

Revolutionary Evolutionist: Stephen Jay Gould and his legacy for radical human geography

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A review essay on *The Science and Humanism of Stephen Jay Gould* (Monthly Review Press, 2011) by Richard York and Brett Clark

1. Introduction

In this review essay I argue that there are three aspects of Stephen Jay Gould's work both relevant and applicable to radical human geography and geographers. First, Gould and Lewontin's (1979) critique of adaptationism provides a useful foundation for radical thought and action free of reactionary constructions such as 'survival of the fittest.' Second, Gould and Eldridge's (1977) idea of punctuated equilibrium provides a theoretical framework for the application of revolutionary change in society. Third, Gould's assertion (1989, 1996 and 2000) that evolution is non-directional (i.e. non-teleological) provides a template for building a better society.

Since the mid-1990s, when I was a geology major at the University of Victoria, I have been a fan of Gould. 1990s UVic was radical, with constant political rallies and organizing around ecological, feminist and many other issues. Carmanah was in the air as anarchists, hippies and utopian communities worked to save old growth forests on the coast of British Columbia. Gould's writings were not out of place in this situation. My attraction to them was more to do with geology than with their implicit political content, but I was interested in both. To some extent, I would credit Gould with giving me my first exposure to radical ideas.

Gould makes mention of his political sympathies in his more popular work, the essays for which he became quite famous and which were collected into a number of books over the course of three decades. For instance he often mentioned 'punctuated equilibrium' which refers to Gould and Eldridge's challenge to a fundamental principle in geology established by Lyell in the 19th century. That principle is *uniformitarianism*, the idea that geological change is smooth and continuous. In contrast, punctuated equilibrium represents change measured by catastrophic jumps. This is also related to the question of whether or not species change slowly over time or quickly and all at once. For instance, an event such as a meteorite impact with the earth is theorized to have caused the extinction of the dinosaurs (Raup, 1992).

Radical philosophy would tend to embrace a 'saltationist' paradigm, in which the discrete jump is the mechanism for change in society. The revolutionary does not look to the status quo of contemporary society to fashion tools of change. Rather, he or she seeks to establish change rapid enough to evade reactionary forces interested in protecting that status quo. This way of seeing the world is compatible with punctuated equilibrium.

2. The Critique of Adaptationism

In *The Science and Humanism of Stephen Jay Gould*, Richard York and Brett Clark (2011) cover Gould's life work in a way that, like Gould, might at first not seem very radical at all. For Gould, good science always came first, and York and Clark remain true to that ideal. The authors are sociologists but the evenness and detailed comprehensiveness of their knowledge of Gould's work, not to mention the intricacies of evolutionary theory, is impressive. They do a very good job of explaining complex evolutionary arguments in laymen's terms.

For instance, Gould and Lewontin's (1979) concept of the spandrel as a critique of adaptationist explanations is particularly well presented by the authors. Spandrels are spaces between arches used for structural support. A rectangular room with a very high ceiling (e.g. in a large cathedral or church) might contain many spandrels between domes or arches near the top of the structure. They are purely incidental, but unavoidable, side-features of central support frameworks. By analogy, Gould theorized that physiological features of many organisms were like spandrels. York and Clark (2011, p. 60) argue that the human brain is one such feature. Many aspects of the brain can be explained in purely adaptationist terms, such as the ability to speak. Other aspects, such as reading and writing, arose as side effects.

Evolutionary adaptationists maintain that each and every feature of an organism has been honed by natural selection for a specific function defined by environmental context (Fodor and Piatelli-Palmarini, 2010). Dawkins (1976) argued that natural selection fits adaptations to environments operating at the level of the gene. So, for instance, the end result of millions of years of evolution operating upon the basic genetic framework of the beaver's rodent ancestors culminates in a host of phenotypes, the physical expressions of genetically defined features, that perfectly fits its environment. The beaver's teeth, tail and dam, among other features, radiate outward from an internal genetic framework.

In *The Extended Phenotype* Dawkins (1982) speculated that human culture might, in fact, be a set of extended phenotypes that ultimately start from genetic material, but that pass through another selectional filter at the level of the 'meme'. The latter is a discrete representation of cultural information passed vertically from older to younger generations with high enough fidelity to preserve useful information necessary for survival. The theory that human culture consists of discrete units is reductionist in the same way that the concept of a selfish gene is reductionist, but the former (culture) is posited to be constrained, not defined, by the latter (genes). Critics of Dawkins sometimes make the mistake of assuming a strict single level reduction of all phenomena to the level of the gene (see for instance Bunge, 1998, p. 36) but this misses the point.

The popular view of Dawkins is somewhat like the popular view of Darwin insofar as it largely consists of misperceptions about what these two authors actually said. To understand Dawkins

(as with Darwin) one must actually read Dawkins thoroughly. Gould was certainly one of Dawkins' (and Darwin's) most thorough and well-read critics.

Gould was at pains to demonstrate fallacies and errors in adaptationist thinking. Dawkins, as a self-proclaimed reductionist and materialist, was therefore one of Gould's primary targets. York and Clark (2011, p. 85) describe how the idea of convergence crept into neo-Darwinian thinking as a natural consequence of strict adherence to a dogma wherein evolution 'chooses' the same basic sets of adapted features over and over again. For instance, the eye has been re-created many times by natural selection. Local variations (i.e. in the way that pre-eye structures were configured) produce global similarities such that all eyes (from the primitive 'eye cups' of submarine worms to the sophisticated eyes of humans) resemble each other in some fundamental ways.

According to Gould, this view of evolution has served to obscure many more central contingencies in the unfolding of the 'tape of life', that if played over and over again would never result in the same trajectory. Adaptationists on the other hand, people like Dawkins and his ally Daniel Dennett, believe that this imaginary tape would, on the contrary, play out in pretty much the same way each time evolution 'chooses' the best designs.

The narratives and analogies used in debates between Gould and Dawkins can also be used to try to explain human history. A tradition dating back to at least Herbert Spencer was devoted to the application of ideas such as 'survival of the fittest' and other evolutionary clichés to human societies. Gould, perhaps somewhat mistakenly, would almost certainly have placed Dawkins within a lineage tracing its descent back to Spencer. The worldview of 'sociobiology' would thus posit that society replete with class inequality, injustice and baseness, is justifiable as an unavoidable state resulting from human adaptation resulting in the sorting of individuals based on their ability to adapt and compete. Playing out the tape of human history would result in the same stratifications no matter how many times it was played.

Taking the analogy (that between natural and human history) further, *all* societies would necessarily trend towards inequality and stratification because, like the eye, that state of affairs is an ideal optimization selected naturally. The critique that belies this 'argument from the eye' will be used to show similarly why human societies do not by necessity evolve towards similarly unequal states. That the eye is not always derived independently is evident in the fairly recent discovery (York and Clark, 2011, p. 86) of shared genes between organisms that were previously thought to have evolved eyes separately and with no communication. Shared structures underlie eyes in organisms as diverse as mollusks and mammals. Analogously, shared structures of human history underlie products of the systematic production of misery due to exploitation and greed. The latter result from dialectical struggles between owners of means of production and those whose only ownership is the labour they provide and without which the means of production would lie still, barren from lack of use.

3. Punctuated Equilibria

Punctuated equilibrium is the idea that geological change occurs in a non-uniform manner. Change through geological time is, according to the theory of punctuated equilibrium, characterized by the periodic occurrence of catastrophic events, indicated in the geological record by rapid speciation ‘into’ the gap opened up by the event, followed by a much longer period of quiet or non-change (Huggett, 1990). Gradual or uniform change, characterized by slow change in species composition is, according to this theory, rare (Gould and Eldridge, 1977; Raup, 1992).

Speciation (the appearance in the fossil record of new species) happens quickly and all at once. Gaps in the stratigraphic record, previously treated as ‘no data’ (Gould and Eldridge, 1977, p. 116), are synchronized with the tempo of speciation. In Gould and Eldridge’s words, “[s]mall numbers and rapid evolution virtually preclude the preservation of speciation events in the fossil record...” a statement that is here interpreted as meaning that revolutionary change often eludes capture even when unsuccessful.

Changes happening at the fringes of society will in time come to dominate the centre. In nineteen-fifties United States ideas like ‘free love’ or ‘equal rights’ were most likely considered radical by mainstream Americans. With the advent of accessible birth control and the civil rights movement these ideas came to dominate to the point where now they are commonplace. The underlying point is change happens relatively quickly and often it happens in the margins.

The “Occupy Wall Street” movement offers another case. Where the impetus for this movement began is open to debate. In keeping with the geological analogy, a large catastrophic event (such as a meteorite impact on earth) opens a large phyletic space in the realm of speciation possibility. With the decimation of the dinosaurs due to unforeseen cosmic realities (Raup, 1992) came the rise of the mammals. By analogy, the fall of stable banking systems in the United States driven by over-leveraging capital led to the creation of a large space of possibility (albeit with very negative consequences) in domains of everyday life in America. This applies especially to young people, who have been hit hard by recent structural societal changes.

With unemployment at sustained high levels and the value of university education diminishing, the ‘under 30’ educated segment of society has both the energy and the organizational capacity to launch an attack on the powers that be, especially those associated with the banking crises starting in 2008.

The Iraq war’s eminent demise, returning war veterans with diminishing future prospects and the decline of stable social safety nets also adumbrate the makings of both revolutionary protest and general disgruntlement. Without a doubt the potential for change in the Occupy Wall Street movement remains latent. But the message occupiers hope to communicate to the rich and powerful remains unrealized, overly distributed among a hodgepodge of grievances.

According to the theory of punctuated equilibrium, movements such as Occupy Wall Street should proceed in short sharp bursts. “Speciational events” would result in the proliferation of productive and specialized sub-units splintering from a main group interested in more general claims (such as “we are the 99%”) or demands.

The so-called ‘battle in Seattle’ was won through creative or cultural resistance more than the creation of a revolutionary vanguard. But punctuated equilibrium sometimes runs the risk of recapitulating features of the adversary it purports to be fighting. Periodic catastrophic events perpetrated by activists, students and revolutionaries is in part what led to the discrediting of certain counter-hegemonic tactics in the 1960s and 1970s battle to end the Vietnam War. That struggle, like the present one, was also about economic justice, women’s and subaltern rights, and other concerns, but in the sixties some issues such as racism were fresher and more contentious due to the fact that, for instance, fundamental human rights had only recently been established during the civil rights movement.

Big business ultimately played a large part in deciding events that turned the tide against extended American presence in Vietnam. At the same time a movement from the margins moved towards the centre. We now fail to be shocked by the appropriation of public space for protest and democratic discussion.

Origins and outcomes link up together in non-linear ways that are tangled and very difficult to sort out. Scaling back to take in movements from the early sixties until now, the range of progressive narratives forms a many-coloured cloth, the braids of which ultimately elude illusions of shared goals and directions.

4. Evolution Without Teleology

The range of life forms through time are many and various but they do not even begin to exhaust the possibilities, and humanity rarely comes out on top. To assume that replayed ‘tapes of life’ always end up in the same hierarchies is to indulge in the same kind of hubris that leads to racism, sexism and homophobia. The idea of society ‘ending up’ a certain preordained way is no different from saying society trends toward that unequal or unjust state as a goal.

Goal-directed philosophies, or teleologies, such as these have sometimes found a home in the realms of human geographic inquiry. Returning to the example of eyes, *The Dictionary of Human Geography* (Gregory et al., 2009, p. 742-743) has this to say by way of critique (in this case of Aristotle’s teleological logic):

“...humans do not see because of a series of prior biological processes that produce eyes; rather, eyes are produced in order to meet the purpose of seeing. The teleological end of seeing arranges biological conditions such that eyes eventuate.”

The same article points out that early Marxist geographers such as Neil Smith used the teleological concept of ‘stages’ to theorize how societies eventually move past capitalist formations to more just and equal socialist societies.

Wonderful Life, one of Gould’s most important and widely cited books, takes on the idea of teleology in evolution using the Burgess Shale as a model. Progressive theories of evolution assume increasing diversity and complexity through time. The suite of organisms found in the Burgess Shale, a series of outcrops high in the Rocky Mountains on the border between BC and Alberta, Canada, suggest that this assumption is unfounded.

The fossils associated with the Burgess Shale represent such an incredible diversity and complexity of life that the speciation event associated with the early Cambrian period has come to be known as the “Cambrian explosion.” The separation between the Precambrian and the Cambrian marks the evolution of life from single- to multi-cellular forms with hard, and thus preservable, parts. The amount of time that has passed between the Cambrian explosion and now is approximately one tenth of the time of the entire history of the planet.

One of Gould’s most famous constructs, that of the ‘tape of life,’ gets extensive use in *Wonderful Life*. As already alluded to above, the tape of life is a metaphor or thought experiment for thinking through evolution as a whole. It lets us ask ‘what if’ the ‘tape of life’ were played over again? Would it result in the same diversity and/or alleged hierarchy of life forms that we see today on earth? Gould argues that with each re-play of the tape of life we will get a wholly different result, which is equivalent to saying that evolution is non-teleological. The organisms of the Burgess Shale provide empirical evidence corroborating this claim. The number of phyla and diversity of forms within each phylum in the Burgess Shale demonstrate that diversity as measured between phyla seems to have decreased at certain moments in natural history.

York and Clark (2011, p. 62) write specifically about *Wonderful Life* in *The Science and Humanism of Stephen Jay Gould*. They note that in addition to working against human hubris, Gould’s theory stresses how structural constraints established early in evolutionary history serve to restrict the set of possible body plans of phyla developed later in that history. The point here is that adaptation and natural selection do not have complete freedom to act. Structural constraints limit the possibility space of natural selection to a significant degree.

The inferences of non-teleology and structural constraint for radical human geography should now be becoming a little bit clearer. These inferences rely upon arguments from analogy. Arguments from analogy are limited, but one strength they possess is heuristic. The ‘shape’ of natural history can be used as a heuristic analogy for examining the ‘shape’ of human history.

I have also been relying upon arguments from authority, but arguments from analogy and authority are not enough. Logical analysis requires more and with this in mind I now turn to some features of human history that can be logically informed by *evolutionary history*, a nascent

interdisciplinary field of inquiry that has only recently begun to produce interesting findings. For human history to plausibly be anything like natural history human culture and society must possess some kind of information upon which evolutionary processes work. Organisms house DNA which in turn consists of genetic material that has been passed on from generation to generation from time immemorial. Cultures and societies, on the other hand, possess no obvious material parallel to the gene. Dawkins (1976 and 1982) has suggested the term 'meme' as a unit of cultural information transmitted between human generations.

York and Clark correctly perceive Dawkins work and, by extension, his notion of the meme, to be reductionistic. York and Clark do not disavow the meme specifically, but they do make the mistake of conflating the reductionistic science of Dawkins with what they call sociobiology (York and Clark, 2011, p. 139). The latter ignores human history, culture and society as side effects of genetically determined structures of human behaviour. But the emergence of higher order phenomena is no less hindered in human realms by, for instance, art consisting of elementary particles of culture than is the rhinoceros, in the non-human animal realm, from developing its distinct body shape and behaviours from a specific configuration of complex molecules.

What Gould and his allies Eldridge and Lewontin stress is that reductionism does not take *emergence* seriously enough. Reductionism places the stress at the wrong level and essentially ignores variables available for selection at group or species levels. Human societies and whole cultures think or act in a diversity of ways. Revolutionary events in Paris will play out differently than they will in Seattle, Sao Paulo or Beijing. Different movements (a movement of movements if you will) across both time and space will have commonalities as well. The point is that the movements will not, cannot, always act towards the same goals. Play the tape of human history out many times and you will see a range of outcomes, hierarchies and consequences emerge.

5. Revolutionary Evolution

The legacy of the life and work of Stephen Jay Gould for radical human geography has three main aspects. These are 1. a *critique of adaptationism* ('survival of the fittest') using the architectural analogy of the spandrel 2. *punctuated equilibrium*, or the idea that historical change occurs catastrophically, very quickly and in a relatively short period of time and 3. the *non-teleology* (lack of goal orientation or directionality) of evolution. To summarize, these aspects inform radical human geography in the following ways.

First, the *critique of adaptationism*, most succinctly summed up by the phrase 'survival of the fittest' is one of Gould's (and Lewontin's) most famous and accessible ideas. York and Clark aptly focus upon the spandrel, elucidating the ways in which 'spaces between' main structures

may themselves be selected and developed through time. Between main structural constraints lie possible future mainstreams.

For radical human geographers this is cause for hope. Turning adversity into strength, processes of marginalization by forces of the status quo foster new means for radical theorization and organization. The ‘architecture,’ if you will, of mainstream society provides both confining structure (the building’s arch) and also space for creativity and movement (the spaces between the arches, or the spandrels).

Second, *punctuated equilibrium* is one of Gould’s (and Eldridge’s) most important concepts for the discipline of paleontology and, by extension, geology, natural history, and human history. Keeping in mind dangers of applying geological analogies to human society (the latter operating at a much smaller time scale), there are very useful aspects of punctuated equilibrium upon which radical human geographers might draw.

The terms ‘radical’ and ‘revolutionary’ indicate a manner of achieving societal or cultural change quite different in character from those that are more ‘moderate’ or ‘liberal.’ The former, not satisfied with a status quo that maintains inequalities and injustices, insists upon seizing the ripe moment in history. Punctuated equilibrium is perfectly in keeping with these aims. York and Clark fail to do justice to this aspect of Gould’s work, despite demonstrating deep understanding of Gould’s magnum opus, *The Structure of Evolutionary Theory*.

Third, *non-teleology* is possibly one of the least well-understood aspects of Gould’s work because it is the most abstractly philosophical. The idea of replaying the ‘tape of life’ is a theme that runs throughout Gould’s work. It is a boon to radical human geographers because it very succinctly upsets the status quo. Conservatives and reactionaries would like to believe that current inequalities or injustices are the fault of their victims. Hierarchies between humans are naturalized and constructed as ‘right.’ Replaying the tape of life (or in this case the ‘tape of human history’) under this paradigm would result in exactly the same orders of suffering.

The radical human geographer might use tools of Gould’s thinking to bring another way of thinking to bear upon societal problems. Replaying the tape of human history would thus result in non-hierarchical societies as often as it would result in their opposite. The strength of this way of thinking is that it is both non-dogmatic and logical. Used properly and thoughtfully this is one of the most powerful tools in the revolutionary thinker’s toolbox.

York and Clark, with hesitations noted above, have done admirable justice to the life and work of Stephen Jay Gould in this book. They distil the essence of Gould’s thought in laymen’s terms without dumbing down. Radical ideas are presented scientifically. This book is highly recommended as an introduction for those new to Gould, for those already familiar with his work desiring a useful synopsis, and for those wishing to learn new aspects or ways of viewing the

ideas and implications of one of the most distinguished and beloved of thinkers, teachers and writers of the past few decades.

6. Works Cited

Social Science Under Debate (Toronto: University of Toronto Press, 1998) by Mario Bunge

The Extended Phenotype (Oxford: Oxford University Press, 1982) by Richard Dawkins

The Selfish Gene (Oxford: Oxford University Press, 1976) by Richard Dawkins

What Darwin Got Wrong (New York: Picador, 2010) by Jerry Fodor and Massimo Piattelli-Palmarini

The Structure of Evolutionary Theory (Cambridge: Harvard University Press, 2002) by Stephen Jay Gould

Full House (New York: Harmony Books, 1996) by Stephen Jay Gould

Wonderful Life (New York and London: W.W. Norton & Company, 1989) by Stephen Jay Gould

The Lying Stones of Marrakech (New York: Three Rivers Press, 2000) by Stephen Jay Gould

“The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme” by Stephen Jay Gould and Richard Lewontin (*Proceedings of the Royal Society of London, Series B, Biological Sciences*, Vol. 205, No. 1161, The Evolution of Adaptation By Natural Selection, Sept. 21, 1979, p. 581-598)

“Punctuated Equilibria: The Tempo and Mode of Evolution Reconsidered” by Stephen Jay Gould and Niles Eldridge (*Paleobiology*, Vol. 3, No. 2, Spring 1977, 115-151)

The Dictionary of Human Geography, 5th Edition (Malden, MA: Wiley-Blackwell, 2009) Gregory, D., Ron Johnston, Geraldine Pratt, Michael Watts, and Sarah Whatmore (eds.).

Catastrophism: Asteroids, Comets and Other Dynamic Events in Earth History (London and New York: Verso) by Richard Huggett

It Ain't Necessarily So: The Dream of the Human Genome and Other Illusions (New York: New York Review of Books, 2000) by Richard Lewontin

Extinction: Bad Genes or Bad Luck (WW Norton, 1992) by David Raup

The Science and Humanism of Stephen Jay Gould (Monthly Review Press, 2011) by Richard York and Brett Clark