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Benardete's Less Radical Puzzles: Collective Causation or Retrocausation?*

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【Abstract】In *Infinity: An Essay in Metaphysics*, José Benardete presents puzzles of the 'before-effect,' which he interprets as cases of retrocausation where the effect happens temporally prior to its cause. Two of them are 'less radical' puzzles where the before-effect is allegedly caused by concrete physical events, such as infinitely many gong peals and gunshots. Hawthorne (2000), Laraudogoitia (2003), and Yi (2008) reject Benardete's interpretation. They claim that the two puzzles describe not retrocausation but *collective causation*, where an event is caused by a *fusion* of many things, by a *set* of many things, or simply by *many things as such* without being caused by any one of the many things. I defend Benardete. Collective causation solves neither Benardete's two puzzles nor their simpler variant, and the best causal interpretation of them is that they are cases of retrocausation.

【Key Words】paradox, Benardete, before-effect, retrocausation, backward causation, collective causation, supertask

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1. Introduction

In *Infinity: An Essay in Metaphysics*, José Benardete presents three puzzles of the 'before-effect,' which he interprets as cases of retrocausation where the effect happens before its cause (255-61). Two of them are 'less radical' puzzles where the alleged causes are concrete physical events, such as infinitely many gong peals and gunshots. Hawthorne (2000), Laraudogoitia (2003), and Yi (2008) reject Benardete's interpretation and instead propose alternative analyses quite similar to one another. Hawthorne (2000) claims that the two puzzles reveal the existence of a 'surprising' causal relation, in which an event is caused by a (mereological) *fusion* of many things although it is not caused by any single one of them. Laraudogoitia (2003) says that the puzzles show a thing interacting with a *set* of many things without interacting with any one of them. And for Yi (2008), invoking a fusion or set is an "idle detour," and the puzzles show that *many things* can cause an effect that none of them causes individually (p. 135, fn. 6). In short, they claim that the two puzzles describe not retrocausation but *collective causation*, where an event is caused by a fusion of many things, a set of many things, or many things as such without being caused by any one of them.

I defend Benardete. By considering a simpler variant of Benardete's puzzles proposed by Hawthorne (2000) and utilizing the argument presented in Lee (2020), I argue that collective causation resolves neither the simpler variant nor Benardete's two puzzles and that the best causal interpretation of them is that they are cases of retrocausation.

Benardete (1964) also presents the "more radical" paradox where an "infinite sequence of mere *intentions*" apparently causes a man to stop moving (259). The arguments in this paper, I believe, can be adapted to show that the treatments of this paradox by Hawthorne (2000), Laraudogoitia (2003), and Yi (2008) are inadequate, too. But this would be mostly a repetition of the main points of the arguments. And I believe that the more radical paradox needs quite a different treatment. For these reasons, I address only the less radical puzzles.

2. Benardete's Two Puzzles, Wall Situation, and Collective-Causation Solutions

Benardete (1964) presents his two less radical puzzles as follows:

> Let the peal of a gong be heard in the last half of a minute, a second peal in the preceding 1/4 minute, a third peal in the 1/8 minute before that, etc. ad infinitum. ... Let us assume that each peal is so very loud that, upon hearing it, anyone is struck deaf —totally and permanently. At the end of the minute we shall be completely deaf (any one peal being sufficient), but we shall not have heard a single peal! For at most we could have heard only one of the peals (any single peal striking one deaf instantly), and which peal could we have heard? There simply was no first peal. ... The infinite sequence of deafening peals would seem logically to entail the before-effect of total deafness. For we must be in a state of deafness prior to each peal. Here the effect is temporally prior ... to its cause. (255, 259)

> A man is shot through the heart during the last half of a minute by A. B shoots him through the heart during the preceding 1/4 minute, C during the 1/8 minute before that, &c. ad infinitum. Assuming that each shot kills instantly (if the man were alive), the man must be already dead before each shot. Thus he cannot be said to have died of a bullet wound. Here, again, the infinite sequence logically entails a before-effect. (259)

In the above, Benardete claims that the infinite sequence of infinitely many gong peals or gunshots entails a before-effect because the effect, namely, the man becoming deaf or dead happens before each gong peal or gunshot.

Hawthorne (2000) disagrees. To make his points, he asks us to consider the following variant. Suppose that a series of infinitely many walls are laid from the point x=0 to the point x=1 (see Fig. 1). At x=1, there is a wall, w_0, which is 1/8 thick. At x=1/2, there is another wall, w_1, which is 1/16 thick. And for each nonnegative integer n, there is a wall w_n at $x=1/2^n$, which is $1/2^{n+3}$ thick. And a rigid ball, which is initially positioned at $x=-1$, is rolled toward the walls. There are no objects standing between the ball and the walls, and it is impossible for the ball to burrow into the earth or leave the ground. And each wall is impenetrable and rigid, and so upon contact with any object, it will remain immobile with respect to the ground. And the motion of the ball can be affected only by contact with other objects, and there is nothing else in the vicinity that can affect the behavior of the ball or the walls. Call this the *wall situation*.

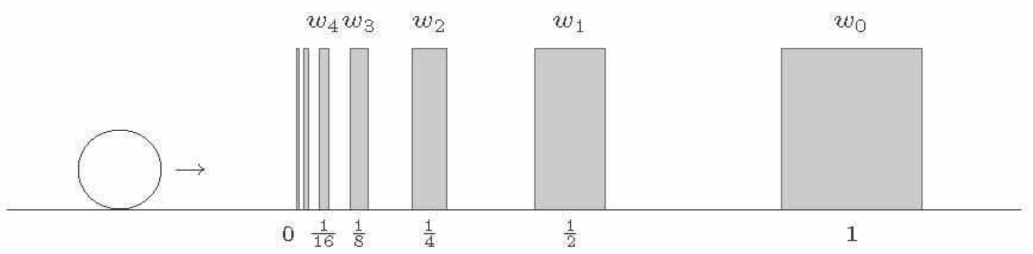

Figure 1: The wall situation

Then, what happens in the wall situation? The ball moves to the right with a constant velocity until it arrives at x=0—let the time of the arrival be t=0. In order to reach w_n, the ball must proceed beyond w_{n+1}. But it cannot proceed beyond w_{n+1}, for each wall is impenetrable. So, it never reaches any w_n. It thus remains stationary or bounces off after it arrives at x=0. That is, the ball goes through a sudden change in motion at t=0. But it contacts none of the walls, for there is always a non-zero gap between it and each w_n. So, no individual wall causes this sudden change in motion because the motion of the ball can be affected only by contact with other objects. What then causes this sudden change in motion?

Hawthorne (2000) answers that it is the (mereological) *fusion* of the walls that causes the change in motion. He says that though the ball does not contact any individual wall, it "makes contact with the fusion of the walls," for "there is no unoccupied space" between the ball and the fusion" at t=0, and "as a result, it does not proceed further" (p. 626). And he says that the lesson of the wall situation is that what he calls "the Contact Principle" is false, i.e., the principle that "[i]f y is the fusion of x's and z contacts y, then z contacts one of the x's" (*ibid.*). And he asserts, "Once we are clear about this, there is no residual puzzle, nor anything further to learn about the wall [situation]" (*ibid.*).

On this analysis, the wall situation is not a case of retrocausation. The effect, namely, the ball's sudden change of motion, happens at t=0 or thereafter. Its cause, the contact of the ball with the fusion of the walls, happens at t=0. The effect occurs simultaneously with, or after, the cause.

Laraudogoitia (2003) and Yi (2008) give similar answers. Considering an analogous situation, Laraudogoitia (2003) claims that "the [ball interacts] with the *set* of [walls] ... without interacting with any one [wall] in particular" (p. 126, italics mine). For Yi (2008), it is not a fusion or set but simply *many things* that cause the ball's sudden change in motion: "The ball [is] arrested ... by *the walls*, which *collectively* block its advance ... although none of them does so individually" (p. 139).

And Hawthorne and Yi claim that Benardete's less radical puzzles can be treated essentially the same way.[1)] Of the first puzzle, Hawthorne (2000) says: "[T]he sequence of peals will generate ... an open ended series of walls of sound. ... [T]he fusion of the walls of sound cause[s] deafening upon contact with the ear" (627). Of the second: "the fusion of the bullets will ... kill the person. At the point at which the fusion penetrates, no bullet will have so penetrated. So we should say that the fusion of the bullets kills the person without any bullet doing so. Any puzzlement will be removed once we recall the falsity of the contact principle" (*ibid.*). That is, the man becomes deaf or dead

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1) Laraudogoitia (2003) does not deal with Benardete's less radical puzzles, but he would agree with Hawthorne and Yi.

by the contact with the fusion of the walls of sound created by the infinitely many gong peals or the fusion of the bullets from the infinitely many shots.

And Yi (2008) agrees that the "solution to the [wall situation] ... applies *mutatis mutandis* to Benardete's two puzzles of before-effect" (140). That is, "the peals collectively cause him to be deaf," and "the infinitely many shots (collectively) cause [him] to be dead" (137, 142).

Let us call these solutions to the wall situation and Benardete's two puzzles the *collective-causation solutions.* They take the puzzles to be not a case of retrocausation but one of *collective causation*, where many events or things as such or their fusion or set cause the effect that none of the events or things causes individually. And they seem to have many merits. First of all, they defuse the mystery of the puzzles if they are right. Retrocausation is mysterious and has no instances that are widely accepted.[2] By contrast, there is nothing mysterious about collective causation, and it has many ordinary instances: A person who would have survived the failure of one of her kidneys can be killed by the simultaneous failure of both kidneys (Yi 2008, p. 141). And when a man is killed by a swarm of bees, there is no single sting that causes his death but the many stings do so collectively (McBride 2005, p. 579).[3] And the solutions remain

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2) Some retrocausal models of physical phenomena have been proposed but remain controversial. The Wheeler and Feynman (1945) absorber theory and the retrocausal interpretation of the quantum correlation in the so-called EPR experiment (Costa de Beauregard 1976) are such examples.

3) Nevertheless, there seems to be a significant difference between these ordinary cases and the wall situation: In the bee-swarm case, for example,

unchallenged, and many others accept them and develop further discussions based upon them. Skow (2016, pp. 117-122), for example, employs Hawthorne's solution to develop an argument supporting his view on explanation.[4)]

The collective-causation solutions, however, all fail. I argue so by adapting the argument proposed in Lee (2020) that the collision between rigid bodies is a case of retrocausation.

3. Disappearing-wall Situation and Retrocausal Interpretation

In the wall situation, the ball moves to the right with a constant velocity, say, v=+1, until it contacts the fusion of the walls at x=0 at t=0—henceforth, 'the fusion of the walls' can be replaced by 'the set of the walls' or simply 'the walls.' After t=0, the ball either remains stationary in contact with the fusion of the walls or bounces off. And if it bounces off, let us suppose, it moves to the left with a constant velocity after t=0, as it approaches the walls with a constant velocity before t=0. Compare this with the *disappearing-wall situation*, which is as follows.[5)] During the time t≤0, it is the same as the wall

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each bee injects a certain amount of venom into the body of the man and so contributes to his death individually though no single sting is enough to kill him. In the wall situation, by contrast, none of w_n contacts the ball and so contributes to the ball's sudden change in motion. Hawthorne calls this "a big metaphysical surprise" (2000, 63).

4) See also Uzquiano (2012).

5) This is an adaptation of the 'disappearing-body situation' presented in Lee (2020).

situation. That is, each wall w_n exists at $x=1/2^n$ in the same way as it does in the wall situation, and the ball initially moves to the right with velocity v=+1 and contacts the fusion of the walls at $t=0$. After $t=0$, however, each w_n disappears (or is removed) in the disappearing-wall situation: w_0 disappears during the time interval ($t=3/8$, $t=1/2$), i.e., after $t=3/8$ and before $t=1/2$, w_1 disappears during the interval ($t=3/16$, $t=1/4$), and for each n, w_n disappears during the interval ($t=3/2^{n+3}$, $t=1/2^{n+1}$). So all the walls disappear during the interval ($t=0$, $t=1/2$), after $t=0$ and before $t=1/2$. Still, the ball contacts the fusion of the walls at $t=0$ in the exact way it does in the wall situation, for the ball and all the walls behave, during the time $t \leq 0$, in the exact way they do in the wall situation.

What then happens after $t=0$ in the disappearing-wall situation? The answer is that the ball can continue to move to the right without changing its motion. To see this, imagine a situation where *only* the ball and w_0 exist while being initially set up as in the disappearing-wall situation. That is, the ball initially moves to the right with velocity v=+1 and arrives at $x=0$ at $t=0$, and w_0 stands at $x=1$ and is scheduled to disappear during the interval ($t=3/8$, $t=1/2$). In this situation, the ball moves to the right with velocity v=+1 without any interruption until it arrives at $x=1/2$ at $t=1/2$ (because there is no obstacle). Note that by this time, w_0, which is located at $x=1$, has already disappeared, for it disappears during the interval ($t=3/8$, $t=1/2$). So, the ball continues to move beyond $x=1$ with no interruption. Likewise, imagine that only the ball, w_0, and w_1 exist while being initially set up as in the disappearing-wall situation. In this case, the ball moves to the right with v=+1 without any interruption until it arrives at x=1/4 at t=1/4. By this time, w_1, which is at x=1/2 and disappears during the interval (t=3/16, t=1/4), has already disappeared. So the ball continues to move and arrives at x=1/2 at t=1/2. And by this time, w_0 has disappeared, and so the ball continues to move beyond x=1 without any interruption. Similarly, imagine that only the ball, w_0, w_1, ..., and w_n exist while being initially set up as in the disappearing-wall situation. The ball moves to the right without any interruption until it arrives at $x=1/2^{n+1}$ at $t=1/2^{n+1}$. By this time, w_n, which is at $x=1/2^n$ and disappears during ($t=3/2^{n+3}$, $t=1/2^{n+1}$), has disappeared. So the ball continues to move and arrives at $x=1/2^n$ at $t=1/2^n$. And by this time, w_{n-1}, which is at $x=1/2^{n-1}$ and disappears during ($t=3/2^{n+2}$, $t=1/2^n$), has disappeared. And so on. So, the ball continues to move to the right without any interruption. Finally, consider the ball and all the infinitely many walls in the disappearing-wall situation. Each wall disappears before the ball arrives at its location, and so it is possible for the ball to continue to move to the right without contacting any one of them even though it contacts the fusion of the walls at t=0.[6)]

In short, the two situations are exactly the same during the time $t \leq 0$, but there is a crucial difference after t=0: The ball never fails to suddenly change its motion in the wall situation, whereas it may continue to move without any change in motion

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6) That this is possible can be shown also by considering the time-reversal of the ball continuing to move without any change in motion as in Lee (2020, p. 565, fn. 4).

in the disappearing-wall situation. What causes this difference?

The collective-causation solutions fail to explain this difference and consequently why the ball changes its motion in the wall situation. Note that what needs to be explained regarding the wall situation is that the ball never fails to change its motion whenever the wall situation obtains. This is not a mere coincidence but a lawful regularity that holds necessarily. To explain this lawful regularity in causal terms, we need to explain not just token-level causal relations among particular events but *type*-level causal relations among kinds of events. That is, we need to understand the wall situation as a situation type and then explain why in all of its instances, the ball's sudden change in motion, which is an event type, never fails to be instantiated. To do so, we should identify a *sufficient* cause of the ball's sudden change in motion: If there were no such cause, it would be possible for the ball's sudden change in motion not to be instantiated in some instances of the wall situation, but that is impossible. Let us then consider the event of the ball contacting the fusion of the walls while the walls having been configured and the ball having behaved during the time $t \leq 0$ as specified in the wall and disappearing-wall situations—let us call the event *Contact*. Note that *Contact* is an event type and occurs (i.e., is instantiated) in all the instances of both the wall situation and the disappearing-wall situation. Proponents of the collective-causation solutions would say that *Contact* is sufficient to cause the ball to suddenly change its motion in the wall situation. That is, they would say that whenever *Contact* occurs, so does the sudden change in motion. But that is not the case: In some instances of the disappearing-wall situation, the sudden change in motion does not occur though *Contact* does. More specifically, there is a possible world where both an instance of the wall situation and an instance of the disappearing-wall situation occur separately in two different regions such that the sudden change in motion occurs in the former but not in the latter even though *Contact* occurs in both. So, *Contact* is not sufficient to cause the ball to suddenly change its motion. The collective-causation solutions, therefore, fail to explain why the ball has to suddenly change its motion in the wall situation.[7)]

And it is not just *Contact* that fails to be sufficient to cause the ball to suddenly change its motion in the wall situation. All the factors concerning the configurations and behaviors of the walls and the ball during the time $t \leq 0$ fail to be so because all of them obtain in the same way in the two situations. So none of those factors can be used to explain the difference in the behavior of the ball after $t=0$ in the two situations.

Some might think that there must be some difference during the time $t \leq 0$ between the two situations, for the walls are scheduled to disappear after $t=0$ in the disappearing-wall situation whereas they are not in the wall situation. But there is a way to prepare the walls so that there is absolutely no difference during the time $t \leq 0$ between the two situations. Suppose that each wn is equipped with some device dn, which produces one of two

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7) And it is straightforward to apply this argument to show that the collective-causation solutions fail to solve Benardete's original puzzles.

outcomes, <0> and <1>, at $t=3/2^{n+3}$ *indeterministically*.[8] If dn produces the outcome <0>, then wn disappears during the interval ($t=3/2^{n+3}$, $t=1/2^{n+1}$). If d_n produces the outcome <1>, wn stands unchanged. Then, the wall situation obtains in the case where each d_n produces the outcome <1>, while the disappearing-wall situation obtains in the case where each d_n produces the outcome <0>. When the walls are prepared this way, there is absolutely no difference during the time $t \leq 0$ between the two situations.

Then, how can we explain the fact that the ball never fails to change its motion in the wall situation while it may continue to move without changing its motion in the disappearing-wall situation? To answer the question, note first that $t=0$ is the only moment at which the ball receives any force that makes it change its motion (from the fusion of the walls or anything else). The ball either remains stationary or bounces off after $t=0$. In either case, the ball goes through no acceleration at any time after $t=0$ (simply because it remains stationary or moves to the left with a constant velocity at any time after $t=0$), and so it is under no force at any time after (or before) $t=0$.[9] The fusion of the walls thus exerts a force on the ball (if it does) at no time after $t=0$ but only at $t=0$.

And in order to explain the difference in the behavior of the ball in two situations, we have to appeal to factors that are

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8) For example, we may use a system like the Norton dome for such a device (Norton 2008).

9) Also, in the case where the ball bounces off, there is a non-zero spatial gap between the ball and the fusion of the walls at any time after $t=0$. So the fusion cannot exert any force on the ball since no action-at-a-distance is assumed to occur in the wall situation.

present in one of the situations but absent in the other. For a factor that is present in both situations cannot explain the difference in the behavior of the ball. And the only relevant factor that is present in one situation but absent in the other is whether the walls continue to exist at their positions after t=0 (call this event C_1) or they disappear after t=0 (call this C_2). Thus, whether C_1 or C_2 happens (i.e., is instantiated) affects whether or not the fusion of the walls exerts a force on the ball at t=0: If C_1 happens, then the fusion of the walls exerting a force on the ball at t=0 (call it E_1) never fails to happen, and consequently, the ball suddenly changes its motion. If C_2 happens, the walls exerting no force on the ball at t=0 (call it E_2) may happen, and so the ball may continue to move without any change in motion. C_1 ensures the occurrence of E_1 and so is a cause of E_1. C_2 makes the occurrence of E_2 possible and so is a cause of E_2. C_1 and C_2 occur after t=0 while E_1 and E_2 happen at t=0. This is retrocausation.

While admitting that whether the walls continue to exist or disappear affects how the ball behaves after t=0, some might still think that the difference in the behavior of the ball in the two situations can be explained in terms of the causal influence it gets *after* t=0: In the wall situation, they might think, the ball changes its motion because it receives a force from the fusion of the walls *after* t=0, whereas in the disappearing-wall situation, it may fail to change its motion because it may receive no force *after* t=0 (since the fusion does not exist after t=0). But it is wrong to think so, as noted before. Whether the ball remains stationary or bounces off after t=0 in the wall situation, it is under no force at any time after (or before) t=0.

Now the same points apply to Benardete's less radical puzzles. For each of the puzzles, we can imagine a situation analogous to the disappearing-wall situation. Suppose that in the first puzzle of infinitely many gong peals, "the sequence of peals [generates] an open ended series of walls of sound" and "the fusion of the walls of sound cause[s] deafening upon contact with the ear," as Hawthorne (2000, 627) says. Let t=0 be the moment at which the ear contacts the fusion of the walls of sound. And suppose that at t=0, each wall of sound is located at $x=1/2^n$, as each wall is located in the wall situation (Fig. 2). Now, suppose that *after* t=0, for each wall of sound, we prepare a sound-absorbing plate at a place distant from the walls of sound and then place the plate between the ear and the wall of sound so that the wall never reaches the ear. Thus, even though the ear contacts the fusion of the walls of sound at t=0, no wall of sound reaches the ear, and so the man does not become deaf. Therefore, the contact between the ear and the fusion of the walls of sound is not a sufficient cause of the man becoming deaf. The event of the walls of sound remaining unblocked after t=0 causes the man to become deaf. Since t=0 is the only moment at which the man receives causal influence from the walls of sound, therefore, the event that happens after t=0, namely, the event of the walls of sound remaining unblocked after t=0, causes the man to become deaf at t=0. This is retrocausation. And the second puzzle of infinitely many gunshots can be treated essentially the same way.

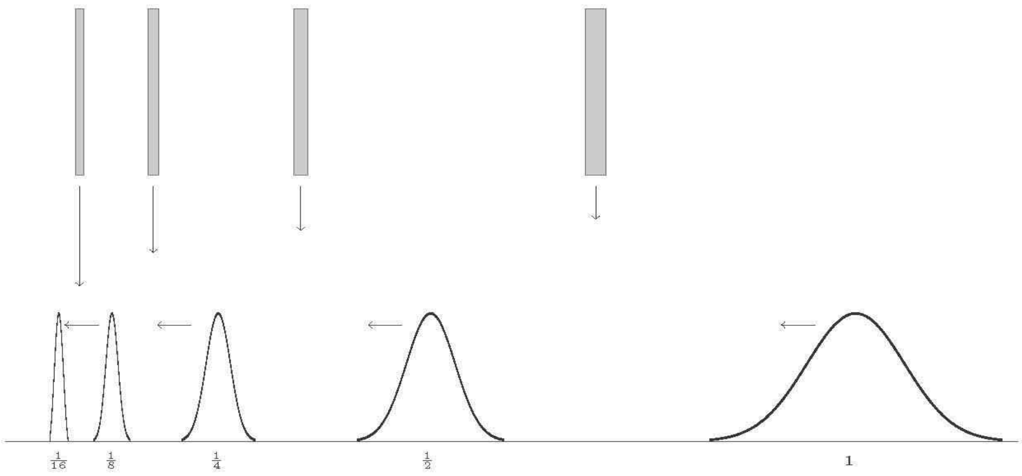

Figure 2

4. Refuting Alternative Explanations and a Skeptical Challenge

In the wall situation, we have assumed that the motion of the ball can be affected only by contact with other objects. However, it is now well-known that in systems of infinitely many objects obeying laws of physics, a rigid body that is infinitely divisible may suddenly self-accelerate due to the interactions among its own parts, and action-at-a-distance may emerge from the base laws which permit only contact interactions (Lee 2011, Angel 2001). So, we should not preclude the possibility that the ball's sudden change in motion is caused by its own self-acceleration or by some action-at-a-distance from other objects.

Even if we change our stipulation and assume that the wall situation obtains in possible worlds where self-causation and action-at-a-distance may occur, the ball's sudden change in motion can best be interpreted as an effect of retrocausation. Consider the explanation that in the wall situation, the ball's sudden change in motion is caused by its own self-acceleration or by action-at-a-distance from the walls. Then, why does the ball never fail to self-accelerate, and why do the walls never fail to exert an action-at-a-distance on the ball, at the moment of contact in the wall situation, whereas the ball or the walls may fail to do so in the disappearing-wall situation? It is no good explanation to insist that the ball self-accelerates just when it does, and the walls exert an action-at-a-distance just when they do. Instead, it is better to explain, if the ball's sudden change in motion is indeed caused by self-acceleration or action-at-a-distance, that in the wall situation, the ball never fails to self-accelerate, and the walls never fail to exert an action-at-a-distance on the ball, at the moment of contact because the walls will be there after $t=0$, while in the disappearing-wall situation, the ball or the walls may fail to do so because the walls will disappear after $t=0$. This is retrocausation.

That is, the retrocausal interpretation has the following merit. Unlike contact interaction, which happens when objects make contact, self-causation and action-at-a-distance are considered to be mysterious, partly because we have no idea of the conditions under which they occur: When an object that remains stationary up to some moment suddenly self-accelerates or accelerates due to some action-at-a-distance, we have no good explanations of why the self-acceleration or action-at-a-distance occurs particularly at that moment. And action-at-a-distance violates the requirement of locality that there must be some spatiotemporally continuous causal chain from the cause to its effect. By contrast, we can specify under what conditions the kind of retrocausation needed to explain the wall situation occurs. The continued existence of the walls at their original positions after t=0 causally affects the ball only when the ball contacts their fusion. And there is a continuous causal chain from the continued existence of the walls at their original positions after t=0 to the ball receiving a force at the moment of contact. In these respects, the kind of retrocausation operative in the wall situation is less mysterious than self-causation and action-at-a-distance.

Finally, some might be skeptical of any attempt to interpret the wall situation in causal terms. But as long as we accept that our causal notions have a legitimate role to play in describing at least some part of the world, we have a good reason to give a causal interpretation of the wall situation. In the wall situation, the ball never fails to suddenly change its motion upon contact with the fusion of the walls. This is a lawful regularity, and it enhances our understanding of the world if we can specify the conditions under which the lawful regularity holds. And we can do that: The ball never fails to suddenly change its motion if the walls continue to exist after the contact it makes with their fusion; otherwise, it may fail to do so. And in many ordinary cases where we can specify conditions under which a lawful regularity obtains (such as the expansion of steel under heating), we naturally give it a causal interpretation, even if the phenomenon it describes has other indeterministic aspects (such as indeterministic state changes of the steel atoms due to heating) that are hard to be interpreted causally. Though the wall situation has other features that may resist a causal interpretation, the lawful regularity that holds in the situation is no different from those ordinary ones of which we naturally give causal interpretations. So it seems better to interpret the lawful regularity in the wall situation in causal terms than to leave it unexplained, and when we do so, the best causal interpretation we can give of it is that it is an effect of retrocausation. And the same conclusion holds for Benardete's two puzzles.

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베나르디티의 덜 극단적인 역설들: 집단인과인가 아니면 역행인과인가?

이 충 형

호세 베나르디티(José Benardete)는 자신의 책 『무한: 형이상학 에세이』 (Infinity: An Essay in Metaphysics)에서 결과가 원인에 선행하는 소위 역행인과 혹은 사전효과(before-effect)의 사례로 세 가지 퍼즐을 제시한다. 이 중 둘은 사전효과의 원인이 무한히 많은 징소리나 총탄 발사와 같은 물리적 사건인 경우로 좀 덜 극단적인 경우들이다. 반면, 호쏜(Hawthorne 2000), 라라우도고이띠아(Laraudogoitia 2003), 그리고 이병욱(Yi 2008)은 베나르디티의 해석에 반대해, 이 퍼즐들이 역행인과의 사례가 아니라 무한히 많은 것들(또는 무한히 많은 것들의 집합이나 부분전체론적 합)이 함께 모여 원인이 되는 집단인과의 사례라고 주장한다. 이 논문은 베나르디티의 해석을 옹호하여, 집단인과 개념으로는 베나르디티의 퍼즐뿐만 아니라 이보다 더 간단한 퍼즐도 풀 수 없고, 적어도 위의 두 덜 극단적인 베나르디티의 퍼즐들은 역행인과의 사례라고 해석하는 것이 가장 좋은 인과적 해석이라고 논증한다.

주요어: 베나르디티, 역행인과, 사전효과, 집단적 인과, 초과제