. Though the terms did not exist at his time, we can view Adam Smith as describing a form of evolution where human behavior evolves to match the incentives in the environment.

Adam Smith works in a time when the scientific method used for natural sciences starts to be adopted also for studying human behaviors and institutions. For him, the multiple observations

needed to understand laws governing human behaviors come indeed from history. And to expand the number of observations available, history is not just “history” over time, but also a comparison of different populations in different parts of the world at the same time. Travel diaries are part of history (e.g Dahl 2014). The 18<sup>th</sup>-century proliferation of travel diaries, history books, and studies on, say, anatomy or geology is not coincidental (Paganelli 2015).

With experimental evolution, one takes genetically identical populations of organisms and places them in different environments to see how they evolve. The knowledge of genetics was basically nonexistent in Smith’s time. Yet many in Smith’s day believe that some characteristics are determined by blood—in effect, genetically. Kings and aristocrats, for instance, are such by birth. The poor are naturally poor. Some people are naturally superior and some are naturally inferior. Smith (morally) objects to these beliefs. His objection is embodied in a strict assumption: human nature is homogeneous and constant (Levy 2002; Peart and Levy 2005). So for Smith human beings are naturally all the same. All distinctions we observe are due to nurture, so much so, Smith says, correctly or not, that until the age of 6 or 8 even parents notice very little difference in children’s talents: if some adults claim to be naturally different, it is their vanity that speaks (Smith [1776] 1981, WN I.ii.4). Smith goes so far to even deny any natural kin affection. What we think of as natural affection of kin is in reality just habitual sympathy. If a jealous and untrusting husband is convinced that the child his wife brought to life is not his, even if the child is indeed his, he will treat that child differently from a child he believes is his own (Smith [1759] 1984, TMS VI.ii.i.14). Similarly, no natural feelings of kinship exist between a parent and an absent son. Some time after the son shows up again, he is difficult to get along with “from want of habitual sympathy, from want of the real principle and foundation of what is properly called family-affection.” (TMS VI.ii.i.8)

Given his natural egalitarianism, Smith needs to explain institutional and moral variations by other means. He does so by asking what happens if the environment in which people live changes: something roughly similar to ecological adaptation.

Vernon Smith explains this idea, as ecological rationality, to explain experimental behaviors which differ from rational choice predictions (Smith 2008; see also Smith and Wilson 2017). When experimental results show “irrational” behaviors, the results may simply reflect a rational adaptation to an environment and the transposition of that adaptation to the laboratory. For example, we might learn, from an early age, that sharing our toys is a rational strategy in the long run, and that sharing and cooperating is a rational strategy also for adults in a complex and anonymous society. When we enter the laboratory, we bring with us that experience and that set of values. So we share and cooperate on the playground as well as in the laboratory. Our cooperation is not irrational. It is a rational adaptation to the social needs of our environment. So what we see in the lab is not necessarily an example of (ir)rationality, but an example of the cultural and moral values we embrace in our social environment.

The idea of ecological rationality that Vernon Smith proposes is what is seen in the experiments of Henrich and his team, even if they do not call it that. It is also similar to the idea of experimental evolution and to what Adam Smith describes, even if this is a moral experimental evolution rather than a biological one.

So, starting from genetic homogeneity, how do we explain differences in preferences and institutions? Adam Smith’s answer seems to be cultural adaptation to different environments. And he does it using history and something resembling experimental evolution both at the global and local level. The variable he changes in the environment is wealth. Granted, Smith spends most of his intellectual life trying to explain wealth formation. Nevertheless, once different levels of wealth are

explained, he is willing and able to consider wealth exogenously to analyze the different effects it creates on morals and institutions.

Given the accounts of hunter-gatherers present in Smith's time, Smith believes that hunter-gatherer societies do not have a complex court system; as a matter of fact, that most do not have a court system at all. Some rely on their chief and/or elders to resolve disputes. For Smith, commercial societies do have more sophisticated legal systems than hunter-gatherers. Why this difference? The wealth of hunter-gatherers, Smith tells us ([1762-3, 1766] 1982), is very limited, and may consist mostly of perishable items. Private property is therefore limited, if nonexistent. Trade in material objects may also be very limited, or nonexistent. In such an environment, Smith argues, there is no need for property law or contract law. There is no need for a voluminous legal system, which indeed does not emerge and is not present. On the other hand, in an environment in which commerce is prevalent, for Smith, we observe wealth and the presence of both property and contract, and as a consequence the presence of property law and contract law and of a more complex court system to protect and enforce property and contracts. Similarly, Smith observes, in an environment in which physical strength is indispensable for survival, women tend to be subjugated to men. In commercial societies, where production comes from manufacturers where physical strength is not as relevant, women become peers and companions of men. For Smith, different environments, different levels of wealth, therefore, generate different sets of institutions (Meek 1976; Smith 2006), in a sense like different size seeds generate different size beaks in birds.

An example of local institutional adaptation is primogeniture. Primogeniture is an institution emerging and effective during times of high insecurity. Smith claims that during barbaric invasions, trying to protect small pieces of land is very costly and ineffective. The most effective way to protect land is to take advantage of economies of scale. To survive, one needs to avoid dividing land into

smaller pieces and trying to preserve its entirety, if not making it larger. Primogeniture is therefore an appropriate institutional response to this violent and insecure environment. But Smith argues that primogeniture is destined to disappear when the security conditions become more stable, as in commercial societies (WN III.ii.3-7).

As different institutions evolve in different environments, for Smith, also different norms of moral conduct and different preferences evolve from differences in the level of wealth in the environment. For Smith, the test variable is still the amount of wealth created by different means of production, as documented by history or travel diaries of missionaries or long-distance traders. His analysis of cultural evolution runs parallel to the institutional evolution one. He gives examples for the global and local level.

In Adam Smith's view, in the severe hardship of poverty of some societies, showing emotions and distress can be read as a sign of weakness, attracting no sympathy and compromising survival. As a result, emotional displays are avoided. But by avoiding emotional display, no sympathy is received or offered (TMS V.2.9). What looks like apparent insensitivity towards themselves, and consequently insensitivity towards others (TMS VI.iii.18), is the appropriate adaptation needed to survive in severe hardship (Paganelli 2017). In contrast, wealthier societies offer ease and tranquility which allow individuals to express their emotions with fewer negative consequences, as he claims in TMS V.2.13 (for results from a modern cross-cultural study see van Hemert, van de Vijver, Fons J. R., and Vingerhoets, Ad J. J. M. 2011)

For Adam Smith, the poverty and the consequent apparent insensibility of some societies are so deep that a code of conduct where infanticide is "undoubtedly more pardonable" (TMS V.2.15) becomes common. Some societies, Smith tells us, are so miserably poor that people are forced, or think themselves forced, to drown children like puppies (WN I.viii.24). If the weakest members of



societies—the infants, the elderly, and the sick—are not left to die of want or abandoned to be devoured by wild beasts (WN intro.4 and TMS V.2.15), the whole society may not survive because of their limited resources. This ethics is an appropriate adaptation to survive the harsh environment of severely indigent societies. But the same action, infanticide, is and should be abandoned when societies become wealthier. Bigger seeds select for bigger beaks.

The wealth variable can change also within different global environments, creating local environments: wealth inequality within societies. Moral systems adapt to these local differences as well. So, Smith tells us, within a society that uses the same means of production, say agriculture or commerce, there are differences in local environments. There are rich and there are poor. For each of them, given the local amount of wealth, we observe the development of different moral systems. The rich adopt a “loose system of morals” and the poor an “austere system of morals” (WN V.i.g.10). Smith asks: why do we have these different moral systems? Why does the same action performed by the rich generate a different level of approbation than if performed by the poor? His answer, based on his historical observations, is adaptation for survival. If the poor engage in the same “extravagances” and “excesses” as the rich, they would ruin themselves in a few days. The same excesses and extravagances committed by rich have no consequences for them for a few years. To survive, the poor must therefore develop an austere moral system. The constraints of the rich are different, so their moral system evolves differently (WN V.i.g.10). Bigger seeds select for bigger beaks.

An additional point of contact between Smith and experimental evolution is that Smith is aware of what Burnham (2016) describes as “evolutionary mismatches”, that is, that adapting to novel circumstances may prove difficult. When the practice of infanticide continues in rich societies, Smith condemns it as “so dreadful a violation of humanity” and “the most unjust and unreasonable

conduct” (TMS V.2.15). Yet, he claims, it persists because some customs are very difficult to eradicate, even if no longer needed. Similarly, the persistence of primogeniture in a wealthy and safe environment is unnecessary, and yet it may “absurdly” persist (WN III.ii.4-7).

So, using history to collect observations, with his assumption of human homogeneity and wealth as a test variable, Smith develops a system of environmental adaptation with a method similar to experimental evolution—cultural or moral experimental evolution, rather than biological. We do not observe genetic changes, which for Smith would be impossible because of his assumption of unchangeable human nature, but we observe changes in what for him can change: human character, its morals, and its institutions. Also his results are similar to the ones from experimental evolution: endogenization of changes. Preferences, morals, and institutions can be studied as endogenous. Adam Smith therefore points us toward history to successfully use experimental evolution in economics.

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