

Historicity and explanation

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HIGHLIGHTS

- This paper critiques Beatty's and Desjardins' work on narrative explanation.
- A new account of historical explanation is developed.
- Historical narratives have central subjects and historical trajectories.
- Criteria for stronger and weaker historical narratives are given.
- Contingency is less important for historical narratives than some argue.

ARTICLE INFO

Keywords:

Historical explanation
Historical narrative
Central subject
Historical trajectory
Historicity
Contingency

ABSTRACT

Some scientific explanations are distinctively historical. The aim of this paper is to say what gives such explanations their historical character. A secondary aim is to describe what makes an explanation a stronger or weaker historical explanation. We begin with a critical discussion of John Beatty's and Eric Desjardins' work on historicity and historical narrative. We then offer an alternative account of historical explanation that draws on the work of earlier philosophers (Gallie, Danto, Mink, and Hull). In that alternative account, we highlight four features of narrative explanation that Beatty and Desjardins underemphasize: central subjects; historical trajectories; the idea that historical narratives are known retrospectively; and criteria for determining what is a stronger or weaker historical narrative.

1. Introduction

Some scientific explanations seem to be distinctively historical. Why are the Hawaiian Islands arranged in line, with the biggest island at the eastern end of the archipelago? According to the mantle plume hypothesis, the Pacific plate has moved across a hot spot in the earth's mantle, which caused a series of undersea volcanic eruptions (Morgan, 1971). The youngest volcanic island is biggest because it has had less time to erode. And it's at the eastern end of the island chain because of the direction of movement of the Pacific plate. Other examples of distinctively historical explanation include explanations of human events (Sterelny, 2016), explanations of larger-scale evolutionary trends (Turner, 2014, pp. 255–269), and explanations of homologous traits (Ereshefsky, 2012). Our aim in this paper is to say what gives these sorts of explanations their distinctive historical character. A secondary aim is to give an account of what makes for stronger and weaker historical explanations.

John Beatty and Eric Desjardins offer a well-developed and nuanced

account of historicity and historical explanation (Beatty, 1995, 2006, 2016, 2017; Desjardins, 2011; Beatty & Desjardins, 2009; Beatty, Desjardins, and Crawford, forthcoming). We take their work as our point of departure. Section 2 introduces their understanding of historicity. Section 3 is a critical analysis of Beatty and Desjardins' account of historicity and historical explanation. We highlight four concerns we have with their account. In Section 4, we reach back to earlier philosophers of history, such as Gallie (1955), Danto (1965), White (1963), Mink (1970), and Hull (1975), to provide an alternative account of historical explanation. This alternative account harks back to work in the philosophy of history in the mid 20th Century. One thing those earlier authors stress, but which falls by the wayside in Beatty's and Desjardins' recent work, is the importance of *historical continuity*. Historical continuity involves the persistence of a particular entity, what earlier authors call the 'central subject' of a historical narrative. We'll also discuss how a historical narrative has a trajectory or directionality. And we will highlight how the directionality of a historical narrative is known retrospectively, after the outcome to be explained has occurred.

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<https://doi.org/10.1016/j.shpsa.2019.02.002>

Received 16 October 2018; Received in revised form 18 December 2018; Accepted 9 February 2019

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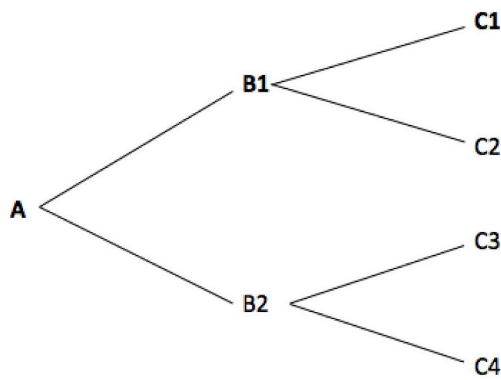


Fig. 1. A branching tree structure.

In Section 5 we use the elements of historical explanation developed in Section 4 to talk about what makes an explanation a stronger or weaker historical explanation. Finally, in Section 6 we summarize the account of historical explanation offered in this paper and contrast it with Beatty and Desjardins' account.

2. Beatty and Desjardins on historicity

Beatty (2016) begins by asking what narrative explanations are good for. When are narrative explanations appropriate, or called for? His answer is that “narratives are especially good at representing contingency and accounting for contingent outcomes” (2016, 34). This answer links up with his familiar thesis that evolutionary history is contingent (Beatty, 1995). Beatty also holds that there are two relevant senses of ‘contingency’. First, there is the sense in which later events are said to be contingent upon earlier events. Beatty (2006) thinks of this as the causal dependence sense of contingency. Second, some events are contingent *per se*, which means that they might not have happened, or might have happened differently.

Beatty uses a simple graphic device to illustrate how he thinks narrative explanations work (see Fig. 1). Suppose that the path from A to B1 to C1 is what actually happens. B1 is contingent *per se*, because B2 might have happened instead. B2 was, in some sense, a real historical possibility. The later downstream outcomes are then contingent upon B1 occurring. Suppose that C1 is what actually happens; C1 was caused by B1, and so is contingent upon B1. But C1 is also contingent *per se*, because C2 might have happened instead. According to Beatty's picture, one thing that literary narratives have in common with historical explanations is that they walk us through a series of turning points that exhibit both kinds of contingency. We can explain how C1 came about by tracing the turning points, and contrasting what actually happened at various junctures with possible paths not taken. For Beatty, giving a historical explanation of C1 depends on saying that previous turning points might have been different. B2 rather than B1 could have happened.

Beatty stresses contingency *per se* to such an extent that he criticizes Stephen Jay Gould for leaving it out at one crucial moment when Gould himself was trying to show how narrative explanation works. Gould writes:

Historical explanations take the form of narrative: *E*, the phenomenon to be explained, arose because *D* came before, preceded by *C*, *B*, and *A*. If any of these earlier stages had not occurred, or had transpired in a different way, then *E* would not exist (or would be present in a substantially altered form, *E'*, requiring a different explanation) (Gould, 1989, 283).

Beatty observes, rightly, that Gould is here talking only about contingency as causal dependence (2016, 39). From Beatty's perspective, this account of narrative explanation is too thin; it also matters that

earlier events or conditions in the series were contingent *per se*. Beatty's notion that the events explained by a narrative are contingent *per se* is tied up with two other notions he aligns with historicity: indeterminism and unpredictability. Historical explanations, for Beatty, explain outcomes that are not determined by prior events. In fact, he writes that historical explanations would be unnecessary in a deterministic world in which the relevant facts are known:

So, to be clear ... what is not worth narrating? Well, what would be the value of narrating events in an entirely deterministic world, in which the laws of nature and all relevant initial conditions are known to the reader, and we can then infer whatever will be the case at whatever time in the future (2016, 39).

Elsewhere Beatty and his co-authors write, “On our account ... history only really matters in an indeterministic world” (Beatty, Desjardins, Crawford, manuscript, 10). In a deterministic world there would apparently be no contingency *per se*. There could be no otherwise, but the possibility of the otherwise is necessary for historicity for Beatty.

Besides indeterminism, Beatty's notion of contingency is tied up with unpredictability. When talking about Gould's thought experiment of replaying the tape of life on Earth, Beatty writes “[un]predictability, which is the focus of the replay experiment, contributes to narrative-worthiness ...: we need a narrative when we don't otherwise know what will happen next” (2016, 38). In sum, we see that for Beatty narratives are appropriate when there is causal dependency and contingency *per se*, and that contingency assumes indeterminism and the unpredictability of the outcome to be explained.

Eric Desjardins' conception of historicity is closely allied to Beatty's, but with some differences of emphasis. For example, Desjardins suggests that the contingency of an event can be described probabilistically. The probability of a downstream event depends on what happened upstream. Change the upstream events and the probabilities of downstream events, the events to be explained, might change. Returning to Fig. 1, suppose the probability of branches $\langle A, B1 \rangle$ and $\langle B1, C1 \rangle$ is 0.5. So, the probability of C1 is 0.25. It is the combined probability of taking branches $\langle A, B1 \rangle$ and $\langle B1, C1 \rangle$. If the probability of the branches changes, so does the probability of the outcome (unless the changes cancel each other out). If, for example, the probability of $\langle A, B1 \rangle$ changes to 0.2, then the probability of C1 occurring is 0.1.

Desjardins (2011, 348) nicely summarizes his view when he writes that historicity involves three things:

- (1) multiple possible past states.
- (2) multiple possible outcomes.
- (3) causal dependence: the probability that a given outcome occurs must change as a function of the historical conditions realized at a given occasion.

Desjardins' account has several interesting features. First, condition (2) incorporates Beatty's notion of contingency *per se*. Indeed, Desjardins writes that “condition (2) entails that things could have been otherwise”, which looks like an endorsement of indeterminism (2011, 348). Second, condition (3) incorporates Beatty's notion of contingency as causal dependence. So, both Desjardins and Beatty think that both sorts of contingency – contingency *per se* and causal dependency – are crucial ingredients of historicity. Third, as mentioned before, Desjardins cashes out causal dependence in a slightly different way than Beatty does by suggesting that the probabilities of downstream events depend on what happened earlier. Fourth, Desjardins contrasts the notion of path-dependence with the notion of contingency as sensitivity to initial conditions. Path dependence is a subtler idea. Instead of saying downstream outcomes are merely sensitive to changes in some upstream variable, Desjardins' idea is that downstream outcomes are sensitive to the historical pathways that connect the upstream events with the downstream outcomes.

We can boil Beatty's and Desjardins' views down to two claims that both philosophers agree about:

- (A) Historicity involves both causal dependence and contingency *per se*.
- (B) Historicity is what makes narrative explanation appropriate.

This is the core view that we will critically examine in Section 3. One feature of this view is that both Beatty and Desjardins start out with an analysis of historicity understood as a feature of historical events and processes. A narrative, then, is just a representation of a series of events and those events exhibit the right sort of historicity. We will introduce more elements of Beatty and Desjardins' account in our critical examination of their account. Let's turn to that examination.

3. Concerns with Beatty and Desjardins' account

One concern we have is that Beatty (2016) links the need for narratives to indeterminism. Recall that Beatty and his co-authors write that “[o]n our account ... history only really matters in an indeterministic world” (Beatty, Desjardins, Crawford, manuscript, 10). In addition, Beatty (2016, 39) himself writes that there would be no need for historical narratives in a deterministic world. It strikes us that when explaining what narratives are good for, the emphasis should be placed on our lack of information about the world, not a metaphysical state of the world such as indeterminism. By linking narratives to indeterminism Beatty is unnecessarily taking a side on a controversial metaphysical issue. When it comes to understanding the nature of narratives, and explanations more generally, the concern should be the epistemic circumstances of agents, not the metaphysical question of whether the world is deterministic or not. A provisional agnosticism or quietism about the metaphysical issues of determinism seems like the way to go when giving an account of narratives. Even if determinism were true, narrative explanations would be epistemically valuable to ordinary humans—humans that lack complete knowledge of the world. Ordinary humans in a deterministic world lack the ability to know all of the events leading up to an outcome, yet they might still desire constructing a narrative to understand why that outcome came about. The question concerning our need for narrative explanations should be focused on our epistemic access to the world and our desire to explain certain outcomes, not the metaphysics of determinism and indeterminism.

Though Beatty aligns historical narratives with indeterminism, Gould, a prominent student of historical contingency, sees a difference between indeterminism and the sort of historical contingency that narratives describe. Gould writes that “contingency is ... not the titration of determinism by randomness” (1989, 51). That is, for Gould contingency and randomness (i.e., indeterminacy) are not one and the same thing. One complication here, however, is that in biological contexts, ‘randomness’ and ‘indeterminism’ sometimes have different meanings than they do in metaphysical contexts (Millstein, 2000). Processes such as random genetic drift, or a series of coin tosses, could be indeterministic in a sense that is still compatible with metaphysical determinism. A fair coin toss is a random or unbiased process in the sense that the probability of either outcome is 0.5, but a frequentist understanding of that probability is compatible with the outcome of each toss being causally determined by a myriad of microphysical influences. Turner (2014) argues that Gould—while avoiding metaphysical indeterminism—saw a close connection between historical contingency and the idea that macroevolutionary species sorting is an unbiased (one could say ‘random’ or ‘indeterministic’) process like a lottery, but this reading does not commit Gould to metaphysical indeterminism, any more than belief in random genetic drift commits evolutionary biologists to metaphysical indeterminism. So while Beatty aligns historical contingency and narrative with metaphysical

indeterminism, Gould and others do not.¹

A second concern we have is the emphasis Beatty (2006, 2016) places on historical narratives explaining unpredictable outcomes. In his discussion of Gould's senses of contingency, Beatty (2006, 338ff.) highlights two notions of contingency: unpredictability and causal dependence. Beatty also makes this link in his 2016 paper when he writes that “[un]predictability, which is the focus of the replay experiment, contributes to narrative-worthiness ...: we need a narrative when we don't otherwise know what will happen next” (2016, 38). We would like to question the linkage between historical narratives and unpredictability.

Desjardins (2011, 348, 351), however, does not make this linkage. His account of historical contingency allows that historically contingent outcomes may be predictable. For Desjardins (2011) historically contingent events occur when multiple outcomes are possible and changing the initial condition or path leading to an outcome changes the probability of that outcome. No threshold of probabilities is specified in Desjardins' account of historical conditions. Desjardins' conditions on historicity allow that a historically contingent outcome can be probable and thereby predictable at least in principle, even highly predictable.

We concur with Desjardins (2011) that historical contingency and the use of historical narratives should not require that an outcome explained be an unpredictable event. Highly predictive events can be the focus of historical narratives as well. Sterelny (2016) nicely illustrates this by citing paradigmatic cases of historical explanations from human history where the outcomes explained are highly probable. Sterelny calls such explanations ‘robust process explanations’.² Sterelny (2016) focuses on explanations in human history, though he tells us that such explanations occur in biology as well (532–3). When it comes to human history he writes that the outcomes explained by robust process explanations do not depend on the decisions of specific individuals. Instead, they are the result of “population-level phenomena interacting with institutional and cultural structures that partition populations and that constrain and bias decision-making patterns within these populations” (2016, 526). Sterelny (2016) cites four cases in human history where the processes leading to the outcomes explained are complex and multi-staged, yet those processes lead to predictable outcomes. For instance, one example Sterelny cites is Turchin's ‘secular cycle’, which explains the predictable outcome that all empires will have cycles of chronic instability (Turchin, 2006). Turchin's ‘secular cycle’ explanation explains predictable outcomes, and it is clearly from the pages of human history. According to Beatty, historical narratives are supposed to explain unpredictable events. However, we don't think the need for historical narratives should be hitched to there being low probability explanations, and Sterelny's examples show that historical narratives can explain highly probable events as well. They also show that some narrative explanations—robust process explanations—do not even describe contingent series of events.

Let's move onto a third concern we have with Beatty and Desjardins' account of historical contingency and narratives. In its barest form, their accounts of historical contingency boil down to this:

To say that history matters with regard to a particular outcome is to say that there was an historically possible (as opposed to merely logically or physically possible) alternative to the actual past, whose occurrence would have led to a different result (Beatty, Desjardins, Crawford, manuscript, 1).

In other words, history matters because the past could have been different and that would have led to a different outcome. This account of historicity allows for two sub-forms of historicity: initial condition

¹ Those others include Powell (2009) and McConwell and Currie (2014).

² Sterelny (2016) distinguishes robust process explanations from actual sequence explanations, which is also a type of historical explanation. Sterelny discusses this distinction in his (1996). This distinction was first introduced by Jackson and Pettit (1992).

historicity and path dependent historicity. Desjardins (2011) is explicit about these two sub-forms of historicity. Beatty (2006, 2016) is less so. In one form, historicity occurs when an outcome is contingent on an initial state. That is, when a change in the initial state leads to a change in the probability of an outcome. In the other form, an outcome is historically contingent on the path taken to arrive at that outcome. To clarify the path dependent notion of historical contingency, think of a path as a series of causally connected events starting with an initial condition followed by intermediary events that lead to an outcome. How many events must a path contain? There must be at least the initial condition and a subsequent intermediary event leading to the outcome. How much of the path needs to be changed to say that the path has been altered? At least two events, and one of those can be the initial condition. What is important to see here is that initial condition historicity is just a function of a potential change of an initial condition, whereas path dependent historicity is a function of a potential change of at least two events leading to an outcome.

As mentioned above, both Desjardins and Beatty discuss initial condition historicity and path dependent historicity. However, the bulk of Beatty's articles, and their joint articles, are devoted to discussing historicity in terms of initial condition dependency. What concerns us here is that initial condition explanations are not the sort of explanation philosophers, historians, and scientists (for instance, Gallie, 1955; Hull, 1975; Gould, 1986; Crombie, 1994) are interested in when they study the nature of historical explanations. Consider a historian's take on the character of historical explanation. Crombie in his substantive *Styles of Scientific Thinking in the European Tradition* (1994) describes various types of scientific reasoning in Western science. One style of scientific reasoning he calls "Historical Derivation and the Genetic Method". Crombie (1994, xxx) describes this style as follows: "[T]he two main principles of the method of historical derivation [are] the diagnosis of common characteristics from a common source, and the postulation of causes to account for the diversification from that source". Notice that this account of historical reasoning is highlighting the path dependency version of historical explanation, not the initial condition version. According to Crombie, historical derivations cite a source (an initial condition) and the causes between that source and the outcome being explained. Our concern with Beatty and Desjardins' inclusion of initial condition explanations as a type of historical explanation is that it unduly deflates what is a historical explanation. Many philosophers, historians, and scientists spend considerable time and effort in articulating how historical explanations differ from initial condition explanations. By including initial condition explanations as a type of historical explanation, Beatty and Desjardins give up the project of articulating what is distinctively historical about historical explanations.

Indeed, one can see this problem when observing that covering law explanations satisfy Beatty and Desjardins' account of historical explanation. Covering law explanations cite an initial condition and a generalization that describes a regularity between classes of events (Hempel, 1965). Why, for instance, did a piece of copper dissolve in sulfuric acid? According to the Hempelian account, we explain that phenomenon by citing the initial condition of a piece of copper being placed in sulfuric acid, and the chemical law that copper generally dissolves in that acid. Notice that even this simple example exhibits both contingency as causal dependence and contingency *per se*. The copper's dissolving is contingent upon its being placed in acid. Moreover, the upstream event—it's being placed in acid—was contingent *per se*. We might not have placed it in acid. Now it seems like something has gone wrong: the whole point of analyzing historicity in terms of these forms of contingency was to help show what is distinctive about narrative explanations. Historical narrative explanations are typically contrasted with covering law explanations. Yet, simple cases of covering law explanations can exhibit both forms of contingency that Beatty and Desjardins highlight. In brief, a significant portion of Beatty and Desjardins' account of historical explanations misses what many

take to be the historical nature of historical explanations.

A final concern we would like to raise is that some putative explanations that fulfill Beatty and Desjardins' conditions for a historical explanation don't seem to be historical explanations. This arises because there is one aspect of a good historical explanation that Beatty and Desjardins' account seems to neglect, namely that a historical explanation should convey a direction or trajectory of historical development (Gallie, 1955; Levine & Sober, 1985). To illustrate this, consider the following description of why Cecilia buys some apples.

The train approaches as Ada nears the station. If she runs, she might catch the train and make it to class on time. If not, she'll miss class. She runs and catches the train. Having boarded the train, she happens to stand next to Benson. When Ada gets in the train, the shopping bag she happens to be carrying reminds Benson that he needs groceries, so he exits at the next stop. While at the store, Benson adds some apples to his shopping basket. Cecilia, who happens by at that moment, is also shopping for fruit. Seeing Benson take some apples, Cecilia decides to go ahead and buy some.

This description is not sufficiently explanatory. Although one could perhaps imagine a context in which a convoluted story like this one could serve as an answer to the question, "Why did Cecilia buy apples?" it seems like something is missing that is usually present in historical explanations. We can get a sense of what is missing by looking at the work of Gallie (1955). He writes, "[C]haracteristically historical explanations emphasize either a continuity in direction of development or a persistence of certain elements, within a particular succession of events" (1955, 162). Perhaps what's missing from the above narrative concerning Ada, Benson, and Cecilia is what Gallie is talking about: there's no direction of development in the narrative, no persistence of any elements. In the narrative concerning Ada, Benson, and Cecilia, what is described is one thing after another. There is no trajectory of development, no directional trend, and no through-line involving any particular central subject.

This aspect of historicity, which Gallie highlights, is missing from Beatty's and Desjardins' accounts of historical explanation. Beatty (2016) highlights two senses of contingency in historical narratives: contingent *per se* and contingent upon. The narrative cited above satisfies both notions of contingency. Cecilia might have not bought apples, hence that outcome is contingent *per se*. And Cecilia's buying apples was caused by Benson's buying apples, hence Cecilia's purchase of apples is contingent upon a prior event. Nevertheless, the narrative is missing the sense of directionality and continuity that Gallie cites as a feature of historical narratives. Similarly, Desjardins' account of contingency misses this feature of historical narratives. For Desjardins (2011, 348) historical contingency is present and a narrative explanation is appropriate when: 1. there are multiple possible past states; 2. there are multiple possible outcomes; and 3. "the probability that a given outcome occurs must change as a function of the historical conditions realized at a given occurrence". The above story fulfills these conditions. Both Benson and Cecilia might not have bought apples. That is, different prior events and outcomes are possible in this scenario. Furthermore, the probability of Cecilia buying the apples is affected by whether Ada got on the train and whether Benson decided to buy apples. Hence, changing prior events can affect the probability of the outcome explained. But still the narrative lacks the sort of trajectory or continuity that Gallie writes is characteristic of historical narratives. There is something missing from Beatty's and Desjardins' accounts of historical narratives that Gallie and others think is characteristic of such explanations.

Let's summarize the four concerns we have raised with Beatty's and Desjardins' accounts of historical narratives in this section. One concern is Beatty's linking the need for narrative explanations to the metaphysical thesis of indeterminism. The need for a particular type of explanation should turn on the explanatory needs of the inquirer, not a metaphysical thesis. Our second concern is Beatty's linking the need for

narratives to the unpredictability of an outcome. Gould decouples historical contingency and unpredictability, and Sterelny gives multiple examples of historical narratives whose outcomes are predictable. Our third concern is that Beatty and Desjardins treat initial condition explanations as historical explanations. But if this is all there is to historical explanation, then the distinction between historical explanation and covering law explanation starts to blur. Our final concern is that Beatty's and Desjardins' accounts fail to satisfy Gallie's characterization of historical explanations as demonstrating the historical trajectory of a series of events leading to an outcome. An account of historical narratives should not allow that historical explanations are merely descriptions of one contingent event after another.

While there is much to commend in Beatty and Desjardins' account, we don't think it adequately captures the nature of historical explanations. In what follows we build an account of historical narrative using the insights of philosophers of history of an earlier era. In particular, we look at the work of Gallie (1955), Danto (1965), White (1963), Mink (1970), and Hull (1975) on historical narrative. One thing that those earlier authors stress, but which falls by the wayside in Beatty and Desjardins' work, is the importance of *historical continuity*. Those earlier accounts tell us that a historical narrative focuses on the persistence of a 'central subject' that undergoes a directional trend or trajectory. In the next section, we make this notion of historical continuity in narratives more precise.

4. Central subjects and historical narratives

4.1. Central subjects

Let's start with the idea of a central subject. Hull (1975) argues that historical narratives need central subjects, and he attributes the idea to White (1963). For Hull (1981), historical narratives are integrationist explanations, and such integrations require a central subject to weave stages of an event or a series of events into an organized whole. "The role of a central subject is to form the main strand around which the historical narrative is woven Central subjects afford the basic unity and continuity of the historical narrative" (Hull, 1975, p. 255). More recently, Roth (2017, 45) writes "what defines a history as a narrative—a beginning, middle, end structure unified by showing the development of a subject over time" (also see Currie, 2014). The central subjects of narratives can vary greatly. They can be individual humans, societies, geological entities, species, or lineages of traits. Whatever they are, they need to be spatiotemporally localized entities (Hull, 1975). Let's turn to a couple of examples to make the idea of a central subject clearer.

Returning to the example at the start of this paper, suppose we want to know why the major Hawaiian Islands are arranged in line, with the biggest island at the eastern end of the archipelago. The historical narrative that answers that question cites the geological history of the Hawaiian Island archipelago. There is a hot spot in the earth's mantle that the Pacific plate moves across in a northwestern direction. As the Pacific plate moves, a series of undersea volcanic eruptions have occurred. The Island of Kauai is situated at the western end of the archipelago and is the oldest of the five major Hawaiian Islands. It was formed about five million years ago. The island of Oahu is east of Kauai and is approximately three million years old. The youngest and eastern most island, the island of Hawaii, is about 400,000 years old and is still forming due to contemporary volcanic eruptions. Returning to our why questions, Why are the islands in a line? Because the Pacific plate has drifted and continues to drift towards the northwest, while the hot spot in the earth's mantle has remained relatively stationary. Why is the most easterly island (Hawaii) the largest island? It is the youngest of the islands and has been less affected by erosion and subsidence. What is the central subject in this narrative? It is the Hawaiian Island archipelago. To understand why the islands are in a line, we need to trace the changes that have occurred to that central subject, from the first

eruptions that created Kauai to the contemporary eruptions that are forming the Island of Hawaii.

Some historical narratives cite a different kind of central subject. Consider the question, why do insects have two pairs of wings rather than one pair of wings, as found in birds? Here the central subject is a lineage of traits. According to Carroll (2005), insect wings are descended from the gills of ancient aquatic crustaceans. The historical narrative that explains why insects have two sets of wings cites the historical path of gills in ancient aquatic crustaceans to wings in contemporary insects. The gills in the ancient crustaceans had multiple appendage segments. In the evolutionary path from crustacean gill to insect wing, the number of segments was reduced to two pairs. This reduction occurred through a series of gene duplication events, changes in ecology, and changing selection pressures. At the genetic level, Hox genes duplicated, and the duplication of each Hox gene suppressed the development of an appendage. A major reason that insects have two pairs rather than more pairs is that Hox genes that suppress the formation of appendage segments were duplicated multiple times in the evolutionary path leading to insect wings. Furthermore, a number of trait transitions occurred in the historical path leading to contemporary insect wings. First, the traits leading to insect wings appeared as gills in primitive aquatic nymphs. Later those appendages evolved such that they occurred as gills in the larval stage of insects and wings in their adult stage. More recently, those appendages evolved to occur as wings in insects with no aquatic larval stage. Each transition is accompanied by an ecological transition and a different set of selective pressures: from aquatic environments, to mixed environments, to aerial ones. This path of environmental changes, selection pressures, and change in the number of Hox proteins led to the outcome that insects have two pairs of wings.

The central subject in this narrative is a lineage of traits, starting with appendage segments in ancient aquatic crustaceans and ending with wings in contemporary insects.³ Like central subjects generally, that lineage of traits is a spatiotemporally continuous entity. In this example, and the previous one, the central subject of the narrative undergoes change that is traced by following the path of the central subject. Note, however, some narratives trace the path of central subjects that don't undergo change, for example, the path of trait lineages that remain in stasis, such as the high degree of conservatism in swallow nest building behavior (Burt, 2001). In such cases we want to know why the traits in a lineage remain similar. We explain that stasis by citing the stabilizing forces that affect the lineage (the narrative's central subject) over time.

4.2. The trajectory of a historical narrative

Having seen the nature of the central subjects cited by historical narratives, let us turn to another aspect of such narratives: the development or trajectory of a historical narrative. As Morgan (2017) has recently pointed out, historical narratives are not merely chronologies of events. They don't merely list a temporal sequence of events. Gallie describes it this way:

[I]t is reasonable enough to insist, in a currently popular phrase, that the main job of the historian is simply to tell his story: but to this we must add that to tell or to follow even the simplest story is not just to assert or to accept 'one damned thing after another'—a brute sequence of temporally and spatially contiguous or overlapping events. To follow a story ... involves for one thing some vague appreciation of its drift or direction ... (1955, 171).

What can more concretely be said about that "vague appreciation of its drift or direction"? Elsewhere Gallie (1955, 162) tells us that "characteristically historical explanations emphasize either a continuity in

³ Calcott (2008) refers to such explanations as 'lineage explanations'.

direction of development or a persistence of certain elements, within a particular succession of events”. Notice the disjunction that Gallie offers emphasizes both change and stasis. There’s “the persistence of certain elements”, which we take to refer to the central subject of a historical narrative, and there’s the “continuity in direction of development”, which we take to be the change a central subject undergoes.

We can see these elements of stasis and change in the historical narratives introduced earlier. The central subject in the Hawaiian Island example is the Hawaiian archipelago itself. In explaining why they are in a line and why the Island of Hawaii is the largest, we cite the changes that have occurred to that archipelago from its inception to the present. In the insect wing example, when we ask why insects have two rather than one set of wings, we trace the evolutionary path of a lineage of traits from appendages in ancient aquatic crustaceans to wings in contemporary insects. The entity that persists, which is the central subject, is that lineage of traits. Furthermore, it is the entity that undergoes change.

We’ve discussed status and change, but what of the *direction* of change that, according to Gallie, historical narratives are supposed to convey? Quite a few authors talk about the trajectory of historical narratives. In discussing the sort of historical sequence that Gallie highlights in his historical narratives, Turner (2014, 170) writes that “The sequence must also have a trajectory; it must exhibit some sort of directional historical trend”. In a similar vein, Currie and Sterelny (2017, p. 14) write that “[n]arrative explanation involves tracing causal trajectories across time”.

The directionality or trajectory of a historical narrative is found in the historical path that a historical narrative is describing. Suppose we want to know why a certain result came about, say, why insects have two sets of wings. We provide a historical narrative to explain why insects have two sets of wings. That involves tracing a path of traits from ancient aquatic crustaceans to wings in contemporary insects. The stages in that path of traits, that is the instances of traits, need to be causally connected and to unfold along a certain temporal trajectory. ‘Path dependency’ is the phrase that describes the particular order of events cited in a historical narrative. The narrative’s explanation of why insects have two sets of wings does not merely cite an initial event. Nor does it merely cite the events that occurred in the evolution of insect wings. It introduces those events in a specific order –an order that brought about insect wings. Historical narratives, in other words, don’t just cite initial conditions, or a jumble of factors that brought about the result to be explained. They arrange those conditions and factors in a directional sequence that reflects the path the central subject undertakes. As the narrative is told, there is a sense of getting closer and closer to the outcome described by the explanandum of the narrative. There is, in other words, a directionality or trajectory to the narrative.

Having seen two aspects of historical narratives –their referring to central subjects and their having a temporal trajectory– we can now say something general about what makes historical narratives explanatory. One thing that makes an historical narrative explanatory is its ability to integrate reports of events into a single cohesive description. For instance, in the insect wing example, reports of various evolutionary events, including changes in regulatory genes, shifts in physiology, and changing environments, are weaved together into a cohesive and integrated narrative. But that is only part of the explanatoriness of a historical narrative. The other important ingredient is that a narrative integrates reports of events in a particular temporal sequence. Not any sequence, but one where, as the narrative is told, we get a sense of getting closer to the outcome explained. In a nutshell, the explanatoriness of a historical narrative lies in its ability to integrate reports of events into a temporal trajectory that leads to the outcome being explained.

4.3. Directionality seen retrospectively

Thus far we have focused on two aspects of historical narratives –

that they describe central subjects and that they cite the historical development of those subjects. We turned to philosophers of the 1950s through the 1970s to develop those themes. We now turn to another philosopher of history of that period, Danto (1965), to highlight another feature of historical narratives, namely that the directionality found in a historical narrative is often known after a central subject has completed its path. It is known retrospectively. Danto (1965) writes of this, and Ereshefsky (2014) and Roth (2017) have recently emphasized the point. Danto (Danto 1965, 169) introduces the idea this way: “To be alive to the historical significance of events as they happen, one will have to know to which later events these will be related, via narrative sentences, by historians of the future”. That is, to see the historical significance of events in a historical trajectory, one will need the perspective of the historian or historical scientist. That significance and the narrative’s directional trend is seen retrospectively, after the historical path arrives at the outcome to be explained.

Historical accounts of speciation nicely illustrate this retrospective aspect of historical narratives (Ereshefsky, 2014). Suppose a small population of a species becomes geographically isolated from the main body of a species. Is that small isolated population the start of a new species, or is it simply an isolated population that will succumb to negative pressures and die? It all depends on what happens later. Will the isolated population undergo a genetic revolution? Will its organisms adapt to its new environment? These are all factors that will occur after the population becomes isolated from the main body of the species. If these factors do occur, then the population’s becoming isolated was the start of a speciation event. Whether those factors occur is only known after speciation has been successfully completed. That is, we only know that the isolation of that population was the start of a speciation process retrospectively.

Seeing that historical narratives explain the directionality of a central subject retrospectively gets the epistemology of historical narratives right. Suppose we were present during that unfolding of events in a historical path. During that unfolding, we would not know the outcome of that historical path. But once the outcome to be explained occurs, we can retrospectively say that the appropriate events were the start and intermediary steps leading to that outcome. Mink (1970) describes the retrospective nature of historical narratives and the different epistemic perspectives one can have during the unfolding of a historical path in his configurationalist account of historical narrative. He writes Mink (1970, 554), “in the configurational comprehension of a story ... the end is connected with the promise of the beginning as well as the beginning with the promise of the end, and the necessity of the back references cancels out, so to speak, the contingency of the forward references.” Here he is talking about the development of a central subject. As it undergoes changes, we don’t know what the outcome will be. Turning back to our speciation example, when a population became isolated it was not knowable whether that was the start of a speciation event because that depends on events that happen after the occurrence of the initial isolating event. Again, the point here is that the directionality of a historical path, even knowledge that a historical path is being laid, is known retrospectively, after the outcome explained occurs. This is not to say that we can never predict the outcome of an unfolding historical path, but merely that is the state we are typically in when it comes to the historical paths that historical narratives cite.⁴

⁴ A referee for this paper asks what is the difference between unpredictability and being in a state where the historical significance of an event can only be known retrospectively. The relevant difference is that between saying (a) that people living in the early 1900s could not have predicted that war would break out in Europe in 1914, vs. (b) that a chronicler present for the events of 1914 could not have intelligibly said that ‘World War I has just begun’. It is only in virtue of later, downstream events that what happened in 1914 was the beginning of World War I.

5. Stronger and weaker historical explanations

Thus far, we have cited three characteristics of historical narratives. A historical narrative is an explanans that cites a sequence of events unified by a central subject. That sequence of events has a certain directionality or trajectory. That directionality is typically known retrospectively. The account of historical narrative offered here also provides a framework for thinking about the strength of a historical explanation. Some historical explanations, we want to suggest, are stronger *historical* explanations than others. They are fuller and richer historical explanations because they provide more relevant information about the events and path that bring about an outcome. This aspect of historical explanation is not developed in Beatty and Desjardins' account of historicity. They focus on distinguishing historical explanations from other types of explanations. For Beatty and Desjardins, historicity resides in causal dependency and contingency *per se*. For them, if an outcome depends on causal dependency and contingency *per se*, then the explanation of that outcome is a historical explanation. Whether an explanation is historical is a yes or no issue for Beatty and Desjardins. They do not provide criteria for evaluating whether a historical explanation is stronger or weaker. We believe that an account of historical explanation ought to do that, with the caveat that the standards for determining what makes for a better explanation will also depend to some degree on context. We suggest that an account of historical explanation that focuses on central subjects provides some tools for evaluating when a historical explanation is stronger or weaker.

To talk about what makes an explanation a strong or weaker historical explanation we again turn to Gallie. He tells us that “many historical explanations help to “thicken up” the historian's narrative by bringing out the continuity between its successive phases, and at the same time to “tighten up” the narrative by emphasizing the dependence ... of its later upon its earlier phases” (1959, 171). Notice that Gallie is highlighting two relations that make a historical narrative stronger: thickening and tightening. Thickening has to do with citing more steps within a historical path. To thicken a historical narrative is to fill in gaps in that narrative. Tightening is different: it highlights the dependency of the outcome on earlier stages in the historical narrative of the central subject. Gallie suggests that the thickening and tightening of a historical narrative happen “at the same time.” In thickening the narrative, we fill in the gaps of the narrative with more events that the outcome depends on.

To make this more concrete, consider the narrative explaining why insects have two rather than one pair of wings. One explanation cites the origin of insect wings in the appendages of ancient aquatic crustaceans. That source provided the resources for two pairs of wings in insects, whereas the source of wings in bats is the single pair of forelimbs in mammals. That's a historical explanation, but a weak one compared to a narrative that fills in gaps between ancient crustacean appendages and wings in insects. Biologists thicken and tighten the historical explanation of insect wings by introducing factors that caused the resultant double pair of wings in insects, such as the reduction of appendages due to the duplication of Hox genes. In fact, they tell a historical narrative citing the order of Hox genes introduced and which appendages were subsequently reduced. According to Carroll (2005, 175ff.), prior to the occurrence of regulating Hox genes, appendages occurred on all trunk segments. Then the Hox 5 gene was introduced and that caused no appendages to appear on the tail end of primitive insects. The next stage was the introduction of Hox 9 and Hox 10 genes, and consequently no appendages on the abdomen. And finally, the introduction of the Hox 8 gene and the result that wings only appeared on the thoracic segments. Each introduction to the narrative of the occurrence of a Hox gene thickens the narrative. It also tightens the narrative because it introduces more events that the outcome depends on.

Using Gallie's terminology, the thicker the historical narrative, the stronger the historical explanation. Citing just the initial condition in

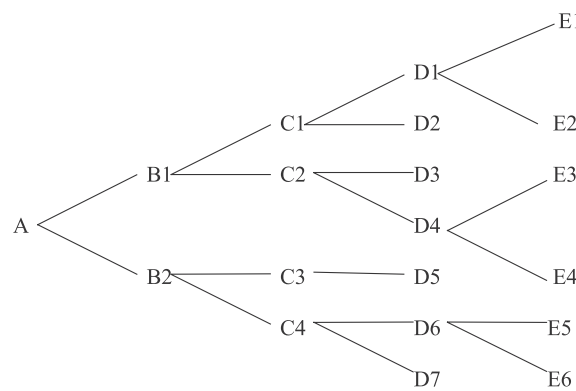


Fig. 2. A branching diagram.

the sequence of events leading to two pairs of insect wings is a fairly weak historical explanation. Start adding events in the path from the appendages of ancient aquatic crustaceans to insect wings and the narrative is thickened and consequently a stronger historical narrative. The more the narrative is filled in, that is, thickened, with information about intermediary events that bring about the outcome, the stronger the historical explanation. Two points are worth bearing in mind. First, the mere introduction of any factor does not make a historical narrative stronger. Only citing factors that are causally relevant to the outcome explained make a narrative stronger. Second, we can now see why initial condition explanations are weak historical explanations: because they merely cite an initial condition, such explanations are not very thick at all.

Thickening not only makes a narrative stronger, it also resolves the directionality of a narrative. That is, thickening brings the directionality of a historical sequence into sharper focus by highlighting the historical path taken to the target outcome (see Fig. 2). Suppose we want to explain how E4 came about. We merely know the path started at A. That is not much of a historical explanation, or at best, a weak one. But suppose we start learning which path segments are taken between A and E4. By adding that information, we begin to thicken the narrative. For example, by knowing that the path from A to E4 was taken via B1, we thicken up the narrative. Furthermore, if we know that E4 not only depended on A but also B1 and C2, then the path is further resolved. Add more information about the path, thicken it up a bit more, and we have a stronger historical explanation about the outcome at the end of the path. As a narrative thickens, the trajectory of the path taken comes into sharper focus. As the narrative thickens we see which path was taken through the thicket of branching possibilities.

Epistemologically speaking, historical narratives that have been thickened are more informative and explanatory of the outcome being explained. We are not alone in making such a claim. Currie (2014) discusses one aspect of progress in the historical sciences as the shift, using his terminology, from a ‘simple narrative’ to a ‘complex narrative’. This occurs when competing simple narratives are put forward, empirical evidence causes us to abandon some of them, and the surviving hypotheses are synthesized into a complex narrative (Currie (2014), 1175). We see the incorporation of surviving simple hypotheses into a more complex narrative as, using Gallie's terminology, a thickening of the narrative for the targeted outcome. The move from simple to complex narratives is a resolution of the path taken to the outcome being explained. In sum, historical narratives are stronger (thicker in the Galliean sense) when they articulate more factors the outcome depends on. By doing so, they bring into sharper focus the path taken toward that outcome.⁵

⁵ A referee for this paper suggests that thickening is not the only way to make a historical narrative more explanatory. The referee suggests that a historical explanation that applies to numerous situations is more explanatory than a

6. Summary

Let's take stock of the approach to historical narrative offered here. There are three core elements to this approach. The first is a narrative's central subject. Historical narratives describe a series of changes (or stasis) that a central subject undergoes. The various events that a narrative highlights are tied together by being events that affect the narrative's central subject. Second, providing a historical explanation is not the same as merely providing a chronology. It is not merely a description of a series of events in a certain order. A historical narrative also gives a sense of the direction taken by a series of causally related events. That series of events is on a trajectory to a particular outcome. Third, the directionality of a historical narrative is detected retrospectively. It is after the outcome explained occurs that we can weave the preceding events into a historical narrative. It is after the outcome occurs that the trajectory of a historical narrative becomes clearer.

These three elements of historical narratives –central subjects, directionality, and retrospective knowledge– underlie another feature of this account of historical narratives, namely that we can judge what is a better or worse historical explanation. The mere citing of an initial condition does not make for much of a historical explanation. But fill in the events that caused the outcome, and we acquire a stronger historical narrative. Using Gallie's terminology, the thickening of a narrative fills in the causal factors that bring about an outcome. And as a narrative thickens, the trajectory of that narrative becomes clearer.

Let's see how the account of historical explanation offered here addresses the concerns we raised with Beatty and Desjardins' account. As we saw earlier, Beatty and Desjardins believe that one prerequisite for anything being worthy of narration is living in an indeterministic world. We are unhappy with this coupling of indeterminism and historical narratives. Indeterminism is a metaphysical thesis, whereas the appropriateness of historical narratives is an epistemic question concerning what we don't know and what we want to know. The account of historical narratives offered here does not hitch its wagon to the metaphysical thesis of indeterminism. Instead, it highlights the epistemic tools needed for a good historical narrative.

Another concern we had is with Beatty's linkage of historical explanations to unpredictability. For Beatty, the outcome explained by a historical narrative should be unpredictable. Perhaps that is true of some historical explanations. But in a recent article, Sterelny (2016) cites explanations in human history where the outcomes explained were predictable. The unpredictability of an outcome, we maintain, is not a necessary feature of historical narratives. In contrast to Beatty's account, the account of historical narrative offered here allows that predictable outcomes can be the focus of historical narratives.

A third concern we had with Beatty and Desjardins' account is their allowing initial condition explanations to be historical explanations. For them, contingency *per se* and causal dependence are the elements of historicity. But those elements allow that initial condition explanations can be historical narratives. We believe that Beatty and Desjardins unduly deflate what is a historical explanation by allowing that initial condition explanations are historical explanations. The account of historical narratives offered here does not do that. Historical narratives cite the historical path that a central subject undergoes, not merely the initial conditions of that central subject.

A further concern we had with Beatty and Desjardins' account is that the notion of directionality or historical development drops out of their

account of historical narratives. Again, contingency is the key for them, and for them a historical explanation amounts to explaining why a later event is contingent on an earlier event or set of events. Beatty and Desjardins' account leaves out the sense of directionality one gets when reading or hearing a historical narrative. That as a narrative is told, there is a sense of moving along on a trajectory closer to the outcome explained. The account of historical narrative offered here draws on the insights of previous philosophers of history to reintroduce the element of directionality one finds in historical narratives.

Finally, in anchoring historical narratives to contingency Beatty and Desjardins fail to provide an account of what makes better or worse historical narratives. They focus on whether an explanation is historical or not. But it is also important to know what makes an explanation a better or worse historical explanation. That issue was certainly on the agenda of philosophers of history in the mid 20th Century, and it should be on the agenda of those currently studying historical narratives. The account of narratives offered here makes good on that desideratum and provides criteria for judging what makes a narrative stronger or weaker.

Let us end by saying that there has been lots of good work done on historicity and historical explanation in the last twenty years. Beatty and Desjardins are important contributors to that work. Nevertheless, in the last twenty years some important lessons from earlier philosophers of history have receded into the background. We've argued that those lessons should be brought to the fore in understanding the nature of historical explanation. Consequently, the account of historical narrative offered in this paper is very much a throwback to work done on historical narratives in the 1950s, 1960s, and 1970s.

Acknowledgements

Thanks to Adrian Currie, Eric Desjardins, and Alison McConwell for their comments on an early draft of the paper, and thanks to John Beatty for his helpful feedback. Versions of this paper were presented at the University of Calgary Graduate Association Annual Conference, May 2018, and the Philosophy of Science Association meeting, November 2018. We are grateful to those audiences for their helpful questions and comments. Fulbright Canada enabled Derek to spend a semester at the University of Calgary in the spring of 2017, during which time we began work on this project. The Social Sciences and Humanities Research Council of Canada provided support on this project to Marc.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.shpsa.2019.02.002>.

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(footnote continued)

historical explanation that just applies to one situation. Sterelny's robust process explanations, highlighted in Section 3, are examples of historical explanations that apply to multiple situations. In this article we highlight two ways that historical narratives can be stronger –through thickening and tightening. We allow that the strength of a historical narrative can vary along other dimensions as well.

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