Perceiving causality in action

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Abstract

David Hume and other philosophers doubt that causality can be perceived directly. Instead, observers become aware of it through inference based on the perception of the two events constituting cause and effect of the causal relation. However, Hume and the other philosophers primarily consider causal relations in which one object triggers a motion or change in another. In this paper, I will argue against Hume's assumption by distinguishing a kind of causal relations in which an agent is controlling the motion or change of an object. I will call this kind of causal relations 'causation-as-control'. In instances of causation-as-control, the observer does not become aware of the causality through inference based on the perception of two events (cause and effect). Rather, she perceives the two events directly and without further inference as cause and effect of a causal relation, and, therefore, the causality at work.

Keywords Perception of causality · Causality in action · Embodiment · Elizabeth Anscombe · David Hume

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1 Introduction

The aim of this paper is to provide an argument against the Humean account of perceiving¹ causality (or causal efficacy). The account was developed by Hume in *A Treatise of Human Nature* ('Treatise') (Hume, 2007a), *An abstract of a book lately published* ('Abstract') (Hume, 2007b),² and in *An Inquiry Concerning Human Understanding* ('Inquiry') (Hume, 2008). However, this account is still held in some way or another by other philosophers and psychologists. According to Hume, observers cannot perceive the causality between the two motions or changes (cause and effect) of a causal relation directly,³ in the sense in which they can perceive the shapes and sizes of objects directly, as well as their motions and changes. This is so because causality is not a detectable feature of the sequence (see Beebe, 2009, p. 436). Instead, they can only perceive both events of the sequence directly. The impression of the causality has rather a reflective nature (see *ibid.*, p. 419). It is a determination of thought based on the perception of the sequence's events (Hume, 2007b, p. 413).

Alvin Goldman (1993, p. 373) and Daniel Wegner (2002, p. 64) explicitly agree with Hume and claim that causality, in general, cannot be perceived but must be inferred based on the perception of cause and effect. Rudolf Carnap also says that without addressing Hume (Carnap, 1966, pp. 229). Other philosophers such as James Woodward (2011a, p. 229; 2011b, pp. 19–20) and Christopher Peacocke (2011, p. 159) claim more cautiously that causality can indeed be perceived. However, just like Hume, they argue that observers do not see the causality itself as a detectable feature of the sequence of both events. Instead, they perceive both events unfold and then 'read off' the causality from the event's perceptual cues, including their spatial and temporal properties (Woodward, 2011a, pp. 229–230).

The problem of Hume's argumentation and that of his spiritual successors is that they are primarily concerned with instances of causation in which one event triggers the other to support their position. Hume's primary example of such a causal relation is one billiard ball causing the other to roll by hitting it (Hume, 2007b, p. 413; 2008, p. 46).

In this paper, I will first analyze a group of causal relations that Hume and the other philosophers did not consider, namely causal relations in which the agent is causing an object's motion or change by controlling it. I will call these relations 'causation-as-control' in contrast to 'causation-as-triggering'. Examples for causation-as-control are actions of cutting bread, drinking water, scraping off dirt, and squashing tin cans.

¹ Note that I am only concerned with visual perception in this essay. Whenever I use the word 'perceive' or 'perception', I mean 'see' or 'visual perception', respectively.

² The *Abstract* was published anonymously in 1740. Historians raised doubts as to whether Hume wrote it. However, David Raynor (1993) argues that Hume is the author, and his arguments are plausible. Accordingly, I will ascribe everything written in the *Abstract* to Hume.

³ In the *Treatise*, Hume calls cause and effect of causal relations from time to time 'motions' and from time to time 'changes'. Both in the *Treatise* and in the *Inquiry*, he sometimes uses the word 'object'. However, I suppose that he does not mean 'object simpliciter' but instead 'object in motion' or 'object in change'. Furthermore, in the *Inquiry*, he also uses the word 'event' for any cause or effect. So, I assume that I do no harm to Hume, if I credit him with the idea that cause and effect of a causal relation are events. Events, in turn, can be either motions or changes of objects.

My focus on these instances of causation is inspired by Anscombe's *Causality and Determination*. In this paper, Anscombe also argues against Hume's doctrine by drawing the reader's attention to a group of actions that involve causation-as-control:

He [Hume] confidently challenges us to 'produce some instance, wherein the efficacy is plainly discoverable to the mind, and its operations obvious to our consciousness or sensation'. Nothing easier: is cutting, is drinking, is purring not 'efficacy'?" (Anscombe, 1993, p. 93).

Following Anscombe's intuition, I will then provide the following argument: Hume and his spiritual successors may be right that, in many cases, causality cannot be perceived directly. Instead, its awareness is rather of a reflective nature; it depends on the direct perception of the causally related events. But it is only of a reflective nature in the case of causation-as-triggering. The phenomenological character of perceiving causation-as-triggering differs from that of perceiving causation-as-control. In cases of causation-as-control, the causality within the causal sequences can be perceived directly, in the same sense in which shapes, sizes, motions, and changes of an object can be perceived directly. It is obvious both to consciousness and to sensation, and it does not have to be 'read off' from perceptual cues of the perceived events. If a philosopher or psychologist still denies that causality can be perceived directly even in cases of causation-as-control, she must, as Anscombe claims, also deny that the objects themselves, involved in the causally related events, can be perceived directly (ibid., p. 92).

I proceed thus: In section one, I will provide a phenomenological analysis of causation-as-control to elaborate what distinguishes it from cases of causation-as-triggering. In section two, I will analyze those properties of the events constituting instances of causation-as-control, thanks to which the causal efficacy is directly perceivable. In section three, I will then argue why and in which sense the causal efficacy in instances of causation-of-control is directly perceivable and how the perception of causation-as-control differs from the perception of causation-as-triggering.

The distinction between causation-as-control and causation-as-triggering might also be interesting for future psychological research. Researchers interested in the psychological operations accompanying the perception of a causal relation and in the development of causal concepts during infancy have been primarily concerned with instances of causation-as-triggering. I will say a few more words on this issue in the conclusion.

2 Causation-as-control vs. causation-as-triggering

Let us begin with a preliminary remark: I will call any object that the agent acts on, in order to cause a change in it or to move it, a 'target-object'. Agents act on target-objects by pushing, poking, scratching, pulling, turning, stretching, squeezing, hitting, or kneading them. When I cut a loaf of bread, the loaf is the target-object of my action. When I knead a lump of dough, the lump is my target-object. Note that 'target-object' is not a description of an object's natural kind, but rather a description of a role that an object plays. An object is only a target-object if it is acted on by someone.

Humans act on target-objects by bringing their body parts in direct contact with them and by exerting mechanical force on them. Hands are the primary body parts with which this is done. Hands are ideal to act on target-objects because they are covered with flexible, soft, and resilient skin that is highly sensitive to tactile signals. Each hand has five freely movable fingers that are arranged in a way that enables the agent to grab objects of different shapes and sizes. Depending on which target-object the agent acts on and what the agent does with it, she touches a specific side of the object at a specific angle and bends her fingers in a specific way. As Anton Ford states in his paper *The Province of Human Agency*, “[...] [I]f one were to grasp each of these objects, there would be differences in the way one’s hand closed down around them [...]” (Ford, 2018, p. 709). When an agent ties her shoelaces, for instance, she moves her hands and arranges her fingers in a different way than when she ties someone to a mast with a rope. When the agent folds a piece of paper, she touches it in a different way than when she rips it apart.

Let me use this manufacturing metaphor to express this thought: The agent’s hand can become a mold for a variety of objects, adjusting perfectly to their shapes and sizes. Sometimes, however, the reverse is the case. When the agent kneads clay or dough, the agent’s hand rather becomes a cast, so that the target-object adjusts perfectly to the shape of the agent’s hand. In either case, the agent’s hand and the target-object can become closely entangled with each other, at least in some causal interactions.

The ease and efficacy with which the agent can handle differently shaped objects affects the nature of the interaction between the agent and the target-object. Thanks to the close entanglement between agent and target-object, the target-object moves or changes in accordance with the agent’s own motion. As a result, the agent can fully determine the direction, speed, and degree of the target-object’s motion or change throughout the causal interaction. Whenever the agent interacts with her target-object in the described way, I will say that the agent controls the target-object’s motion or change, and that the action involves causation-as-control.

The counterpart of causation-as-control is causation-as-triggering. In triggering an object, the agent determines the direction, speed, and degree of the target-object’s motion or change only at the beginning of the causal interaction. Once triggered, the motion or change unfolds independently from the agent’s own motion. Instances of causation-as-triggering are instances in which the agent’s body is not entangled with the target-object.⁴ Furthermore, unlike controlling, causation-as-triggering is not only

⁴ Note that I use the word ‘control’ in ‘causation-as-control’ in contrast to ‘triggering’ in ‘causation-as-triggering’ in a technical sense that differs from the colloquial sense of ‘control’. There are cases in which an agent is controlling the motion or change of an object in accordance with my technical sense of ‘control’ but not in accordance with the colloquial sense of ‘control’, and vice versa. When I use the word ‘control’ in my technical sense, I can say that I control the doorknob by turning it because my hand is closely entangled with the doorknob while turning it. I can determine its motion throughout the whole interaction. When I use the word ‘control’ colloquially, however, I do not mean a relation between an agent and a sturdy and motionless object like a doorknob. I rather mean a relation between an agent and an object in motion that would, if not controlled, move on its own. Objects that can be controlled in this way are, for instance, moving vehicles, running animals, or rolling soccer balls. In accordance with the colloquial sense of ‘control’, I would not say that I control the doorknob when I am just turning it because, without touching the doorknob, the doorknob would not do anything. But I would say that a soccer player controls the ball when she is dribbling, because, if not controlled, the ball would just roll away. On the other hand and in accordance with my technical sense of ‘control’, I would not say that the soccer player is controlling the ball because

common among agential but also among non-agential causal interactions. Hume's billiard balls are a good example for causation-as-triggering. When a billiard ball hits another billiard ball, or when I hit a billiard ball with my knuckle, the second ball's motion is triggered. Even though the ball's motion is caused by me (or another ball), I (or the other ball) no longer influences its direction or its speed once I (or the other ball) hit it. Other examples of triggering are igniting a match (by striking it against the flammable surface of a matchbox), switching on the light, and breaking a window. When I hit the window with my fist, I cause the window to break, but I do not further determine the fragmentation of the glass. The breaking process unfolds independently from me once I triggered it.

My concepts of causation-as-control and causation-as-triggering are similar to Jennifer Hornsby's concepts of non-mediatly causing and mediatly causing, respectively, from her paper *Actions in their Circumstances*. An agent causes an event mediatly, according to Hornsby, if the event is distinct and easily separable from the agent's bodily motion, for example closing a door by pressing a remote button (Hornsby, 2011, p. 112). An agent causes an event non-mediatly, in turn, if the caused event cannot be 'pried apart' (both ontologically and epistemologically) from the bodily motion (ibid., p. 108). To give examples for non-mediatly causing, Hornsby refers to Anscombe and the actions that she mentions in *Causality and Determination* to argue against Hume, namely pushing a door all the way shut, carrying a backpack, and squashing a tin can by treading on it.

Hornsby says that in cases of non-mediatly causing, the 'causal work', as she calls it, is done by the agent (ibid., pp. 109 and 121). It seems that this is simply another way of saying that the agent determines the motion or change of the target-object throughout the causal interaction. She also remarks that, in the case of non-mediatly causing, the movement of the agent's body depends on the shape and weight of the target-object (ibid., p. 115). I used similar descriptions to explain how agent and target-object are entangled with each other when the agent is controlling its motion or change. However, a closer look shows that my notion of causation-as-control differs from her notion of non-mediate causing. For Hornsby, 'doing something non-mediatly' means that the agent's body alone is responsible for the target-object's motion or change. 'Doing something mediatly', in turn, means 'doing it with the help of a machine'. Hornsby says that in some sense the machine acts on the target-object while the agent just operates the machine. Her example of squashing tin cans mirrors this distinction (Ibid., pp. 108–109). When I operate a machine to squash tin cans, the cans are squashed mediatly. When I squash tin cans by treading on them, the cans are squashed non-mediatly. However, the causal interaction between the machine's industrial rammer and the squashed tin cans might be causation-as-control, as well, because it does not differ much from my boots squashing the tin cans.⁵ On the other hand, Hornsby's

Footnote 4 continued

her dribbling consists of a series of kicks. In kicking the ball, the soccer player is not closely entangled with the ball. She just triggers its motion. In the course of this paper, I will use the word 'control' only in my technical sense.

⁵ That mean that causation-as-control can also occur among non-agential causal interactions, for instance between a robot or a machine and an object. However, I assume that, in many of these cases, the machine or the robot mimics human actions.

non-mediatly causing also includes actions in which the agent triggers an effect, for instance by hitting a target-object, such as a billiard ball, with her knuckles.

Hornsby admits that her idea of non-mediatly causing is vague (*ibid.*, p. 121). Nevertheless, she develops the distinction between mediatly and non-mediatly causing as a means to explain Anscombe's attack against Hume's doctrine of causality. From this point of view, her distinction is imprecise. Many of Anscombe's examples in *Causality and Determination*, such as cutting and drinking, are not only actions in which the agent is in some bodily contact with her target-object. They are actions in which the agent is entangled with the target-object for the whole time. On this basis, I consider my distinction between causation-as-control and causation-as-triggering to be more adequate.

The distinction between causation-as-control and causation-as-triggering is important for the analysis of the cause-event and the effect-event within different kinds of causal interactions. But before I begin with the analysis, let me introduce another category of objects that is relevant for the causal character of acting—tools. Ford complains that philosophers of action have not paid much attention to the phenomenology of using tools (Ford, 2018, pp. 698–699). This essay is not the right place to provide a full-fledged philosophical analysis of tool utilization. However, since some of Anscombe's actions imply the use of tools, I will say something about the influence of tools on the causal nexus within actions.

I will use the word 'tool', like the word 'target-object', not as a description for a natural kind but as a description for a role that an object plays. In this sense, almost every middle-sized object can be a tool, including sticks and stones. If an agent uses an object to act on another object, the latter is a target-object, and the former is a tool. Further examples for tools are knives, screwdrivers, hammers, but also keys and baseball bats. Many of these tools have a handle that enables the agent to grab them tightly just like a target-object. Therefore, they are as freely movable as the agent's hands and fingers. But unlike hands and fingers, tools are differently shaped and have a different surface structure. Some of them are sharp (knives), some of them are solid and heavy (hammers), some of them have a peculiar shape (keys). Thanks to these properties, agents can use a tool to act on a target-object in a way in which they could not without the tool.

In using a tool, the agent no longer stands in direct contact with the target-object. But this does not mean that she cannot control the target-object. When the agent uses a tool, it directly transfers the hand's force to the target-object. From the agential point of view, tools, therefore, extend the biological hand and become extra-corporeal limbs.⁶

In accordance with my distinction between causation-as-control and causation-as-triggering, I distinguish between two respective kinds of tool utilization: Some tools

⁶ In the tradition of phenomenalism and existentialism, the hand of and agent who is holding a tool has been similarly described as a medium mediating between the agent and the tool. The hand is 'a nothing' disappearing from the agent's attention, allowing the agent to merge with the tool. In his book *Being and Nothingness*, Jean-Paul Sartre states accordingly: "I do not apprehend my hand in the act of writing but only the pen which is writing; this means that I use my pen in order to form letters but not my hand in order to hold the pen. I am not in relation to my hand in the same utilizing attitude as I am in relation to the pen [...] The hand is only the utilization of the pen" (Sartre, 1978, p. 323).

help the agent to trigger a motion or change; others help her to control a motion or change.

Recall the examples of the agent hitting the billiard ball and the window. Instead of hitting it with her knuckles, she can also trigger the billiard ball's motion by hitting it with a cue. Similarly, instead of breaking the window with her bare fists, she can also break it with a baseball bat. Felling a tree by driving a wedge with a hammer into a crack of the tree's trunk is also an action in which a change and motion of a target-object is triggered. After hitting the wedge several times, I can roughly determine the direction, in which the tree falls. However, as soon as the tree starts to fall, I can no longer influence its motion.

Some tools, in turn, enable the agent to control the target-object's motion or change. When I use a knife to cut bread, for instance, I grip the knife tightly. I can then move the knife back and forth, as if it was a part of my hand. In cutting the bread, the knife's blade stays on the bread and later in the bread. Thanks to this constant contact, I can determine the speed, the direction, and the depth of the cut throughout the whole process. This example shows that not all tools untie the entanglement between the agent and her target-object. Used in a certain way, some of them rather extend the entanglement.

3 On the nature of causes and effects

In this section, I will analyze characteristic properties of causes and effects. Thanks to these properties, the causal efficacy in cases of causation-as-control is directly perceivable and does not have to be 'read off' from the event's perceptual cues. The properties that I will pay attention to are the temporal order of the cause-event and the effect-event of a causal relation and their complementariness. I will also analyze the spatial relation between the objects involved in both events.

Keep in mind that the kind of causation that I am primarily interested in is causation within causally complex actions. The cause of such an action is a bodily motion directed against a target-object. It can also include the motion of a tool. The effect of the action is the motion or change that the target-object undergoes. The action itself encompasses both the agent's bodily motion and the motion or change of the target-object.⁷ For

⁷ This assumption is controversial, and it has been disputed by many philosophers. As I already mentioned, Hornsby states that cause and effect in the case of non-mediate causing cannot be 'pried apart' from each other ontologically. In other words, instances of non-mediate causing do not involve two distinct events. What the agent does to act on the target-object (the bodily movement) and how the target-object reacts (its motion or change) is one event. Consequently, the causality is also internal to one event (Hornsby, 2011, p. 108). I disagree with this assumption. I think that causation is always a relation between two events. However, I will return to Hornsby's assumption in section three. Against Hornsby, Davidson argues that cause and effect are indeed two distinct events. But unlike Hornsby and I, he also argues that the action itself only encompasses the agent's bodily motion. Any causal effects of this motion lie beyond the boundaries of the action. He claims: "We never do more than move our bodies: the rest is up to nature" (Davidson, 2001, p. 59). There is a passage in Anscombe's *Intention* that can be read as an anticipatory criticism of this position: "[...] [I]f they mean 'I can move my arm but not the matchbox' the answer is that I can move the matchbox—nothing easier." And later she adds: "I do what happens" (Anscombe, 2000, p. 52). But this sentence should not be understood in the literal sense. In moving the matchbox with her hand, the agent neither 'does' the motion of the matchbox, nor that of her hand. Rather, both 'happenings' (her

instance, when I break a window by hitting it with a bat, my strike against the window is the cause and the window's breakage is the effect. When I cut bread with a knife, the motion of my body (including the motion of the knife) is the cause, and the change that the bread thereby undergoes is the effect. In both cases, both events together constitute the action.

3.1 On the temporal order of cause and effect

Every event persists for a certain period of time. Since events are either motions or changes of objects, an event (being a motion or change) begins when the object (involved in the motion or in the change) begins to move or to change. The event ends when the object stops to move or change. I will use the variable ' e_1 ' for any cause-event and the variable ' e_2 ' for its effect-event. Assuming that e_1 caused e_2 , there are essentially four possibilities of how e_1 and e_2 can be temporally related to each other:

- (i) e_1 begins in the moment e_2 begins and ends in the moment e_2 ends. e_1 is contemporaneous with e_2 .
- (ii) e_1 begins before e_2 begins and ends before e_2 ends. e_1 overlaps e_2 (temporally).
- (iii) e_1 ends in the moment when e_2 begins. e_2 succeeds e_1 (temporally).
- (iv) e_1 ends before e_2 begins. e_1 is (temporally) distant from e_2 .

What is Hume's position regarding the temporal order of cause and effect? In the *Treatise*, Hume first argues that the cause of the causal relation must be prior to its effect in order to be recognized as a cause (Hume, 2007a, p. 54). This remark excludes (i) and (ii). Hume also excludes (iv) indirectly in the *Abstract* by emphasizing that there cannot be a temporal gap (or interval) between e_1 and e_2 (Hume, 2007b, p. 409). Accordingly, (iii) is the only viable option. But is Hume right? Do effects temporally succeed causes?

Consider Hume's colliding billiard balls as an example. Imagine that one billiard ball (b_1) hits another (b_2). Did b_1 's motion end in the moment when b_2 's motion began? Clearly, it could have happened that b_1 continued to roll after b_2 started to roll, especially if b_1 hit b_2 in an obtuse angle. In this case, it seems that the effect would not have succeeded the motion. Instead, the cause would have overlapped with the effect.

Against this objection, Hume would certainly argue that the motion that we later identified as the cause of the causal process ended when b_1 hit b_2 . After hitting b_2 , b_1 might have rolled for a bit, but this subsequent motion would not have been part of the cause, because it would not have contributed anything to the original causal process. The cause of the colliding billiard balls ended when the effect began. This was the moment when both balls collided. It was the moment when the kinetic energy of b_1 was transferred to b_2 , making b_2 move.

That Hume would hold such a position, can be seen in his strategy to argue against option (i). Hume states: If e_1 was contemporaneous with e_2 , e_1 would 'retard its causal operation' and would not 'exert itself' on e_2 . As a result, e_1 could not be the cause of e_2 (Hume, 2007a, p. 54). It seems that for Hume, the 'causal operation', as he calls it,

Footnote 7 continued

arm movement causing the movement of the matchbox) constitute her action. I assume that this is what Anscombe had in mind, and this is also my position.

cannot be conducted over a period of time. Instead, it is (and must be) done in a single moment—the moment of the object’s collision.

Hume’s assumption is correct, but only for instances of causation-as-triggering. Instances in which an object triggers a motion or change in another object are instances in which these objects exert power on one another for a single moment. When I break the window by hitting it with a bat, the cause (the motion of my bat) ends when the effect (the breakage of the window) begins. This is the moment when the swing of the bat ‘fulfills its purpose’. It is the moment when all of the bat’s kinetic energy is transferred to the glass. The bat might still swing for a while, but this remaining motion would no longer contribute to the causal process. Accordingly, it is not part of the cause.

Not all causal processes have the temporal order described in (iii). The events that constitute cause and effect of actions like cutting bread or tying shoelaces do not unfold successively. Being in control of the motion or change of a target-object means to determine the direction, speed, and the degree of the target-object’s motion or change throughout the causal interaction. This is possible because the target-object’s motion or change does not unfold independently of the agent’s motion. In contrast to Hume’s doctrine, the ‘causal operation’ in the case of causation-as-control is conducted over the whole period of time. Every phase of the target-object’s motion or change (no matter how small) is a direct causal result of every phase of the agent’s motion. As a result, the cause (the bodily motion) and the effect (the caused motion or change) are contemporaneous, as I defined it in (i). When the agent begins to move, the target-object begins to move or change, and when the agent stops to move, the target-object stops to move or change.

Consider the action of cutting bread as an example. After laying the knife on the bread’s crust, I start to exert pressure and move it back and forth. As a result of this motion, the bread’s structure changes. The moment I begin to move the knife back and forth (by exerting enough pressure) is the moment the bread begins to change. The moment I stop moving the knife is the moment the bread stops to change. The cause (me moving the knife) is contemporaneous with its effect (the change of the bread’s structure). I can move the knife back and forth gently touching the bread crust without causing any damage. But in doing so, I am not in the act of cutting the bread anymore. My motion is no longer a motion that has causal effects on the bread crust’s structure.

3.2 On the spatial relation between the objects involved in cause and effect

Other than the temporal order, the spatial contiguity between the objects involved in cause and effect is also relevant for the phenomenological character of the causal experience. That it is relevant for the recognition of causality, in general, has been argued for by many philosophers. Woodward states that people learn from early on that energy can only be transferred through physical contact. Therefore, as I have already mentioned, he regards the perceptual accessibility of spatio-temporal and geometrical

cues as a necessary requirement for the ability to ‘read off’ causality (Woodward, 2011a, pp. 235–237).⁸

Hume also states that spatial contiguity is essential in order to recognize a causal relation. He does not explicitly distinguish between the spatial contiguity of cause and effect and the spatial contiguity of the objects involved in them. However, in the *Abstract* and the *Inquiry*, he emphasizes that both objects must touch each other to communicate the motion using the words ‘impulse’ and ‘force’ (Hume, 2007b, p. 409; 2008, p. 46). Hume’s colliding billiard balls are indeed a paradigm example for two objects that touch each other, but only for a single instance.

I assume that causation-as-triggering, in general, involves objects that are in contact with each other for a short amount of time. This fact is grounded in the temporal order of triggering events. As I said in the last sub-section, kinetic energy can only be transferred through physical contact (collision). However, the transfer only needs an instance of time. When the kinetic energy is transferred, the cause ends and the effect begins to unfold independently from further influence.

Controlling the motion or change of an object, in turn, requires the agent (or her tool) to be entangled (which means to be in close contact) with the target-object. This means that the causally relevant part of the agent’s body (or her tool) does not only touch the target-object, but clings to the target-object and maintains this close contact throughout the causal interaction. From the standpoint of physics, causation-as-control and causation-as-triggering do not differ categorically from each other. In both cases, kinetic energy is transferred from one object to another through physical contact. Thanks to the entanglement, however, kinetic energy is constantly transferred from different angles to a varying degree and to different parts of the target-object.

When I knead dough, my fingers are in close and continuous contact with the dough. This enables them to exert constant force on the dough. The change of the dough begins when I lay my fingers around it in order to squeeze it, and I leave my fingers on it throughout the whole process of kneading. When I tread on a tin can with my boots, the continuous deformation of the tin can also depends on the continuous contact and pressure of my boots. When I lift my boots, the tin can stops to change.

3.3 On the complementariness of cause and effect

I will now come to the last but most important property that makes the perceptual experience of causation-as-control unique: complementariness.

Complementariness is usually understood as a relation between two different objects or concepts that match one another and that form a whole when combined.

⁸ In contrast to the spatial relation of objects, the spatial relation of the events themselves is rather irrelevant for the perception of causation. The spatial extent of an event is the area encompassing all the places that the object, involved in the event, occupied during the unfolding of the event (see Dretske, 1967, pp. 488–489). Think of it as the three-dimensional trajectory of the object. Comparing the spatial extent of the cause-event with the effect-event can tell us how much of their spatial extension they share. But it cannot tell us anything about the spatial relation of the involved objects at a certain time. It cannot tell us whether both objects touched or whether they passed each other. Assume that a part of e_1 occurred at position s , and that a part of e_2 also occurred at s . This fact implies that the object, involved in e_1 , and the object, involved in e_2 , occupied s at some point. But it does not imply that both objects were even close to each other because it is possible that they occupied s at completely different times.

Examples for complementary pairs are ying (dark) and yang (bright) in Chinese philosophy, adenine and thymine in the DNA code, or two matching puzzle pieces. I will apply this concept to describe a relation between causes and effects that also ‘match’ in a figurative sense. A puzzle piece is complementary to another puzzle piece if, thanks to its shape and size, its contour perfectly matches the other piece’s contour. A causing motion is complementary to the caused motion (or change) if the object of the caused motion moves (or changes) in perfect accordance with the direction, speed, and shape of the causing motion’s object. Figuratively speaking, the cause-event and the effect-event unfold as two halves of a whole. This description is, to be honest, vague. To make clearer what I mean by ‘complementariness’ of cause and effect, let me discuss a few examples.

First, recall the example of tying shoelaces from section one. As Ford states, when an agent ties her shoelaces, her fingers perform a complex series of micro-movements that is typical for the action of tying shoelaces (Ford, 2018, p. 708). I will add that the shoelaces under the control and guidance of the agent’s fingers also move in a way typical for tying shoelaces. Both motions are complementary. More precisely, the way in which the shoelaces move is in perfect accordance with the direction, speed, and shape of the agent’s fingers. The micro-movements of the agent’s fingers and the shoelaces’ micro-movements ‘form a whole’ that we simply call ‘tying shoelaces’. Clearly, the agent can make the shoelaces move in a different way, but in this case, she would also perform different micro-movements by applying a different tying-technique, for instance.

The complementariness of cause and effect is grounded in the way in which agents control the target-object’s motion or change. Thanks to her hand’s flexibility and her fast reactions, the agent remains entangled with the target-object. Due to this fact, the agent can determine speed, direction, and degree of the target-objects motion or change for the whole time of the interaction. The target-object’s motion or change does not unfold autonomously, but under the persistent guidance of the agent’s hands’ (or tool’s) own motion. As a result, the bodily motion of the agent (or the tool’s motion) can only bring forth a certain kind of motion or change of the target-object.

I assume that Ford has the same thought when he analyzes how cause and effect in actions such as cutting bread or tying shoelaces are related. As mentioned above, Ford emphasizes the agent’s ability to adjust to the different shapes and sizes of objects. He then describes the bodily movement metaphorically as water running over an object. He writes that the “[...] bodily movement does not have a contour of its own: it takes the shape, liquid-like, of what we pour it into.” Later he specifies that it “[...] is determined *in concreto* by the object that it bears upon” (ibid., p. 709). This metaphor seems to be just another way to express that the agent’s motion is complementary to the target-object’s motion or change as I described it before.

Ford makes yet another interesting point. He notes that the agent’s bodily motion in actions like tying shoelaces can only be described with regard to its effect, or, more precisely, with regard to the whole causal interaction. In order to provide a proper description for the motion of my fingers when I tie shoelaces, for instance, I need to refer to the whole action of tying shoelaces. I need so say something along these lines: “I move my body exactly in the way that is required to tie my shoelaces”. Ford states that the description.

[...] has no content apart from that which it receives from the embedded description of what I am doing to something other than my body – namely, to my shoelaces (ibid., p. 708).

This example stems originally from Davidson. In his paper *Agency*, Davidson notices that, in some cases, neither the cause nor the effect of a causally complex action can be properly described in abstraction from the whole action (Davidson, 2001, p. 51). Neither can we describe the motion of the agent in abstraction from her action of tying shoelaces nor can we describe the motion of the shoelaces in abstraction from this action. How can I describe what happens to the shoelaces other than saying: “They are getting tied by the agent”? Or recall the action of cutting bread. The motion of the knife (held by me) is clearly complementary to the change that the bread undergoes. The loaf of bread changes in accordance with the speed, direction, and shape of the moving knife. Again, it is almost impossible to describe the change that the bread undergoes in abstraction from the action of cutting bread. I need to say: “The bread is getting cut by a knife”.⁹

This problem does not occur in the case of causation-as-triggering. It seems to be easy to describe cause and effect without referring to the whole causal relation. Neither Hume (2007a, p. 409) nor Woodward (2011a, p. 240) have difficulties in describing the movement of the two colliding billiard balls without any implication as to whether the first ball caused the second’s motion. Similarly, when I say that the agent hit the window (with a bat), I do not imply that this motion caused the window to break. Also, when I say that the window broke, I do not imply that this was the result of a hit against it.

For Davidson, how we describe cause and effect in the case of tying shoelaces in contrast to cause and effect in the case of smashing windows does not indicate any peculiarity of the causal sequence (Davidson, 2001, pp. 51–52). But it does. It indicates that, unlike causation-as-control, causation-as-triggering, in general, does not involve complementary events. The caused motion of the second billiard ball is not in perfect accordance with the direction, speed, and shape of the first billiard ball. How the motion of the ball unfolds, depends, to a large extent, on features of the environment such as the surface properties of the table as well as the form, weight, and diameter of the ball. In the case of causation-as-triggering, the ‘causal operation’, as Hume calls it, is done in a single moment, usually in the moment of both object’s collision. Once the motion or change is triggered, it unfolds independently from the first object’s motion. Due to this fact, the object of the cause moving in a certain way and exerting a certain amount of power could trigger a different motion or change.

⁹ To be precise, it is possible to describe the cause-event without referring to the whole causal interaction with the target-object, for instance, by retracing its unfolding in a coordinate system. However, and this is the crucial point, such a description would be neither practicable nor comprehensible as a natural description. Philosophers of embodiment such as John Haugeland have shown that embodied motions, in general, are comprehended as a unified interaction between the bodily motion and the object that the body is in contact with. His example is that of an ant walking over sand: “If, on the other hand, there is constant close coupling between the ant and the details of the beach surface, and if this coupling is crucial in determining the actual path, then, for purposes of understanding that path, the ant and beach must be regarded more as an integrated unit than as a pair of distinct components” (Haugeland, 1998, p. 217).

What exactly it triggers depends, to a large extent, on the condition of the object that it collided with and on other environmental features.

Readers familiar with Hume will have noticed that my notion of complementariness resembles Hume's criterion of 'constant conjunction'. This is certainly true. A constant conjunction obtains if and only if causes of the same type are always (or almost always) accompanied by effects of the same type (Hume, 2007b, pp. 63–64; 2008, pp. 54–55). For Hume, all events must fulfill the criterion of constant conjunction in order to be acknowledged as cause and effect of a causal relation. In the *Inquiry*, he writes: "[...] [W]e may define a cause to be *an object, followed by another, and where all the objects, similar to the first, are followed by objects similar to the second*" (Hume, 2008, p. 56).

In *Causality and Determination*, however, Anscombe argues against this position Anscombe (1993, pp. 93–94). According to her, causality does not imply strict generalizability. In the following, I will use the variable ' E_1 ' for the event-type of e_1 , and the variable ' E_2 ' for the event-type of e_2 . The fact that e_1 caused e_2 does not imply that events of type E_1 will always cause events of type E_2 . To give an example, Anscombe refers to Hume's colliding billiard balls. A rolling billiard ball might cause another billiard ball to roll. However, a similar ball with similar speed, rolling in a similar direction might also cause no motion at all, if it collides with a wall (ibid., p. 94). And even if it collides with a ball, as I mentioned above, the effect could still be different. The hit ball could roll in a different direction (if the table was bumpy) or slower (if the ball was gluey). So, cause and effect of the causal relation in case of causation-as-triggering are not only not complementary; events of the same type as the cause will also not always cause events of the same type as the effect.

Complementariness, as I defined it, is not identical with generalizability or constant conjunction. However, the former concept implies the latter concepts. If a cause is complementary to its effect, events of the same type as the cause will usually cause events of the same type as the effect. Imagine an agent kneading dough with her bare hands. Depending on how and with how much force she moves her fingers, the dough changes in different ways. Given that the agent moves her fingers in a similar way, on the other hand, a different lump of dough in a different situation would undergo a similar change.

4 Perceiving causation in action

In the previous section, I determined three characteristic properties with regard to which instances of causation-as-control differ from instances of causation-as-triggering: The events are contemporaneous and complementary, and the agent is entangled with the target-object. In this section, I will show in which sense these properties influence the phenomenological character of perceiving causality. I will begin my argumentation by outlining Hume's general position on perceiving causality.

Hume's position on perceiving causality is grounded in his assumptions about the nature of events. However, his discussions in the *Abstract* and the *Inquiry* show that he is primarily interested in the phenomenological character of perceiving causal sequences, even though he does not use the word 'phenomenology'. For Hume, events are motions or changes of an object that is spatially isolated from other objects. These

events are, as Hume says, “[...] complete in themselves, and never point out any other event which may result from them.” (Hume, 2008, p. 46) A billiard ball rolling on a table is the best example for such an isolated motion. However, according to Hume, all events are like these: “The scenes of the universe are continually shifting, and one object follows another in an uninterrupted succession [...]” (ibid.). Now, the basis of the awareness of causality, for Hume, is the perception of two successively unfolding events. When an observer encounters two colliding billiard balls for the first time, she does not perceive the causal efficacy because there is no observable feature in the cause that points out its effect (ibid., p. 19): “The impulse of one billiard-ball is attended with motion in the second. This is the whole that appears to the *outward senses*” (ibid., p. 46). Accordingly, the observer, as he claims, perceives cause and effect as loose and separate (Hume, 2007a, pp. 54 and 300; 2008, p. 54).

Now what happens after the first encounter? Given that the observer frequently perceives events of type E_1 followed by events of type E_2 , she will assume “[...] that there is some connexion between them; some power in the one, by which it infallibly produces the other [...]” (ibid., p. 54). As a result, she will not only realize that events of type E_1 necessarily cause events of type E_2 but also develop a certain psychological habit (ibid., p. 32). Whenever she encounters an instance in which an event of type E_1 occurs, her mind will, upon the perception of the type E_1 event, predict or infer that an event of type E_2 will follow. Or in the words of Hume: “[...] *[U]pon the appearance of one, the mind anticipates the senses, and forms immediately an idea of the other*” (ibid., p. 56).

According to Hume, this inference is not an explicit process of reasoning but rather automatic (ibid., p. 32). However, does it also have a perceptual nature? Does the acquisition of the psychological habit of inferring type E_2 events based on the perception of E_1 events change the phenomenological character of the experience of both events? Does the observer stop seeing events of type E_1 and events of type E_2 as unconnected, independent, and loose and does she instead begin to see the causal efficacy between them?

Interpreters of Hume answer this question differently. According to Anscombe, Hume argues that observers can never observe causality in the individual case (Anscombe (1993, p. 92). According to Helen Beebe, on the other hand, Hume indeed claims that the acquisition of the psychological habit enables the observer to experience one event as causally efficacious for the other (Beebe, 2009, p. 422). In her book *Hume on Causation*, Beebe provides a more detailed interpretation. For her, Hume develops a projectionist account according to which the internal impression of causality is ‘spread’ onto the world. As a result, the observer’s impression of causality acquires a perceptual quality (Beebe, 2006, p. 89).

Beebe’s interpretation is questionable. She even admits that Hume sometimes writes in a way as if he wants to claim that the impression of causality ‘stays in the mind’, as a mere feeling that is not ‘spread’ onto the world (ibid., p. 147; also see Hume, 2007a, p. 111; 2008, p. 55). But even if Beebe’s is right and Hume considers the impression of causality to be perceptual by nature, he does not treat causality as a detectable feature. It is neither a detectable feature of the cause nor of the effect, nor of the causal sequence as a whole (see Beebe, 2009, p. 436), and the acquisition of the psychological habit does not change this fact. For Hume, the experience of causality

(even after the acquisition of the psychological habit) rests on the perception of the two successively unfolding events constituting the causal relation. This becomes clear when we think of Hume's psychological habit as a habit that anticipates the effect based on the perception of the cause. So, the experience of causality, for Hume, even in accordance with Beebe's interpretation, has a hybrid phenomenological character oscillating between reflective and perceptual.

Woodward and Peacocke hold similar positions. Woodward emphasizes that causality can be perceived. However, in accordance with Beebe's Hume interpretation, he treats causality as some kind of secondary property that has to be 'read off' from the events' independent perceptual cues. To give an example, he describes the perceptual awareness of causality between two colliding billiard balls as a process: "[...] [W]e see a moving billiard ball strike a second stationary ball and then see the latter begin to move [...]". Based on the perception of the events' spatio-temporal cues or parameters, we perceive that the collision caused the second ball to move (Woodward, 2011a, p. 240; see also *ibid.*, p. 239). In the remainder of the section, Woodward also seems to be uncertain whether the awareness of the causal efficacy is better classified as a perception or as a judgment based on a perception (*ibid.*, pp. 240–241). Peacocke also admits that causality can be perceived. However, it is not a genuine observational concept. For an observational concept, "[...] a constitutive account of the concept's very nature involves its capacity to feature in the content of perceptual experience." (Peacocke, 2011, p. 158) Instead, the representation of causality is rather computed from the perceptual representation of other genuinely perceivable properties. These are spatial, temporal, and material properties of objects and events (*ibid.*, p. 157).

As I mentioned in the introduction, Hume, Woodward, and Peacocke only consider instances of causation-as-triggering to support their position, and their analyses might be true as analyses of the phenomenological character of perceiving instances of causation-as-triggering. Hume characterizes all events as successively unfolding, with their objects being spatially distinct, except for the moment of their collision. Furthermore, events are complete in themselves and never point out anything beyond them, according to Hume. Given that events are related like this, it is indeed plausible to assume that the observer cannot directly see the causality at work in the sequence of cause and effect, even if she has already acquired Hume's psychological habit. In perceiving an object triggering a motion or change of another object, the perceptual awareness of the causal efficacy might be indeed dependent on the perception of the events constituting the causal relation together with their spatial and temporal properties. It might indeed be indirect. At least, there is empirical evidence that supports this view.¹⁰

¹⁰ In his pioneer psychological experiments, Albert Michotte tested how subjects experience situations in which one object touched another whereupon the other object started to move, too. According to Michotte, the majority of the test subjects perceptually experienced a causal relation between both objects (a launch, a collision, or simply a push). However, he admits that some test subjects only saw two temporally successive motions (Michotte, 1963, p. 20). Robert Joynson raises further doubts and points out several flaws in Michotte's experimental setup. He also notes that subsequent experiments by Beasley (1968) rather show that only a minority of observers perceive similar situations as causal (Joynson 1971, pp. 299–301). In a more recent discussion, Lance Rips doubts that observers have a hardwired perceptual system, 'a cause detector', for detecting collisions, launches or other causal relations that involve causation-as-triggering. A

The central thesis of my paper is that the phenomenological character of perceiving causality in instances of causation-as-control is different. In the case of causation-as-control, cause and effect are contemporaneous and complementary. The target-object moves or changes at the same time and in accordance with the speed, direction, and shape of the agent's hands. Furthermore, the moving agent is deeply entangled with her target-object. Due to the complementariness, cause and effect are not complete in themselves, as Hume claims. They match one another as 'two parts of a whole'. Also, since both events unfold contemporaneously, with the agent and target-object being in close contact, the observer does not perceive two successively unfolding events that she identifies as cause and effect of a causal relation. Both events are perceived at once as 'two halves of a whole' and, therefore, immediately as cause and effect of a causal relation. And perceiving two events as cause and effect of a causal relation means nothing else than perceiving the causal efficacy between them.

To illustrate that, imagine an observer seeing an agent tying her shoelaces. It would be wrong to describe her perceptual experience as an experience of the agent's fingers moving in a specific way and of the shoelaces also moving in a specific way, together with the awareness or perceptual inference that the first event caused the second. Instead, the observer perceives both the finger's motion and the motion of the shoelaces immediately and at once as cause and effect of a causal relation, and, therefore, the causal efficacy between both motions. It is not even possible for the observer to focus on the motion of the agent's fingers without being perceptually aware of this motion as the cause of tying shoelaces. Similarly, it is not possible for her to focus on the motion of the shoelaces without being perceptually aware of this motion as the effect of tying shoelaces.

In section one, I introduced Hornsby's distinction between mediately and non-mediately causing. According to Hornsby, whenever an agent causes a motion in a target-object non-mediately, cause and effect of this action cannot be 'pried apart' from each other neither epistemically nor ontologically. I do not agree that cause and effect of these actions cannot be 'pried apart' from each other ontologically. They are still two distinct events. However, the assumption that they cannot be 'pried apart' epistemically points in the right direction. Moreover, her phenomenological analysis of perceiving non-mediate causation resembles my phenomenological analysis of perceiving causation-as-control. With Anscombe, Hornsby says that the causal efficacy in these cases is evident,

Footnote 10 continued

cause detector would detect causal relations directly and independently from any higher cognition, including long-term memories about prior instances of similar relations or short-term memories about spatial and temporal cues of the involved objects (Rips, 2011, pp. 78–79). The perception of causality, in these cases, would be similar to that of motion. Research, however, seems to show that the representation of causality in these cases rather resembles the perception of traffic jams and executions. It seems to be based on the additional examination of further spatio-temporal relations of the environment and to rely on higher-level knowledge about similar causal relations (ibid., pp. 92–93). Rips's analysis is in line with Anne Schlottmann's. She claims that the perception of causality is not 'purely perceptual', that is informationally encapsulated, but 'deeply meshed with causal reasoning'. It "[...] lies at the interface of perception and cognition." (Schlottmann, 2000, pp. 441–442; also see Rips 2011, p. 79). In the conclusion of this paper, I will briefly discuss the relevance of my distinction between causation-as-triggering and causation-as-control for future psychological research.

[...] not because one sees two happenings, nor yet because one sees a person and a happening that she causes, but because one sees a happening that *is* the person's causing. (Hornsby, 2011, p. 108)

I do not claim that observers only see one happening. Cause and effect in instances of causation-as-control are complementary but not homogenous. Accordingly, they can be distinguished even in perception. Think of the motion of the fingers in contrast to the motion of the shoelaces when our agent is tying them. However, it is part of the cause's essence that the cause appears to the observer as the cause of its effect; and it is part of the effect's essence that the effect appears to her as the effect of its cause. In this sense cause and effect cannot be 'pried apart' from each other epistemically.

To further support the assumption that the cause in instances of causation-as-control also appears as the cause of its effect, and the effect as the effect of its cause, I will discuss some cases of illusionary causation. Imagine a situation in which the bodily motion in an instance of causation-as-control occurs without its typical effect. I am particularly thinking of mime artist. Mime artists move their bodies as if they were acting on a target-object without any object being present. When you see a mime artist moving her arms as if she was playing the violin, you usually know that she is imitating playing the violin. Your perceptual experience, however, might be a bit distorted. You might feel that there is something missing that would be normally there, namely the violin. That is so, because your perceptual experience is, in fact, the experience of someone moving her body as if she is playing the violin. It might even seem to you, as if the mime artist is holding an invisible violin under her chin, and an invisible bow between her fingers.

The distortion that I just described might be even stronger if you are confronted with what I would like to call 'mime objects'. Mime objects are the counterparts of mime artists. They are objects which move or change as if they were acted on by an agent but without any agent acting on them. A player piano, also known as 'pianola', is an example for such a mime object. Player pianos are self-playing pianos; their keys move as if they were pressed by someone.¹¹ However, the play of a player piano is not the best example for the perceptual phenomenon that I want to describe because, in actually playing the piano, the agent's fingers are not strongly entangled with the piano's keys. For this reason, I also think of mime objects in fictional stories and movies. The enchanted brooms in the movie *The Sorcerer's Apprentice*, for instance, move in a way as if they were wielded by someone without someone wielding them. Or simply imagine a bread undergoing a change that is characteristic for being cut with a knife without actually being cut. It might feel uncanny to watch the keys of a player piano or the brooms in *The Sorcerer's Apprentice* move without being moved. It might also feel uncanny to 'see' the bread change 'in your imagination'. In fact, you probably do not simply 'see' piano keys and brooms move, and bread change, in these cases. You probably see brooms and piano keys move as if they were wielded and pressed by someone, respectively, and you probably 'see' a bread change as if it was cut with a knife. And maybe it seems to you as if a ghost is wielding the brooms, pressing the piano keys, and cutting the bread.

¹¹ I owe this example to an anonymous reviewer.

These examples are supposed to show that, even if the bodily movement in cases of causation-as-control occurs without its typical effect (the motion or change of a target-object), observers probably perceive the bodily motion as the cause of such an effect. Also, even if there is no agent bringing forth the change or motion of a target-object, observers probably perceive the change or motion as a change or motion that is usually brought forth by a specific kind of bodily motion. Presumably, this kind of perceptual phenomenon does not occur in instances of causation-as-triggering. When you perceive a window break without any visible object causing the breakage, you might assume that something caused the breakage. But, unlike the motion or change of a mime object, you would not see this breakage as the typical effect of a specific motion, because different kinds of motions could have caused the window to break.

One might still question the stark contrast between perceiving instances of causation-as-triggering and perceiving instances of causation-as-control. More precisely, one might question that there is a stark contrast between becoming perceptually aware of a causal relation based on the perception of two events, and immediately seeing a causal relation in perceiving two events. It seems that in both cases, the sequence of two events is perceived and not the causal relation holding between them. Accordingly, the causal relation must be inferred in both cases. However, as I have already argued, the crucial difference between both forms of perceptual awareness precisely consists of what the perceiver already sees just by seeing both events unfold.

In cases of causation-as-triggering, none of the events has perceivable properties that let it appear as the causal counterpart of the other. Both events are, in fact, causally related, and there are various ‘spatio-temporal cues’, as Woodward argues, that indicate the causal relation. However, they could also be not causally related because events of the same types can appear in various other contexts. They are complete in themselves, as Hume claims. For this reason, the observer perceives both events as events in their own right, and, based on this primary perceptual act, she becomes aware that these events are, in fact, causally related. This does not mean that the perceiver has to calculate for a while to find out that they are causally related, but that the awareness of the causal efficacy is not purely perceptual but also inferential in nature. The way the perceiver becomes aware of the causality in these cases is comparable with the way she recognizes that someone has measles based on the perception of the red skin rash. Red skin rash indicates measles, and the perceiver might know that, but the rash could also be a symptom for another disease. Red rash is a phenomenon in its own right; it is a cluster of red bumps on the skin with certain perceivable properties. Upon seeing all relevant properties of the rash, the perceiver infers that the rash is a symptom for measles and not for another disease. But she does not simply ‘see’ the measles in perceiving the rash.

In cases of causation-as-control, the observer is presented with two contemporaneous and complementary unfolding events of two objects that are deeply entangled with one another. Thanks to these properties, both events do not appear as individual events that could or could not be causally related and whose causal efficacy must be inferred. They simply appear as cause and effect of each other. Accordingly, perceiving both events unfolding consists of nothing else but perceiving the causal efficacy between them. From a phenomenological perspective, the relation between cause and effect in instances of causation-as-control is comparable to the relation between the

varying shades of color of a cube and its shape. Note that the visual perception of an object's shape, in general, depends on the observer's ability to distinguish different shades of color created by nearby light sources. Now, without its varying shades of color, an observer could not see that the object in front of her is a cube. But becoming perceptually aware of the cube's cubical shape is not two-fold. The observer does not primarily perceive the shades of color and then 'reads off' the cubical shape from this perceptual information. Even though it is possible to distinguish the object's varying shades of color from the cubical shape, perceiving the cubical shape simply consists of nothing else but perceiving the varying shades of color. It is not even possible for the observer to focus on the shades of color without being perceptually aware of the object's cubical shape. That is also the reason why we can create the optical illusion of a cubical shape by applying the right combination of shades of color on a flat surface. The shape of the cube is seen directly thanks to the cube's varying shades of color, in the same sense in which the causal efficacy in the case of causation-as-control is seen directly thanks to the three aforementioned properties. And since Peacocke grants objective shape the status of an observational concept (Peacocke, 2011, p. 157), he should also grant causality in causation-as-control this status.

5 Conclusion

The purpose of this paper was to provide an argument against Hume's account on the perception of causation that is also defended by other philosophers. I admitted that the perceptual awareness of causal efficacy in instances of causation-as-triggering might indeed be indirect, and it might indeed involve reasoning and inference. It might be based on the primary perception of the two temporally succeeding events constituting the causal relation. However, perceiving causality in instances of causation-as-control is different. In these cases, observers perceive both events of the causal relation directly and immediately as cause and effect. In Anscombe words, the causal efficacy is plainly discoverable in the perceived sequence. It is obvious both to consciousness and sensation.

If I am right, test subjects in psychological experiments might give different reports after perceiving instances of causation-as-control than after perceiving instances of causation-as-triggering. Unfortunately, Albert Michotte and other psychologists working in this field were primarily interested in the psychology of perceiving collisions, launches, and other kinds of causation-as-triggering. And indeed, many experiments have shown that the perception of collisions, for instance, is not psychologically encapsulated (which means purely sensual) but psychologically modular and dependent on higher cognition. Due to its differing phenomenological character, further experiments might show that the perceptual experience of causation-as-control is much purer and less modular.

Furthermore, recall that, for Hume, the causal efficacy in a certain causal relation cannot be perceived at all if the observer encounters this kind of causal relation for the first time. I have not addressed the question whether an instance of a certain kind of causation-as-control can be already perceived at the first encounter. I am inclined to say "yes", but I also think that this is an empirical question which cannot be answered

in a philosophical discussion. It might even be a question which cannot be answered at all. As Beebe noted, there are not many potential test subjects who have never seen at least one instance of a certain kind of causal relation (Beebe, 2009, p. 428).

Causation-as-control is clearly involved in many simple actions that infants observe frequently at a very early developmental stage. Due to this fact, it might also be the case that our general understanding of causal efficacy is primarily influenced by experiences of causation-of-control. That means that we get to understand causal efficacy first as a productive principle involved in actions such as cutting bread, kneading dough, and tying shoelaces. The understanding of instances of causation-as-triggering, such as collisions or launches, as likewise causal, in turn, might be rather derivative. Anscombe and Max Black argue similarly. Black claims that our understanding of basic causal interaction in agency is much more fundamental for our understanding of the general concept of causality than the understanding of scientific and sophisticated causal notions (Black, 1961, pp. 35 and 37). And Anscombe claims that the possession of the general concept of causality, expressed by the abstract word ‘cause’, presupposes the mastery of specific causal concepts involved in actions such as scraping, pushing, and carrying (Anscombe, 1993, p. 93).

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