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A Critique on Salmon's Probabilistic Approach to Causation

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Abstract

Questions about the metaphysics of causation may be usefully divided into questions about the objects that are causally related, and questions about the causal relations themselves. For instance, is causation merely a physical concept? What is the connection between causation and probability? According to Wesley Salmon, an analysis of causation in terms of physical and causal relations of propensity is possible. But he replaces the notion of necessity with what he calls propensity. This approach to causality is consistent with a probabilistic approach. Another approach would be to reduce such relations to the physical causation. These questions should be resolved. As it turns out, in order to resolve these fundamental and metaphysical disputes, we can turn to a concept of causation that has been discussed within the Islamic philosophy. This approach treats causality as a rational and philosophical notion, and, in contrast to the probabilistic approach, it retains the necessity of causal relations.

Keywords: Causation, Causal Mechanisms Model, Metaphysical Concept, Necessity of Cause and Effect, Determinism.

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1. Introduction

Causation is a venerable subject in philosophical literature: on the one hand, it deals with the continuous realm of human knowledge, and on the other, it concerns arguments about scientific explanations and laws of nature. Since it seems impossible to give a full account of our knowledge of the world in the absence of a proper account of causation, it is clear that a greater understanding of causation can lead to greater understanding of the world. Often, it is assumed that causality is a concept that refers to a special relationship between two things, a cause and an effect. This question has, over the centuries, been a matter of dispute among philosophers and physicists, especially since the advent of quantum mechanics.[1]This diversity of views is subject to differences in ontological and epistemological positions.

General approaches to causation are divided into two major types, *realistic* and *anti-realistic* approaches. Among the realists, some argue that causation is reducible to non-causal states of affairs, while others think causation is primitive and non-reducible. Considering causation as an actual matter, Islamic philosophers take a realistic ontological approach towards the principle of causation, and consider it to be a natural principle that is impossible to refute. Salmon's approach to causality is consistent with a probabilistic approach, but he replaces the notion of necessity with what he calls *propensity*.[2] The approach to causation in the Islamic philosophy is realistic, and takes knowledge of causation to be more than merely descriptive knowledge. This is a form of what is called *determinism*. However, there are profound ontological differences between the two approaches. Salmon takes a probabilistic approach to causality, while in Islamic philosophy, causal necessity is considered unavoidable.[3] This article advocates a realistic approach to the essential relationship between cause and effect, treating causality as both a metaphysical and rational issue. To say that causality is a rational concept does not mean that there are no causal relations or attributes in the external world, and to defend physical

[1]The conception of causation in classical physics is deterministic: the future of a system can be predicted from its present state. However, Quantum Physics, by appeal to the uncertainty principle, claims that determinism does not hold in the micro world. This has led to doubts about causation, and the philosophical community and physicists are no longer in full agreement. Some eliminate it from their theories of the foundation of the universe; others see this indeterminism as a deficiency in human knowledge. For instance, Einstein never abandoned causal justification for a statistical theory. He believed statistical theories were incomplete, and that they would eventually cede to a causal theory. He also believed that this problem could be solved by scholarly philosophy in a way that science could respect.

[2] It is taken to be an objective property of either an object (e.g., the propensity of a radioactive atom to decay) or a condition (e.g., the propensity of a fair coin to land heads given that it is tossed on a surface with slots). Many philosophers take propensities to be irreducible features of the physical world. Others take the view that propensities are reducible to relative frequencies. Propensities are taken to be necessary for understanding physical chance, especially in quantum mechanics (Psillos, 2007: 199).

[3]The principle of causation has formed the basis of many rational demonstrations of Islamic philosophy, for instance Avicenna, Farabi, Mullah Sadra, Allame Tabataba'i. According to this realistic approach, informed on the one hand by religious beliefs and, on the other hand, by Aristotle's philosophical principles, the following two features for the concept of causation are considered: (1) it is a rational and a priori concept; (2) effect and its perfect cause are inseparable.

causality is not to say that it warrants a comprehensive concept of necessity.

2. Physical Concept of Causality and Salmon's Probabilistic Approach

In response to the problems of the Deductive–Statistical model proposed by Hempel, Salmon proposes a model of the so-called *statistical relevance*. As has been shown, statistical laws alone cannot adequately explain a range of relevant phenomena. Salmon provides a new explanation, which he calls the model of *mechanical causality*. He attempts to develop a theory of probabilistic models using statistical and causal mechanisms of the possible relationship between cause and effect, rather than posing any necessary alignment with the progress of the modern physical sciences. However, given interpretations of quantum causality, this account should be regarded with suspicion, due to the absence of complete human knowledge of the quantum level. It would, though, be premature to conclude that causal explanations of quantum phenomena are impossible in principle. This conviction is not motivated by the hope or faith that a satisfactory hidden variable theory will sooner or later be found. Rather, it seems to me that the nature and role of causality in microphysics is a deep and difficult matter to sort out (Salmon, 1984: 254).

Salmon claims that his approach provides a comprehensive and objective account of causality. Thus, he holds that providing a probabilistic concept of causality is non-negligible. The philosophers such as Salmon who favor a probabilistic approach to causality consider it an essential element of causal explanation. However, Salmon claims that his theory is not based on an epistemic but a physicality-objective approach. So do statements about causal relations pertain to individual events or do they hold only with respect to classes of events? In answer to this question, Salmon suggests that his approach offers a bridge between the two: thus, a causal approach should include both individual events and the general rules and regularities represented in the physical world. To this end, he proposes two concepts, causal *propagation* and causal *production*, to account for causal phenomena. Causal production occurs when we say 'light started a forest fire', meaning that an electrical discharge produced ignition; causal propagation occurs when the signals transmitted by a broadcasting station are received by the radio in our home. Music reaches us because electromagnetic waves are propagated from the transmitter to the receiver. Salmon's technical term for this causal process is *propagation*, which replaces the concept of *event*. His *production* is explained in terms of causal forks of three types: a *conjunctive* fork, an *interactive* fork, and a *perfect* fork. These are involved in situations where a common cause produces two or more effects that are related to each other.

Salmon's (2001) probabilistic approach to causation is founded on the dual assumptions below:

1. The substitution of the concept of *event* with that of *process*. A process is a physical identity, which is continuous, spatial, and temporal. Thus, we should not seek to find the connectivity and communication between separate events. Whether they are positive or negative, the causal processes provide causal connections. In this case, during separate incidents, the value and importance of the

statistical relationship is more physical ones.

2. The replacement of the notions of statistically positive relationships and dependencies with transitional causal effects. The probability distribution that occurs in the transfer of causality is not a statistically positive effect on the transmission ratio, but involves propensity.

In this way, Salmon attempts to establish a comprehensive model of explanation based on a probabilistic approach to causality. Salmon maintains that the cause and effect relationship is a relationship between physical quantities of material. His final approach o causality can be summarized as follows: A process transmits an invariant (or conserved) quantity from A to B (A≠B) If it possesses this quantity at A and at B and at every stage of the process between A and B without any interactions in the half-open interval (A, B) that involve an exchange of that particular invariant (or conserved) quantity (1998: 257). This gives two important results: firstly, the metaphysics of causation is excluded, and secondly, cause and effect relations are explained in terms of a physical connection.

Some philosophers have criticized Salmon's account of physical connections and argue that, in many cases, there are such intuitive connections involved in causation but that these do not transfer energy: for instance, the following quote from Beebe (Dowe, 1996: 11) consider I may kill a plant if I fail to water it. If this is the case, then Salmon's theory of transmission will encounter problems. Some philosophers add that even if we believe in the objective structure of physical events, causal claims involve contextual dependency. So, a perspectival nature is proposed to account for the human-centered concept of causality, as in the example, due to Menzies (2007), of a major famine in India. Such a famine may be caused by vassal Indians, drought and famine, or a failure of the Indian government to store and distribute the food provided by international authorities.

Such criticisms are not strong enough to create insurmountable problems for Salmon's physical approach to causation. Salmon's response to the first example would be that the plant was severed from its root and then grown in soil. So, the plant will wither and die whether I water it or not: the real cause of the plant dying is the absence of a physical connection enabling water to reach the roots and leaves. In the second case, the drought and water shortages are real and immediate reasons, while defects in the storage process are an effective cause. Even if the government fails to store food, there will be no famine or drought if there is no shortage of food or water.

We can seek to strengthen the case with further counterexamples. Imagine an incurable patient, and suppose that only a certain drug is effective in treating his or her condition. It might be suggested that instead of taking the medicine, the patient should turn to yoga or prayer. This could be explained in two ways: firstly, healing occurs, but there is no physical connection between the prayer and the (healing) effect. If so, it is not the case that the causal relationship is just a physical relationship; secondly, recovery does not occur, because there is no physical connection between the cause and the effect. If so, the physical causal- connections approach is correct. The patient improves, and we get the result that the causal relationship is not only a physical

relationship. Salmon tries to justify this in physical terms. It is the physical processes that occur in the human brain that lead to the recovery. But there is another way of framing the problem. Considering the aforementioned examples, the existing processes are:

A: Causal processes related to subjective factors.

B: The causal processes that are consistent with the transfer of the effects of the pill.

Processes A and B can both lead to recovery. However, on Salmon's view, such a conjunctive fork cannot be optimal. This is because, according to the asymmetry thesis,[4] the statistical relations that have the potential to explain the accidents and events are unlikely to exist. This is in consistent with his definition of conjunctive forks, and contrary to the probabilistic approach on which his explanation relies.

It should be noted that our purpose in this article is not to reject physical causality, but to show that such an account is not a philosophically *comprehensive* concept of causation. Salmon's approach is to a large extent inspired by the physicalist approaches of his predecessors, and is prone to all of the criticisms made of naturalistic approaches, given the ambiguity in his proposed definition of the physical object. Salmon's account and the naturalistic accounts of his predecessors clearly have some general points in common, and it is evident that accepting the physicalist approach leads to a naturalistic worldview. Such a view, which accepts a series of consecutive material causes devoid of any form or indication of an end, leads to nothing but infinite regression. It also forgets the importance and role of age-old fundamental questions posed by thoughtful human beings, regarding the nature of creation, the purpose of the creation of mankind and other creatures, and virtues like wisdom, prosperity and happiness, which make an essential contribution to man's social and individual life. An alternative and more appropriate worldview could lead to a more comprehensive framework for understanding the concept of causality. In the next section, we will show that Islamic philosophers, whose worldview admits theism and immateriality, believe that an account of causality must include both metaphysical and physical concepts.

3. Metaphysical Concept of Causation in Islamic Philosophy

3.1. Causation as Philosophical Principle

Before embarking upon the discussion, and to gain a better understanding of the issues at stake, we should first of all remind ourselves of the two sources of knowledge acquisition: sense experience, and the intellect. The method of science involves determining the truth or falsity of its constituent propositions, and it will here be necessary to examine this method. Propositions based on research, both empirical and rational, can be divided into two categories: *a priori* and *a posteriori*. *A priori* statements may be determined to be true and false through the rational intellect alone, whereas *a posteriori* statements are

[4]The asymmetry thesis is that conjunctive forks are always open to the future 

and never to the past 

Since statistical relations explain otherwise improbable coincidences, it follows that such coincidences are explained only in terms of common causes, never common effects (Salmon, 1984: 163).

discovered to be true or false by empirical methods. The major difference is that the evidence supporting the truth of *a posteriori* propositions is not valid in all cases, while this does not hold of *apriori* propositions. Philosophy is a rational way to approach and enquire into the distinction between classes of statements (Obodiat, 2007).

The doctrine of Islamic philosophers (trans-empirical causality) is philosophical and although our knowledge of such causation comes from experience, experience is not a criterion for judging it. Thus, in contrast with empiricism, the interpretation of causality in this sense goes beyond from the level of empirical observation, and becomes a principle of philosophical and intellectual enquiry. But in Western philosophy, this is generally not considered natural or logical intelligible. Causality is neither an object in the external world such as a pen, a desk, or a cat, nor merely an intellectual or mental concept such as the 'universal' in 'Human is a universal concept.' Rather, it is like other completely general philosophical concepts, such as 'being' and 'non-being' (Tabataba'i, 1999: 376). According to the empiricist view, since the origin and source of philosophical intelligibility is sense experience, the only way to access it is through experience and knowledge. In contrast, according to the Islamic Philosophy, especially MollahSadra (1989), causality is a feature of the metaphysical world. In this sense, in Islamic philosophy the physical aspect of the concept of causality (the natural efficient cause) arises in the context of nature. On the other hand, although the principle of causality is a philosophical and rational principle, it covers both the metaphysical and the empirical world. Thus, causality is considered from two points of view – as a rational issue, which is indicative of an ontological aspect, and as an empirical issue, with epistemological implications. Nonetheless, the ontological aspect is regarded as superior to the epistemological. In fact, the epistemological function of causality falls under the wing of its ontological function: in Platonic terms, the fallible material world is overshadowed by the infallible world (that includes certain knowledge).

3.2. Nature of Cause-Effect Relation

We now face at least two basic questions: is the relationship between cause and effect real, or is it based on our inductive knowledge of the world? The main dispute here lies in the contrast between ontological and epistemological perspectives. The idea that there is a genuine relationship (both a certain and necessary one) between causes and effects is not something that is agreeable to everyone. Some philosophers believe that it is a matter of empirical fact that there is no such real relationship. Such philosophers begin with sensory experience, and this approach is taken by a broad spectrum of empiricist philosophers, scientists, and the general public. Questions concerning the existence and the identity of cause and effect are distinguished (they are generally treated as two independent events), and the relationship between them is treated as genuine. Thus, the approach posits three components: the cause, the effect, and the relation between cause and effect. Since these are treated as conventional components, causality and causal relations are reduced to contiguity, and time priority and other logical relations are viewed as accidents. This is the inevitable result of adopting an approach which rejects the possibility of the communication of any

genuine metaphysical meaning. But against this view, rationalists and especially Islamic[5]philosophers reframe the distinction between the epistemological and ontological positions: they believe that a genuine relationship between cause and effect precedes any sensory experience. According to this approach, the method of proof is rational and based on *a priori* statements. Avicenna's account is presented in the following quotation:

> But sequence does not eliminate two things, meaning the two things will happen in a sequence. As one might cause the other, the feeling and experience of a multiplicity is obtained for the soul. Our knowledge of the matters that are the most natural and optional proves this, and admits the existence of the causes that such knowledge is based on (Ibn Sina, 1983: 3).

Or:

> A body can affect another body when it has a certain physical relation to that body, while in real causation position is completely irrelevant (Ibn Sina, 1984: 237).

According to this account, an effect has no distinct identity of its own. Indeed, the cause represents the existence and reality of the effect. From this perspective, causes are divided into several types, such as: immediate or mediate, direct or indirect, complete or incomplete, longitudinal or transverse, simple or complex, subjective or non-subjective, natural or supernatural, and real or potential. The real cause can be divided into natural and super natural or divine. The classification of causation into natural and super-natural or divine is a milestone of this perspective, differentiating it from western rationalists' approaches (although there are similarities, including the view that causation precedes any human knowledge of it or its intellectual components). According to this view, 'creation' is classified according to two distinct groups, compiled and simple. Compiled creation is the act of a natural cause, i.e. a change in cause resulting in the emergence of the effect; simple creation is the act of a divine cause, which creatures' existence out of nothing and being out of absence. In other words, the cause that creates and gives existence is necessarily abstract and super-natural, and temporality plays no role, in such creation. So, we cannot say that an incidence is the cause of another incidence. Thus, we can conclude that the absolute path of the metaphysical notion of cause is irreducible to any physical component. Perhaps there is an analogy here with what is known as the "conservation law."

The real cause is inseparable from its effect; an effect that is not the real, the cause is nonexistent. The underlying cause is known through the phenomenon of observing causes and effects as temporal sequences: in this way, underlying causes become known (Obodiat, 2007: 123). But how could these be distinguished? We know

[5]It should be noted that there are significant differences between Western rationalist philosophers and the Islamic Philosophy. Contemporary Western rationalists believe that a sense of mental causation and causal relations is a reality, but have so far have failed to provide a coherent approach. Some hold that it is just a theoretical concept (Boyd, 1991), or a necessary and sufficient condition (Nagel, 1961) and what is described by counter factual conditionals (Lewis, 2001). For others, it is absolutely irreducible (Tooley, 2001) (See also Anscombe, 2001). But in the Islamic philosophy, the concept of causality is considered with special delicacy, based upon the analysis of cause and effect. In this section, we will consider causality in this sense.

that series of effects are observed in natural phenomena. Some of the factors that exist in the causal history of the given phenomenon are important because of the existential need of the effect. In contrast, others factors do not meet any of the existential needs of the effect, and only constitute cause and effect chains that precede the effect. So by focusing on the distinction between linear cause-effect chains and temporal cause-effect chains, confusion between underlying causes and real causes can be avoided. To illustrate the above claim, consider the following examples: suppose that you pick up a pen and begin to write something about the nature of causality. This act involves a linear set or chain of causes that involve your soul, your will, the movements of your hand muscles, the movement of your fingers, and the movement of the pen on the paper. At the same time, this set of causes forms a linear cause and effect chain.

Now, suppose that your hand taps the glass on the table, the glass falls, and the water it contained spreads across the ground. The chain of factors here include your hand's tap, the glass falling, the glass striking the ground, the glass breaking, and the water spreading across the ground. In this chain, the temporal priority of the cause over the effect indicates a set of causes that contrive effects, resulting in the occurrence of the incident. By definition, the priority of causes over effect in this series suggests a set of potential causes that lead to the occurrence of the phenomenon. But what is of higher importance among causal classifications is that which is *necessary* to bring about an effect. In discussing causes of this type, Mullah Sadra (1989) states that what causes existence is also required in bringing about an effect (or lack of it), and existence and non-existence is governed in both regions. In other words, causality consists of two elements (cause and effect) and the relationship between these is real and objective (Tabataba'i, 1999: 130).[6]

3. 3. Necessity of Causal and Effect

On the basis of the above discussion, we can distinguish the following two theories:

1. The necessity of the cause-effect relation (the non-violation of natural conduct).
2. The principle of uniformity (the permanence of natural behavior).

The unified consensus within scientific research would be to affirm these claims. However, we still need ask what it means to speak of the necessity of causal relationships. We should note that if our concern is with real relationships between causes and their objective and factual effects, metaphysical necessity implies a permanent connection between two objects or two real events (such as an apple falling due gravity). This is different from the case of true statements that describe the implications of logical necessity. To illustrate the above claims, consider the following statements:

[6] It is may be suggested that some states of affairs involve a doer that has been perished but where the act remains: for example, a watchmaker who makes a watch (or a builder who makes a building) and then dies. In reply, it can be said that the real causes involved in making the watch and the building are the materials, and in acting, the maker takes possession of this materials. In fact, he is an agent who enacts a series of motions which are for him real acts and effects for him. These are preparatory causes, without which the effects can survive. Here we must remind ourselves that "within the component elements of causes, only those that have a direct connection with effects, and in their elimination of the phenomena of the effect, will not be existent"(Tabataba'i, 2007: 130).

A. If the sun shines then the land is bright and heated
B. If the sun shines then fish live in water
C. If fish can survive on land then the sun shines.

Although A, and C are semantic arguments, they are honest inferences. However, there is a fundamental difference, due to the fact that only a part of the first sentence expresses a relationship of causal necessity, although the conclusion is expressed in the form of a proposition. On the other hand, another fundamental principle resulting from the principle of causality is the principle of uniformity, which states that a specific effect will be issued only from a known cause. This means that the effect cannot be attributed to just any cause, and this indicates the stability and continuity of nature. In some cases, if we see that different results are obtained under the same conditions, we must realize that the conditions were really not the same, and accept that we not understood the nature of the difference (Dinani, 1994: 301-302).

Many empiricists follow Hume's criticism of the principle of induction and the principle of causality. They claim that scientific experimental results are the sole criterion fork knowledge creation. They claim that such methods offer the best access to various natural phenomena and to ways of integrating them, without ascribing to those phenomena their true dignity. Carnap, in line with his philosophy of truth and his rejection of metaphysics, seeks to eliminate necessity from science. He claimed that: "Today, the notion of metaphysical necessity is removed from the laws of nature" (1993: 305). For Carnap, metaphysical issues fall outside the scope of experimental (scientific) work. If we consider these issues carefully, we will see that the statements (e.g. of anti-realist or empiricist philosophers of science) reveal a contrast between empiricist philosophy and empirical sciences. There is something in common to the methods of scientists in different empirical sciences, namely determining the nature of certain cases, but the principles and rules that philosophy concerns itself with include all that is possible, whether existing in nature or not. In other words, enquiry of this kind does not rely on the observation of nature.

Salmon proposes a different approach, according to which causality is not treated as a metaphysical issue. Consequently, he embeds the notion within a physical category of cause and effect, where relationships are said to be established between objective probabilities. His main fallacy begins with the reduction of causality to a physical mechanism, which reveals his commitment to the epistemic approach: the origins of his probabilistic approach lie in the results of modern science, especially quantum physics. It seems that his approach is close to the approach to causality adopted by Hume,[7] who denied any necessity in causality. At best, this reduces causality to constant conjunction. Salmon's adoption of *process* rather than *event* is similarly unacceptable, because it ignores the relationship between the real and the necessary.

4. Causation and Scientific Laws

Salmon's conflicting views on the concept of law reveal confusion as regards the

[7] Since Hume is an empiricist, he reduces all concepts, including causation, to sense-perception, and derives knowledge of contiguity, succession, and conjunction between causes and their effects from sense- perception. As a result, he concludes that the necessary relation between cause and effect is inadmissible: there is no *law* of causation.

application of laws to the explanation he proposes. He accepts that the notion of a law as a sub-layer concept in nature plays a prominent role in real explanation (such as the laws of aerodynamics and Newton's laws). But elsewhere, Salmon reduces causal laws to casual regularities. Thus, we can distinguish two aspects of Salmon's explanatory project:

(1) Enforcement that has explanatory power at a deeper level, such as Newton's laws.
(2) The regularities in a variety of natural phenomena (such as the pre-Newtonian knowledge of the relationship between the tide and the position of the moon when placed under regularities that had no explanatory value (1984: 121).

In 1994, Salmon attempted to solve some of these problems; the theory of causal explanation he proposed (*the Conserved Quantity Theory)* avoids counterfactual conditions completely.[8]His approach to avoiding any counterfactual condition and epistemic dependence (the penalty of leaving aside the conversation law) could signal the beginning of skepticism. But we know that laws and explanations are intimately related, and laws often have a prominent role in the statements that scientific investigation formulates as evidence.[9]In this section, we will offer an explanation of this.[10]

In general, it is clear that a law cannot be merely a general statement that does not refer to a specific time and place. For example, 'every gold piece weighs less than ton' is true of all gold pieces, but is not acceptable as a general law, because no law of science (a fundamental law of nature) can rule out the existence of a (perhaps man-made) piece of gold over a ton (Hempel, 2002: 69). To avoid such problems, philosophers consider general propositions expressing natural laws to involve a *counterfactual condition*: for example, from the statement that 'all gold pieces weigh less than one ton', we cannot conclude that 'if a stone is made of gold then it weighs less than one ton.' But if all paraffin candles melt in boiling water, we can conclude that a particular paraffin candle will melt in boiling water. The counter factual condition proposition is: 'if A, then there will be B' or 'if A hadn't happened, B wouldn't have ensued.' Empiricist philosophers believe that the experimental method is the way of investigating the truth or falsity of claims of this form. In contrast, rationalist philosophers like Rosenberg explain the

[8]Some philosophers have criticized the integrity of Conserved Quantity Theory, on the basis of a counterfactual condition theory. In this regard, Psillos, by giving some examples subject to the existence of processes that are just examples, believes that the counterfactual condition for causal processes is needed, if it is realized that this surrounds a conservative quantity (Psillos, 2007: 127).

[9]Laws generally divide into two branches, empirical and theoretical. Empirical laws apply have observable instances. For example, each wire conducting an electric current is an instance the empirical law. In theoretical laws, un-observables are taken to be the causes of observable phenomena: for instance, if asked why this wire conducted electricity, we would reply with reference to unobservable concepts like free electrons and the specifications of atoms. Theoretical laws offer a deeper layer of explanation.

[10] In discussions of the nature of scientific laws among contemporary philosophers, there are two main approaches: anti-realistic approach (Van Frassen) and realistic approach (Armstrong, Lewis). Without getting into the details of the conflict between these two approaches, here we have chosen a realistic approach. From this ground, Islamic philosophers (and many others) endorse the centrality of causation to laws and explanations (and hold, in addition, that the concepts of law and explanation are closely entangled).

truth of these propositions in terms of causal a relationship between the antecedent and the consequence in conditional statements. In other words, the counter factual conditions are restatements of causality (2005: 30). So, the reason why Hempel's formal model of explanation is still unable to present a correct and strong meaning of explanation is due to his lack of attention to the close relationship between law and causality. A law is something more than a concept of knowledge than expresses a generalized sense of regularity and predictability: it, like causal necessity, is a metaphysical concept. In other words, it is characteristic of any scientific law (formative) is that it is generally necessary. The realist account if the emergence of scientific laws proceeds in accordance with the following steps:

1. Use the principle of recognizable nature and causality(philosophy)
2. Examines specific examples (empirical).
3. Law of causal genesis (philosophical)
4. Causal necessity (philosophical).

Scientific laws combine elements of philosophy (that include *a priori* propositions) and empirical research (that include *a posteriori* propositions), to which stage 2 of the above sequence is dedicated. Unlike the other 3 stages, such propositions are not known with certainty; it is likely that future experiments will reveal that existing scientific laws do not hold. This does not rule out other philosophical axioms and statements.

To illustrate the above claims, consider the laws of Newtonian mechanics, which hold true only on certain understandings of size and speed. The following question might be asked: how is possible to make use of these laws (for example in industry) despite them being revocable laws? The answer is that scientists trust these laws due to their predictive power, which are due to necessary features. Most people know that scientific developments do not occur without philosophical presuppositions. On the other hand, scientists use induction and postulate the principle of uniformity, and this enables them to apply with findings to events in the outside world. However, it seems that we gain access to laws of nature through experimental methods, but this does not mean, as empiricists think, that to codify *laws* scientists need to study specific and detailed cases; scientific theories are subject to constant conjunctions of events, and cumulative tests are repeated. But the reality is that laws of nature involve inherent attributes and characteristics of persistent objects, whether they are tested or not (inherent attributes are qualities that are essential and necessary (like the oddness of the number 5).According to this realistic approach, science involves distinguishing between epistemic and ontological functions and the use of philosophical presumptions in formulating rules, in addition to the use of inductive methods.

To clarify the above claims, consider statements such as the following: 'The boiling point of water at atmospheric pressure is equal to 100 degrees Celsius; 'Iron a conductive material', 'Wood is anon-conductive material'. According to what was discussed above, these statements are true based on the universality of rules in the past, present and future about water, iron, and wood. Likewise, it is not possible to be fund water that its boiling point at atmospheric pressure is equal to no one hundred degrees

Celsius; iron that is not conductive and wood that is conductive in nature. This means, on this view of a law, that universality, necessity, and non-conduct violation are philosophical principles revealed in sensory experience and observation. Scientists have to use tools and laboratory instruments, and humans have designed the set to observe the inherent characteristics of objects, but the rules are not created by humans and are not disturbed by error testing (Chalmers 2006: 183). So what causes that scientific laws are not necessarily true in terms of this epistemic component. Thus, through the epistemological approach, scientific explanations have tight links with scientific laws and, considered empirically, are falsifiable. There is no room on this approach for necessity. In contrast, on the ontological approach, metaphysical/ philosophical principles play an important role in explaining the objective world and reality (including the metaphysical meaning of causality and the necessity of cause and effect). In the case of scientific laws, the use of philosophical principles of metaphysics is inevitable.

Ultimately, the relation between a cause and effect is a real and necessary one, and what leads scientists to suspect otherwise is related to the failure to distinguish ordinal and real causality. However, a different approach can be observed in areas subject to natural causality, such as Newton's first law of motion). In the experimental sciences, misunderstandings about causation and determinism on the one hand, and confusion between determinism and necessity on the other, lead to the view that the concept of causality is exhausted in the micro world. However, if we take a rational rather than an empirical approach towards causality, it is not necessary to change our attitude to the metaphysics of causation in a manner that must conform to our experience. The principle of causality is indeed an *a priori* proposition.

5. Conclusion

Wesley Salmon takes probabilistic causation to be an analysis of the basic role of causal relations in scientific explanation. In addition, he emphasizes the concepts of *process* and *propensity*, and takes these to consist in objective physical relationships. The argument I have presented has shown that if causality is reduced in this way, this generates problems that must be resolved. Islamic philosophy takes causality to be as a metaphysical and philosophical concept. Consistent with a realistic approach, realistic scientists use methods of *Inference to the Best Explanation* (IBE) in scientific research to discover the real causes of phenomena. Most philosophers believe that IBE is the basis of the activities of scientists. IBE involves providing the optimal explanation of phenomena, where the best and optimal explanations are those possessing the highest probability. Thus, when we are looking for a cause for given phenomenon, we should look for those causes that best explain the phenomena. In this context, the philosophical principles of causation and causal-effect necessity have a special place and are inevitable in the expanding field of natural laws. The fallibility of scientific advances is a result of the epistemic component of scientific explanations. However, there is no good reason to reject philosophical laws like the law of necessity. Salmon ignores the epistemic factor in the framework of induction that he proposes, as well as the metaphysical meaning of

causation, and this makes his account deficient.

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نقدی بر رویکرد احتمالاتی سمن نسبت به علیّت

خدیجه حسن‌بیگ‌زاده[۱]، سیدحسن حسینی[۲]

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چکیده

آیا می‌توان علیت را صرفاً به‌عنوان یک نوع مفهوم فیزیکی برگرفت و نه چیز دیگری. آیا می‌توان رابطه علّی را بر حسب واژه‌های احتمالاتی تحلیل کرد. سمن معتقد است می‌توان یک تحلیل فیزیکی از علیّت داشت، که در آن، روابط علّی برحسب احتمال عینی ملاحظه شوند. او مفهوم ضرورت را با مفهوم «تمایل طبیعی» جایگزین می‌کند. این یک رویکرد احتمالاتی است. رویکردی که علیّت را به مفاهیم فیزیکی تقلیل می‌دهد و سبب می‌شود مسائلی به پاخیزد. ما در پاسخ به این مسائل، در موضع فلسفهٔ اسلامی به علیّت می‌پردازیم که در آن، علیّت یک مفهوم فلسفی است و برخلاف رویکرد احتمالاتی ضرورت علّی و معلولی در آن، محفوظ باقی می‌ماند.

واژه‌های کلیدی: علیّت، الگوی مکانیزم علّی، مفهوم متافیزیکی، ضرورت علّی و معلولی، موجبیت.

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