On the Meaning of Biological Contingencies for Human Lives

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Turning Points is not only an overview of many critical events that shaped human evolution, personal life, and development. It is also a lucid and accessible account of why we should resist the tendency to infer intelligent design, faith, and genetic fatalism when looking at human life in general. This review highlights the central philosophical themes that arise in Kampourakis's analysis and identifies some scholarly work by philosophers who have explored these ideas in the last fifteen years.

Keywords

contingency • Darwin, Charles • design • development • human evolution • narratives • path dependence • transition events

Review of *Turning Points: How Critical Events Have Driven Human Evolution, Life, and Development* by Kostas Kampourakis (Prometheus Books, 2018).

Turning Points by Kostas Kampourakis offers a view of human life that is opposed to teleological reasoning, or more precisely to the tendency to infer design and grounds for faith while observing and explaining human life. While this common theme in the history of philosophy of science has mostly been related to Natural Theology, Kampourakis's arguments against the "design stance" go beyond the idea that the appearance of design implies the existence of an intelligent Being responsible for the presence of life on Earth. The case opens with the idea that the design stance is something pervasive in our species from a very young age. It is not as strong as an instinct, but the design stance exists as a default setting for humans when they are interpreting natural phenomena.

Kampourakis supports this claim in Part 1 by presenting number of polls and studies in psychology indicating a higher incidence of teleological inference among subjects of young age or among adults put under time pressure. This empirical approach to articulating the design stance is interestingly different than what is typical in debates about Natural Theology. By suggesting that humans seem particularly inclined to infer goal directedness when looking at biological

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phenomena, Kampourakis identifies an issue anchored in a tangible psychological and social tendency, instead of a mere philosophical position articulated by a handful of skilled anti-naturalists. Kampourakis thus hopes to overcome a pervasive yet naive design stance by summarizing various kinds of empirical evidence about humans. He suggests that evidence indicates that genes do not predetermine who we become, that our personal lives can take unforeseeable trajectories, and that the evolution of humans as we know it was not meant to happen.

The chapters in Parts 2–4 make one substantive claim. The main reason offered by Kampourakis for rejecting the design stance is that the majority of life processes (reproduction, ontogenesis, individual life, and evolution) are full of turning points. For him, turning points are events that are both contingent *per se* and that subsequent events are contingent upon. This seemingly simple thesis entails a number of ideas previously explored by different philosophers. First, saying that some events in this world are contingent *per se* implies some form of indeterminism, or at the very least it means that things could have been otherwise. One can find an interesting, albeit technical, analysis of this idea in the work of Xu (1997) and Belnap (2005), as they elaborate in detail the (pre)conditions for causation in the frameworks of branching time and branching spacetime. I'm leaving aside the account of causation here to focus only on the ontology of a turning point. In a nutshell, Belnap and Xu would argue that the latter implies the “existence of transition events.” A transition event corresponds to an ordered pair composed of an initial event and an outcome event, but where the outcome is only one among other possible alternatives that lie in the future of an initial event. Therefore, as a transition event happens, one of the alternative outcomes is being realized while the other possibilities are being dropped-off (Belnap 2005, 231).

Admitting the existence of turning points further presumes that this world should be conceived as a branching process, as opposed to a linear one. For example, let's suppose that we observed a series of events going from *A* to *B* to *C* (see Figure 1). If *A* and *B* are turning points, then the passage from *A* to *B* is a transition event and *B* to *C* is a second transition event.¹ This entails that there are moments when it was possible to go from *A* to some alternative *B** (and then *D*), and from *B* to *C** (where *B** is different than *B* and *B** different than *C*). So, instead of a simple linear sequence, we obtain a ramification from *A* into alternative possible historical possibilities.

Figure 1: Branching history

In this context, outcomes become path dependent. In the previous scenario, the outcome *C* is not necessary, but its occurrence causally depends on the occurrence of *B*. In Kampourakis's

¹The ordered pairs $A \rightarrow C^*$, $B \rightarrow C^*$ and $A \rightarrow D$ would also be transition events in this graph. The focus is only on the two transition events that occurred in the example.

words, “events like B are critical because they may determine which of several possible paths will be followed” (26). We find this branching view of history and the type of causal dependence that follows from it in the writings of other people. Kampourakis credits Beatty’s (2006a) excellent analysis of the notions of contingency in Gould’s *Wonderful Life* (1989), but there have been more extended philosophical analyses of these topics in evolutionary and ecological contexts (see for instance Beatty and Desjardins 2009; Desjardins 2011, 2015).

Endorsing this branching view of historical processes can have implications for explanatory strategies as well (Beatty 2016). A certain caricature of science would want science to be able to explain phenomena in nomological terms. However, singular outcomes of series of transition events cannot be explained by merely citing regularities and initial conditions. In order to make sense of why C , instead of C^* (or D), has occurred from A , it matters that we say something about the past possibilities that could have led to a different outcome. In the absence of turning points, we could say that C happened because it was the expected outcome in situations where event A happens. In fact, not much would be lost by omitting B , since nothing else but C would have been expected to happen in the first place. Adding B to the account of the occurrence of C would simply be redundant. However, there is a reason to include B only if things could have been otherwise and B is a difference maker in this regard. In other words, in the presence of turning points, our understanding of a given outcome is enhanced by mentioning both transition events *and* the alternatives that were dropped off along the way. So, if the range of historical possibilities are such as depicted in Figure 1, then it is truly informative to explain the happening of C by saying “because B happened instead of B^* .” One would thereby imply a counterfactual of this form: Had B^* occurred instead of B , then D instead of C would have been the outcome. Applying this conclusion to Kampourakis’s thesis, the existence of turning points suggests that some form of narrative about the realized and the not-realized historical possibilities can significantly improve one’s understanding of a situation. When it comes to explanatory strategies, if there are turning points, then historical narratives occupy the higher ground.

Although Kampourakis does not consider Beatty’s (2016) analysis of the value of narratives, the last and more philosophical chapter of *Turning Points* depicts a view of explanation in which narratives play an important role. In brief, Kampourakis argues that while turning points may preclude perfect predictability, they “do not diminish the explanatory power of the narrative in so far as we know enough about antecedent states in order to understand their causal relation to the observed outcome” (325). It is interesting to look at this statement in the light of Sterelny’s (2016) analysis of the distinction between robust and fragile historical trajectories. In brief, a robust trajectory tends to be less path dependent, i.e., it is less sensitive to changes in past conditions. Conversely, a fragile trajectory will have some “points of vulnerability in their causal chain,” which means that small changes in the timing or order of events could result in very different outcomes. Building from Jackson and Pettit’s 1992, Sterelny suggests that fragile trajectories typically call for actual-sequence explanation, i.e., identifying the specific (and contingent) links in a causal chain leading to a given outcome. Robust trajectories, on the other hand, can be explained by specifying the resilience of an outcome (Sterelny 2016, 523), which means that the emphasis is put on the rule-making constraints that lead a specific causal chain to follow a predictable pattern. Given that Kampourakis’s goal is to emphasize the points of vulnerability in developmental, personal, and evolutionary trajectories in humans, we could have expected him to insist on the importance of actual-sequence explanations. Instead he seems to take a mixed strategy.

In fact, the fourth part of the book, which deals with human evolution, gives lengthy examples of robust explanations. For example, bipedalism was likely to appear in our lineage due to

the advantages it afforded our ancestors while they were dealing with problems of thermoregulation and locomotion in savannah-like habitats; or it might have played a role in making them more attractive in sexual selection; or standing gave them an edge in situations of combat. Adaptationist explanations like these follow the model of a robust explanation. They highlight reasons that make an outcome likely (given its fitness-enhancing consequences), thereby making any reference to specific contingent details superfluous and seemingly irrelevant. But as Kampourakis's analysis shows, the inclusion of these examples does not prove that contingency goes out the window. Having a robust explanation only reduces the relevance of some contingent details. Some contingencies will always be relevant, such as the small biomechanical changes in the pelvis and lower back vertebrae that preceded the occurrence of full-time bipedalism. Similarly, small modifications in the timing of gene expression during development (a phenomenon known as heterochrony) resulted in a later and prolonged brain development in our species. These are examples where small, unpredictable changes had huge evolutionary impacts. Ignoring them in our account because there exist robust explanations of some key features of human anatomy and behaviors would only reveal a bias for adaptationist scenarios. The question then is not whether we should choose between actual-sequence and robust explanations. Instead, the challenge is to combine robust and vulnerable processes in a narrative that genuinely improves our understanding of specific outcomes. Contingency and narrative structures thus have their place in scientific explanations. However, the thesis developed by Kampourakis does not entail that all contingent events are worthy of the same attention. The ones that matter are the ones that made a difference by opening new paths.

What are these turning points? Many of them are the usual culprits. Part 2 of the book deals with development. Here we have meiosis (the production of gametes with a specific genome which involves chromosome segregation and recombination), fertilization (the moment where one sperm over millions of alternatives is given the right of passage by an ovum), mitotic divisions in embryo (the specific pairwise arrangements that occur during first cellular divisions), and the implantation of the embryo on the uterus. All of these moments in the development of an organism are to a large extent unpredictable, yet crucial in determining the phenotypes of individuals.

Part 3 deals with the life of a person, or more precisely, the decisive moments in the life of Charles Darwin that led to the publication of *The Origin of Species*. Here, Kampourakis tells the story of how Darwin's voyage on HMS *Beagle* came very close to never happening due to his father's unwillingness to give his blessing, or because of Captain Fitzroy's peculiar views on the shape of Darwin's nose and what it implied about his character. Despite his inclination for natural history, a Darwin deprived of a trip around the world observing the diversity and distribution of life forms would most likely be a Darwin who never writes *The Origin*. Receiving Wallace's manuscript in 1958 was also important in this matter to the extent that it urged Darwin to produce a summary of a much more substantial version of the project. Without this event, *The Origin* would have never been written, at least not in the form that we know it. So, as we are looking at a particular event in the life of an important figure in the history of life sciences, we can see that things could have turned out differently, that *The Origin* was a rather fragile outcome. What does this mean for the history of science? Kampourakis is careful, and rightly so, not to infer that there would not have been a theory of evolution by natural selection without Darwin's seminal book. There are several reasons to believe that the idea of evolution by natural selection as a general outcome in the history of science is somewhat robust. Darwin's 1842 sketch and Wallace's manuscript are but two rather compelling pieces of evidence. So, the existence of turning points at one level of analysis may not entail contingency all the way up.

Finally, Part 4 looks at the evolution of our species, *Homo sapiens*. As mentioned above, Kampourakis discusses distinctive features of human beings, but most of them are presented from an adaptationist viewpoint. So, somewhat paradoxically, the emphasis is more on the robustness of these outcomes. I've mentioned bipedalism and prolonged brain development already. The last chapter of that section also covers the evolution of language and culture. It again revolves around the acquisition of traits that made our ancestors better adapted than the other *Homo* species that existed in the past, such as ability to learn collectively. The only feature that is not presented with a stronger adaptationist lens is the evolution of our chromosome 2, which happens to be the result of a fusion of two chromosomes, an event that led to the separation of hominids from the other apes.

Does Kampourakis make a strong case? Is emphasizing turning points a good approach to overcoming the design stance? Highlighting the contingency and multiplicity of outcomes as a way of opposing teleology is a well-known strategy. As Beatty (2006b) shows, Darwin's reflection on the theological dimensions of evolution took a similar route when he decided to demonstrate that evolutionary outcomes (in orchids) can be contingent. Darwin saw that traditional teleological reasoning—i.e., when a life form is explained in terms of usefulness, and differences within a general form are explained in terms of differences in use—is incompatible with a biological fact. The fact is that the same end can be fulfilled by different means, where which of these means arises in a given lineage is a matter of chance. In a similar vein, we could say that Kampourakis, by highlighting the various turning points of human life, shows (once more) that evolutionary outcomes are not simply the result of a prewritten path, because things could have been otherwise. And he shows that which outcomes happen is (to a certain extent) a matter of chance.

Although the argumentative strategy used by Kampourakis is not new, his analysis brings something original by looking at more-recent evidence and applying his argumentative strategy to human development and personal life. I find it somewhat unfortunate however that Kampourakis downplays the difference between teleological reasoning generally and the specific ideas that life processes are intentionally designed and that our presence on Earth was inevitable. In fact, biology abounds with claims of traits, organs, and organisms being functional or useful, and many of those claims involve a form of teleology that would escape Kampourakis's criticism. Yet, as an antidote against fatalism and design, this book contains number of convincing elements. It is worth noting as well that this manuscript targets a popular audience. That evolution is not progressive and development not entirely programmed by our genes are hardly news for biologists and philosophers of biology. Yet, one of the greatest values of *Turning Points* is the accessibility and clarity with which complex and technical notions are presented. This is one of the best works of vulgarization on these topics that I have encountered.

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