Philosophy of Science and Al-Ghazali's Conception of Causality

Philosophical Analysis By Mashhad Al-Allaf

1. **The General Formula of the Principle of Causality**
2. **Analyzing the Relationship between Cause and Effect, The Nature of Impossibility.**
3. **Al-Ghazali: intrinsic powers, Intervening, and Miracles**
4. **Induction and the Uniformity of Nature**
5. **David Hume on Justifying Induction**
6. **Reichenbach and the Pragmatic Justification of Induction**

Al-Ghazali was the earliest philosopher to deny the necessary connection between the cause and its effect. His theory of causality had a great impact on the course of philosophical reasoning in the west. Nicolas de Malebranche (1638-1715) reflects this impact through his philosophy of Occasionalism. David Hume (1711-1776) also reflects this impact in his discussion of causality and the problem of justifying induction.[1] This issue became a central topic in philosophy of science. B. Russell presented an analytic approach of discussing it, while Herbert Feigl and Hans Reichenbach discussed a pragmatic justification of induction.

Al-Ghazali discussed causality in his book *The Incoherence of The Philosophers (1997)*, chapter 17, pages 170-181 to which I will be referring in my discussion.

From the opening of his chapter al-Ghazali clearly said:

"The connection between what is habitually believed to be a cause and what is habitually believed to be an effect is not necessary, according to us [al-Ghazali].

But [with] any two things, where "this" is not "that" and "that" is not "this," and where neither the affirmation of the one entails the affirmation of the other nor the negation of the one entails negation of the other, it is not a necessity of the existence of the one that the other should exist, and it is not a necessity of the nonexistence of the one that the other should not exist-for example, the quenching of thirst and drinking, burning and contact with fire, light and the appearance of the sun, death and decapitation, healing and the drinking of medicine, and so on to [include] all [that is] observable among connected things in medicine, astronomy, arts, and crafts."[2]

1. The General Formula of Causality

In order to understand what al-Ghazali saying we need to understand first causality.

Causality is the relationship between a cause and its effect. It might take this form:

If a cause occurs, then its effect must follow.

We can summarize causality by this general formula:

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[1] The influence of al-Ghazali on Hume in regard to the issue of causality is clear enough. Also Hume was acquainted with Islamic philosophy and Islamic religion, in his *A Treatise on Human Nature* (1739) Hume said: "To begin with contiguity, it has been remarked among the *Mohametans* [Muslims] as well as *Christians* that those pilgrims who have seen *Mecca* or the *Holy Land* are ever after more faithful and zealous believers than those who have not had that advantage." See R. Ariew and E. Watkins (2000): Vol. II. P. 270.

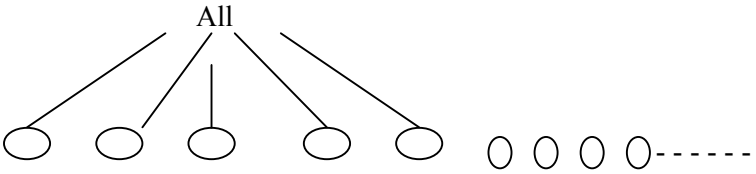
[2] Al-Ghazali (1997): p. 170.

(A) (B) [h (A) ----------► h (B)]

For every A and B the happening of A causes the happening of B. This formula is general enough to be applied in different scientific fields and we will call it the general scientific formula. In which the logical symbols can stand for different variables. Let us understand A as temperature and B as pressure of a gas. Thus, if you increase the temperature, then you will cause the pressure to be increased too. This is called Boyle's law. In which there is a causal relationship between the temperature and the pressure.

Or let A stand for temperature and B for expansion of metal, if you increase the temperature you cause the metal to expand. After doing this on different kinds of metals you can easily develop a simple scientific formula which says:

All metals expand by heating. This general formula is reached by a method of observation and experimentation, by which we moved from studying empirically many particular cases to a general formula presented in the form of "All". This method called induction, or to be more specific it is imperfect induction.



By this method scientists formed their most famous scientific laws and theories, and by this method too scientists claimed that these scientific theories are capable of predicting the future. Let us take this example, based on the general formula of causality: A stands for distance and B for gravity, then any change in the distance will cause change in the force of gravity; the longer the distance is the less gravity, and the shorter the distance the stronger the force of gravity. There is a causal relationship between the force of gravity and the reverse of the distance. This was summarized in Newton's law of gravity. Newton said: "to the same natural effects we must, as far as possible, assign the same causes."

In physics the formula of causality deals with the basic concepts of space, time, and mass. For example to find the cause of motion which is called force in physics we need to know the mass of the body, its first velocity and its second velocity, in addition to knowing the first time of motion and the second time, then the force can be calculated in this way:

$$F = M \frac{(V2 - V1)}{(T2 - T1)}$$

F= M x Ac (the second law in Newton's physics)

These equations help in knowing the motion of a body in a straight line, however, knowing the momentum (M=M x V) and the place of a body will help in predicting the motion of this body in the future.

But this specific physical formula has been criticized by W. Heisenberg in his principle of uncertainty, noticing that it is applicable in macrophysics but not in microphysics where it is impossible to measure both the motion and the position of an electron at the same time. Thus, we cannot predict the future position and motion of an electron with certainty.

2. Analyzing the Relationship between Cause and Effect
Let us go back to the general formula of causality in order to pursue further analysis.

The general formula states that:

If A (the cause) happened, then (B) the effect happens too.

In this formula we find three things:

- The cause (A)
- The effect (B)
- Relationship between A and B

What kind of relationship is this?

1. It is conditional; (if ….. , then……)
2. It is transitive; (if A causes B, and B causes C, then A is the main cause of both.)
3. It is asymmetrical; (if A causes B, it is impossible for B to cause A.)
4. It is temporal; (A, as a cause, precedes B, the effect, in time.)
5. Is it a necessary relationship?

Al-Ghazali answered: "No" it is not necessary.[3]

But if the answer were no, then how can we explain the continuous connection between the cause and its effect?
Al-Ghazali thought that the connection between cause and effect exists but has two aspects:

First, it is a habitual connection.
Second, it is not necessary.

Al-Ghazali said:

"The connection between what is habitually believed to be a cause and what is habitually believed to be an effect is not necessary, according to us. …it is not a necessity of the existence of the one that the other should exist, and it is not a necessity of the nonexistence of the one that the other should not exist."

In order to understand what he said I think we have to understand what he meant by "habitual" and "necessity" by giving an example of fire as the cause of burning cotton:

Al-Ghazali said:

'The first position of the philosophers is to claim that the agent of the burning is the fire alone, it being an agent by nature and not by choice-hence incapable of refraining from acting according to what is in its nature after contacting a substratum receptive of it. And this is one of the things that we deny.'[4]

[3] Malebranche and Hume, following al-Ghazali, would answer negatively too.
[4] Al-Ghazali (1997): p. 171.

Al-Ghazali replies to the philosophers:

The one who enacts the burning in the cotton, causing separation in its parts, and making it ashes, is God. As for fire, which is inanimate, it has no action.

And what kind of proof do you (the philosophers) have that fire is the agent of burning?

Al-Ghazali continues:

They have no proof other than observing the occurrence of burning upon contact with the fire.

Observation, however, only shows the occurrence of burning **at** the time of the contact with the fire, but does not show the occurrence of burning **by** the fire and that there is no other cause for it.[5]

It is clear that existence "**with**" a thing does not prove that it exists "**by**" it.

Al-Ghazali further explain the confusion in this issue by referring to the habit of correlating ideas by saying:

"The **continuous habit** of their occurrence repeatedly, one time after another, fixes unshakably in our minds the belief in their **occurrence according to past habit**."[6] (Emphasis mine)

According to al-Ghazali fire has no intrinsic natural qualities of burning, and cotton has no intrinsic natural qualities to be burnt. If it worked this way, then fire would always be burning out of necessity and cotton would always be burned, again out of necessity, and there would be no way to interrupt this process.

But we know that the course of natural happening some times is interrupted. Therefore, the connection between cause and effect is not necessary.

The philosopher replied that however, we know that they are always connected to each other.

To this al-Ghazali answered: the continuous connection between them that has been always observed from past experience does not justify that they are going to be necessarily connected in the future. In fact their connection, which is undeniable, due to a cause external to them acting upon them.

Al-Ghazali said:

Their connection is due to the prior decree of God, who creates them side by side, not to its being necessary in itself, incapable of separation. On the contrary, it is within [divine] power to create a sense of fullness without eating, to quench the thirst without water, and so on to all connected things.[7]

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[5] See al-Ghazali (1997): p. 171.
[6] Al-Ghazali (1997): p. 174.
[7] Compare with Nicolas Malebranche (1638-1715): as a Cartesian philosopher Malebranche dealt with dualism trying to solve the philosophical problem of the relationship between the two separate substances, i.e., mind and body. He offered the occasional approach that mind and body cannot interact but God enacts the motion of bodies only on occasion of corresponding mental processes. Thus, neither mental processes,

The philosophers denied the possibility of this and claimed it to be impossible.

So for the burning of cotton, for instance, when in contact with fire, al-Ghazali allowed the possibility of the occurrence of the contact without the burning, and he allowed as possible the occurrence of the cotton's transformation into burnt ashes without contact with the fire.

Al-Ghazali denied the *necessary* connection between cause and effect based on past experience; instead he presented the issue of *possibility* of different happenings in the future. In other word, the past experience cannot justify the necessity of future happening. There are possibilities that may or may not occur.

What does al-Ghazali mean by possible and impossible?

He said:

"The impossible consists in affirming a thing conjointly with denying it, [or] affirming the more specific while denying the more general, or affirming two things while negating one [of them].
What does not reduce to this is not impossible, and what is not impossible is within [divine] power [possible]."[8]

Causality is none of these three categories of impossibilities; therefore, the future relationship between the cause and its effect does not necessarily resemble the relationship that occurred in the past. Causality is not tautological and our knowledge about it is not a priori; causality belongs to the empirical experience. In the realm of empiricism there is no necessity that past experience will justifies the future happenings.

Al-Ghazali's discussion of Necessity and Possibility is related to two kinds of propositions: the analytic and synthetic.

The analytic proposition is true by definition and its negation is self-contradictory. Since its truth is obtained before experience it is prior to experience and is called a priori. Thus it is necessarily true. For example, one can say: "all triangles have three angles" and "all bachelors are unmarried." To then say a triangle has six angles is self-contradictory, similar to saying that a bachelor is married. You need no experience to prove the truth of such statements because they are true by definition. In this sense, a priori proposition is tautological adding no new information; meaning the predicate "has three angles" or "unmarried" gives no new information about the subject "triangle" or "bachelor," it only repeats what was already in the subject.

Thus, there is a necessity here but the proposition is analytic, it is about nothing but itself, while causality is not analytic and it is about a thing happening in the external world.

The synthetic statements are derived from experience, and the opposite of which is not contradictory, they cannot be true by necessity, their truth-value can be determined through

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nor bodily movements have any intrinsic natural ability to interact as cause and effect and God is the only working agent and the only real cause of all events by creating an occasion for one thing to affect another. The cause does not actually bring about its effect, but only presents an occasion on which God works to produce the effect.

[8] Al-Ghazali (1997): p. 179.

observation. Knowledge of cause and effect belongs to this type and thus has no necessity to be always the same.

Al-Ghazali said:

As for God's moving the hand of a dead man, setting him up in the form of a living person who is seated and writes so that through the movement of his hand ordered writing follows, [this] in itself is not impossible as long as we turn over [the enactment of] temporal events to the will of a choosing being.
It is only disavowed because of the continuous habit of its opposite occurring.[9]

3. Al-Ghazali on Miracles

Al-Ghazali's attempt to establish that there is no necessary connection between cause and effect was intended to prove that miracles are possible and God can intervene in the natural setting of causes and effects, producing results that did not exist in past human experience. This intervening is called miracles. If the connection between the causes and effects is necessary and is due to their intrinsic powers, then breaking this connection would be impossible by God, and miracles would be impossible too. Our knowledge in regard to the connection between causes and effects is entirely coming through past experience and through induction, and we cannot be certain that the future will resemble the past, and there is no certainty in inductive reasoning, also there is no logical impossibility that the future could be different from the past.

4. Induction and the Uniformity of Nature

Induction is possible because it is based on the connection between causes and effects, the latter is possible only because nature is uniform, and thus future prediction and knowledge can be based on past experience. But how do we know that nature is uniform? Is our knowledge about it a priori or a posteriori? Can we prove that nature is uniform by deductive valid argument or by inductive strong argument?

Some philosophers such as John Stewart Mill thought that the uniformity of nature can be established on the basis of empirical inductive knowledge, but this begs the question, because induction presupposes uniformity of nature in the first place, in order to make any generalization in the form of a scientific law.

Thus induction presupposes causality and causality presupposes the uniformity of nature.

5. David Hume (1711-1776) on Justifying Induction

According to Hume knowledge cannot go beyond experience, but his conception of experience is restricted and limited to sense perception. How much of knowledge, then, we can get from sensory experience about the principle of causality, and how we justify the necessary connection between cause and effect in order to justify future knowledge based on past experience.

Hume thought that there was no evidence for cause and effect relationships more than our perception of a constant correlation between two observable effects. In other words, Hume thought, as al-Ghazali mentioned before, that observation is the ultimate reference of this justification. But observation, as al-Ghazali pointed out before, is not sufficient to prove the necessary connection between cause and effect.

Hume divided human inquiry into two kinds of propositions:

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[9] Al-Ghazali (1997): p. 180.

First, Relations of Ideas, such as 3 x 5 = ½ of 30 expresses a relation between these numbers and has dependence on the knowledge of the external world, the opposite of which is contradictory.
Second, Matters of Fact, such as the sun will not rise tomorrow. This proposition implies no contradiction with its opposite that the sun will rise tomorrow. It depends on observation.

But the assurance that the sun will rise tomorrow is only based on past experience and on "the record of our memory" and all reasoning concerning propositions that are related to matters of facts seem to be founded on the relationship of cause and effect.

This relationship of cause and effect alone can go beyond sensory experience and the record of our memory to predict an occurrence such as the sun rising tomorrow. If you ask what kind of assurance that we have for such a prediction, the answer would be that we have it in the record of our past experience.

Hume emphasizes that this is not a priori knowledge, meaning it is not necessary for the cause to produce the effect, it is only related to induction and observation of the past but through which we can not predict the future with certainty.

6. The Pragmatic Justification of Induction

In order to establish that the future will necessarily resemble the past, then we have to establish that there is a necessary connection between the cause and its effect. But this is only based on induction; therefore, we have to justify induction as a valid basis for scientific knowledge.

Induction can be justified by either deductive valid argument or inductive strong argument. However, deductive valid argument is impossible here because its conclusion can make no factual claims that were not already included in the premises, but knowledge of the future is not a factual claim. Therefore, deductive argument cannot justify induction.[10] Then could we justify induction by an inductively strong argument?
If we do so, then we beg the question, because to assume something to be true that is needed to be proven to be true is a fallacy. The main question was how to justify induction in the first place, then how can we use something unjustified to justify itself?
Herbert Feigl and Hans Reichenbach tried to offer a pragmatic justification of induction. According to Reichenbach:

If any scientific method were guaranteed to be successful, then it would seem rational to accept induction as being successful.

"Suppose that you were forcibly taken into a locked room and told that whether or not you will be allowed to live depends on whether you win or lose a wager. The object of the wager is a box with red, blue, yellow and orange lights on it. You know nothing about the construction of the box but are told that either all of the lights, some of them, or none of them will come on. You are to bet on one of the colors. If the colored light you choose comes on, you live; if not, you die. But before you make your choice you are also told that neither the blue, nor the yellow, nor the orange light can come on without the red light also coming on. If this is the only information you have, then, you will surely bet on red. For although you have no guarantee that your bet on red will be successful (after all, all the lights might remain dark) you know that if any bet will be successful, a bet on red will be successful. Reichenbach claims that scientific inductive logic is in

[10] Or simply because every thing in the conclusion of a deductive valid argument must be already in the premises, but the future is not included yet.

the same privileged position vis-a-vis other systems of inductive logic as is the red light vis-a-vis the other lights."[11]

Reichenbach presented his attempt of rational justification of induction on the basis of uniformity of nature.

1. Either nature is uniform or it is not.
2. If nature is uniform, scientific induction will be successful.
3. If nature is not uniform, then no method will be successful.

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4. Therefore, if any method of induction will be successful, then scientific induction will be successful.

This argument is deductively valid. Its first and second premises are both known to be true. How does Reichenbach then support his third premise as true?

Reichenbach said: " Suppose that in a completely chaotic universe, some method, call it method X, were successful. Then there is still at least one outstanding uniformity in nature: the uniformity of method X's success. And scientific induction would discover that uniformity. That is, if method X is successful on the whole, if it gives us true predictions most of the time, then sooner or later the statement "Method X has been reliable in the past" will be true, and the following argument would be judged inductively strong by scientific inductive logic:

Method X has been reliable in the past.

Method X will be reliable in the future.

Thus, if method X is successful, scientific induction will also be successful."[12]

This argument tends to establish reliability or workability, however it begs the question: how to justify that it will be *necessarily* reliable in the future.

[11] Skyrms, Brian (2000): p. 46. Also see H. Reichenbach (1938) *Experience and Prediction.*
[12] Skyrms, Brian (2000): pp. 46-47.