

**Metaphysical Aspects of Science: An Example of Causality.**

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The current research sought to raise some issues related to causality. It dealt with various forms of causality and led to the conclusion that those forms of scientific causality could not reflect stretchy nature of causality concept. It is argued that another form of causality may be raised to reflect the possible act of correlations among events, actions or orders. This concept is called contextual causality. This paper attempted to set up arguments showing that deep relationship between context and its manifolds and the process of correlation between manifolds. Finally, it is provided new theoretical framework needed to find answers to new epistemological and metaphysical issues followed due to contextual causality.

## Introduction

It has been shown through history of science that every possible advance is due to the right one acquires to suspect and the right to raise doubts. In fact, most men do not have the intellectual capacity to walk in a different path apart from familiar context of analysis and thought. However, those who dare to raise doubt must expect troubles from all those who have dogmatic way of thought and analysis. Therefore, this paper is a philosophical endeavor to raise different problems that may offend most men who do not challenge new ideas that may open new paths of research. There is a historical famous example reflecting challenges that may encounter those who dared to take inquiry to unfamiliar direction. "When we speak of anything as "free," our meaning is not definite unless we can say what it is free from. Whatever or whoever is "free" is not subject to some external compulsion, and to be precise we ought to say what this kind of compulsion is. Thus, thought is "free" when it is free from certain kinds of outward control which are often present. Some of these kinds of control which must be absent if thought is to be "free" are obvious, but others are more subtle and elusive". (Russell,1922:13).

It was Hume who thought in causality in different way. He was the first philosopher ever who dared to raise doubt over the concept of causality and the intellectual bases on which thinkers unquestionable claimed that causality is an intellectual principle that emerges as a reflection of the dynamic processes of our mind. "Hume proceeded primarily from a single but important concept of metaphysics, namely, that of the connection of cause and effect". (Kant,1912, P.15). It was Hume who took the concept of causality to another different direction apart from the causal and traditional approach of analysis. This serious attempt of philosophical effort compelled Kant to confess that it was Hume, who waked him up from his dogmatic slumber. (Kant 2004, P.7)

"Nevertheless, I venture to predict that the independent reader of these Prolegomena will not only doubt his previous science, but ultimately be fully persuaded, that it cannot exist unless the demands here stated on which its possibility depends. He must confess that a radical reform, or rather a new birth of the science after an original plan, are unavoidable. however, men may struggle against it for a while." (Kant, 1912, P. 4). The importance of Hume's way of thought was that he could present a new different conception of causality differs from what was prevailed at his time. He claimed that there is not a single evidence leading us to think why in consequence of the existence of one thing, another thing must be necessarily existed. It was Hume who reflected the delusion of concept formation process that was raised by the rationalists. He could show the process of concept formation namely causality that is nothing more than a process of association as a result of psychological habit. By the law of association, Hume could change the reference point of the principle of causality analysis by shedding light of its subjective nature instead of objective nature. Kant indicates that. "Hence, he inferred that reason had no power to think such, combinations, even generally, because her concepts would then be purely fictitious, and all her pretended a priori cognitions nothing but common experiences marked with a false stamp". (Kant, 1912, P. 4).

The most important lesson that one must learn from Hume's perspective of speculation is to appreciate both the value of doubt and new suggestions that may lead to new epistemological problems and new attitudes of thought. The question was not about whether the concept of causality was necessary for our knowledge; however, whether it could be thought by reason a priori and reflectively it implied an inner truth of all experience. We are trying here to present a similar attempt of criticism by shedding light on the origin of the concept of the causality taking it to different angles of analysis. This is what I call contextual causality, its conditions of the use and the sphere of its valid application. Respectively, our concern here will be paid to the nature connections between cause and effect and new epistemological problems that may raise as it will be shown via our arguments and discussions throughout this present paper.

### **Nature of Causality:**

Causality is a principle that reflects a form of relationship between two simultaneous events. The former event calls "the cause" brings the later event to existence that is called "the effect". When one experiences two objects or events (A) and (B) where (A) causes (B) falling from height leads to death of B or if A drinking no water is (A) leads to dehydration state of an object that is (B). The former example is a causality in its positive meaning where the existence of A brings about the existence of B. it refers to the positive presence of cause A leads definitely to the effect B. Meanwhile, the latter example refers to the negative absence of A brings about the existence of B that reflects causality in its negative meaning. For more clarification, few issues are discussing here:

Ax is constantly conjoined with Bx.

Bx follows Ax and not vice versa

There is a necessary tie between both Ax and Bx and this leads to developing a belief that whenever A takes place, then B must follow.

There is an epistemological and an existential precedence of a cause over an effect where A has logical priori over B and on the other hand, A existentially does proceed and comes before B.

It has been always arguing that two contiguous objects or two successive events are constantly conjoined or succeeding one another in a certain order where both cause and effect cannot be changed. Both scientists and philosophers have interest in the problem of causality, since as a concept; most people consider causality as a process that implies a simple common sense about conjoining and relationship between objects. In fact, we need more than common sense to prove that A is the cause of B. For instance, in our world, most people have a belief that X is the cause of B. An example of that wrong belief of correlation what naïve people from one side, and both scientists and philosophers from another side thought concerning the movement of the sun around the earth. Causality is about an evidence not about common sense, we need a process of deductive reasoning to trace the epistemological problems that bring about when one starts discussing both epistemological and ontological aspects of the principle of causality.

People used to draw one direction or path where the process of correlation takes place. In fact, people did not get used to take the process of conjoining to different dimensions where conjoining can be reconsidered from other angles. There are different types of causality such as linear, sequential, or circular where correlation between cause and effect can be explained. However, this paper suggests a new path where causality can be presented in new form that gives the process of correlation different dimension. This is what we call here contextual causality. Does the nature of both cause and effect remain unchanged when the circumstance of conjoining remains unchanged, or the nature of cause and effect does change even when the circumstance of conjoining are unchanged? Here we find ourselves discussing what we call "contextual causality" as a new reflection to analyzing the principle of causality that will be discussed latter.

### **New Epistemological Explanation of Causality:**

As we said earlier, people got used to deal with causality and the correlation between cause and effect as a postulate or presupposition that is obvious and understandable. It has been claimed that when A exists then B must follow under certain conditions. However, what we are trying to present here is the claim that such a presupposition is not necessarily truthful. Since the nature of causal correlation may be vary depending not on the elements themselves, either it is A or B but, as it is argued here, but it does depend on the context itself. This context draws the nature of correlation and its direction from one side, and it determines which element of the series does form the cause and which one does form the effect.

The present paper raises "contextual causality" to refer to the nature of correlation and its direction that is determined through the context itself, where the interaction takes place, not through the manifold but through the structure or the context itself. This view reflects and represents structural idealism; a philosophical approach that we developed and adopted from one side and has been implementing in our analyses and reflections to different issues related from another side. (Hassan,2007,P.83& Hassan,2014 ) There are different sorts of causality for instance linear, circular and sequential causality. These sorts of causality try to reflect the nature of correlation between cause and effect and its direction. What are the conditions that give each type of causality its characteristics? Let us discuss the types of causality and investigate its epistemological aspects.

## 1- Linear Causality:

Linear causality defines as a form of correlation where a cause precedes effect, and it has a straight direction link between cause and effect. In addition, cause always epistemologically proceeds effect linear causality. Linear causality indicates that correlation between cause and effect moves from one direction that cannot be reversed. (See Smith,M& Karam,E:2018.) It always moves from A as a cause to B as an effect and this direction cannot be reversed B cannot be a cause for A.

For example, Newton's laws of motions are classified under this type of causality. Newton's law of inertia states that a body continues in a uniform motion along a straight line unless it is acted upon by a force. The force is the cause of the motion of the body. In addition, newton's second law that states a body acted upon by a steady force suffers constant acceleration. His famous example of a ball rolling down a plane has constant acceleration which means that the force of gravity is considered to be the cause of acceleration.

Linear causality has a unique characteristic that effect can be traced to the cause. In addition, it shows that there is only one cause and one effect, which gives it its unique characteristic. For instance, an unfamiliar epidemic causes a change of color skin, or 11th September explosion is the cause leading to the death of hundreds of people. Linear causality is found not only in both exact sciences and social sciences but also in daily life. For instance, when we see a stone thrown by a boy causes a break in the front window. Another example when someone crosses the road, and a car hits him leading his left leg to be broken.

Linear causality can be traced also in different aspects of our daily life. For instance, in military training of young youth, their behaviors and actions can be reduced to the officer's commands that form their actions. In this example, young youth have nothing to do than to obey and to meet all the officer's orders. The action here in this context is moving in linear form from the officer's order towards young youth' behaviors. The same understanding can be traced in any process that requires act of obligation. From these former examples, we can deduce the epistemological and metaphysical characteristics of linear causality. The question now, what are epistemological and metaphysical characteristics of that form of causality that calls linear causality? It is indicated here to the followings characteristics that reflect the nature of linear causality that are the following:

### On Epistemological Aspects of Linear Causality:

**A-** Ontological and epistemological precedence of cause over effect, where cause logically precedes effect temporary and spatially. For example, the father is the cause of his son existence. Here it is claimed that a father temporary and spatial precedes a son. On the other hand, the order that is given by the chief to the employer temporarily proceeds the action of the employees leading to the outcome. This nature is ascribed to linear causality, however this is not entirely right since this correlation varies depending on the context itself where there is possibility that effect temporary and spatial exists before the cause itself as we will show through contextual causality.

**B-** Irreducibility is based upon the former one and follows it. In other sense, the cause epistemologically or metaphysically precedes the effect and accordingly it is impossible that effect precedes the cause. The path of correlation moves one-way direction starting from cause to effect. According to that familiar view, it is difficult to think in different way if A is cause of B, then it is unimaginable B is the cause of A. For instance, if a bullet has been launched from a gun toward a specific goal that is George, then the bullet that penetrates George's skull leading directly to cause the death of George.

This correlation between A and B

cannot be reduced inversely. In previous example, if the bullet is the direct cause of George's death, irreversibly George's death can never be a cause of pistol shot. In other sense, if the father is the cause of son's existence, irreversibly son's existence cannot be cause of father's existence. People think argument of irreducibility is irrefutable, however, we are going to show weakness of irreducibility argument throughout contextual causality.

**C-** Logical Necessity refers to the fact that same cause must necessarily produce same effect. It also refers to force of cause that may impose upon the object proportionally matches the intense of effect. The more the force is strong, the more intense is the effect and vice versa. In addition, necessity refers to the fact, same cause leads to same effect with no exclusion. When we say the rain leads to growth of grasses. It means that fall of rain necessarily leads to growth of grasses. It also follows that if amount of rain in two areas are the same, it is supposed that size of growing grasses is the same. For instance, if we have two dates seeds had same water supplies, and had same temperature and same soil conditions, does it lead us to raise the following question is it necessarily to have two typical dates trees? In other words, if it is claimed that same conditions lead to same conclusions, according to that understanding, two dates trees must be



corresponding or producing same number of dates. Respectively, the answer must be positive. When the conditions are same, then same qualities must be produced. However, it will be argued, it is not necessarily same cause leads to same effect but it may produce something different.

**D-** Relationship between cause and effect is determined by temporal sequential events where the former event temporary precedes the following event.

Accordingly past event always precedes the present event, and it represents its own cause while present event represents an effect. (Mcglade, J: 2014, PP142-143).

For example, when someone sets a plan all the actions following are effects of the planning action that came into existence in the first place and that is considered as a cause of the following actions. Another evidence of temporal linear causality antecedent generation is the main cause of the existence of successor one. If antecedent generation is, A and successor generation is B, then A is always the cause of B. Another example indicates to that characteristic, when a student sets up a plan to study his lessons and arranges his timetable, it is considered to be a cause of his academic achievement and success. This state leads to argue the main reason for student to pass his exams successfully is his timetable plan. We find such concept implies some contradictions leading us to raise contextual causality since it tries to go beyond such contradictions implied in theoretical framework. Our argument concerning contextual causality is based on showing there are both ontological and logical possibilities for B as an effect to be a cause of A as a cause and not necessarily that A is always the only cause of B as it will be shown later.

Let us now discuss another type of causality that is called circular causality where circular causality shows mutual interactions between two objects or events. What are epistemological and ontological characteristics on which the concept is based and implemented in scientific literatures.

It depends on reciprocity between both cause and effect. In other sense, there are mutual interactions of cause and effect. For instance, if A is the cause of B, therefore B yields back indirectly to have an influence on A. (Yang A., Peng C& Huang N:2018,P.2). This task makes the difference between linear causality and circular causality investigating the relationship between cause and effect indirectly. In respect to that dissimilarity, linear causality can be named mechanical causality where a cause always leads to an event not vice versa and where the cause epistemological and ontological precedes the effect. This type

of causality is a simple and a direct form of correlations. On the contrary, circular causality is a complex form of causality comparing. (Campbell, D.T:1974:179-186). Therefore, the interaction takes place with circular causality in loops not in lines as in linear causality. Within a system that has different parts, there are possibilities and chances of causal and mutual dependencies that may occur between A and B or vice versa in any form of mutual correlation. It is argued that there are three types of circular causality that are declarative, semantical, and operational. (Massimo, B, Tiziana, C & others 2015: pp1-20).

This understanding can be traced in contextual nets where the main role imposed by asymmetric event structures. In that view, symmetric conflict is replaced by a relation modelling asymmetric event structures that are used to represent a new type of dependency between events arising in contextual nets. It can be deduced from the earlier indication that the nature of cause and effect does not ascribe to the element of the system or structure but on the contrary, it does ascribe to the system itself. The system draws series of mutual dependencies and respectively deciding which element of a series plays a role of cause and which one plays the role of effect. For instance, in physical world, the movement of a body is a cause of velocity but after while velocity of that body affects in the movement itself. The more the movement is speed, the more velocity of the body measured and vice versa after the body feels fatigue, it reduces velocity and accordingly the movement reduced simultaneously. Another example is the disputation over evolution argument raised by Darwin. What is the cause of natural existence whether it is created or evolved? Does it refer to an external cause or does it refer to an internal cause? It is an argument similar in its theoretical structure to the discussion regarding the chicken and the egg challenge. If one thinks the nature is created by an external cause that is God, then all creatures are products of God will and providence. This view forms the base on which both theologians and theists built their arguments defending the idea of creation and concluded that the hen must come into existence before the egg. On the contrary, atheists disagree with creation argument. They believe, it is the force of evolution that causes such variety of natural products leading to that variety existing in nature. It is the power of nature, that generates various forms of species, depending on the process of evolution and natural selection. It follows those religious verses need to be reinterpreted respectively to the theoretical approach that one adopts to solve that argument. (Smith, Z & Arrow H: 2010.PP 48-61)

Here comes the importance of what we call contextual causality, as we will explain later. In addition, in epidemics, one virus affects negatively on a

bunch of cells. Here A causes a disease of B, but after the body has a dose of plasma, the body gets a necessary immunity allowing the body to affect virus where it loses its effects on the body and having no more power and effect on the body. Circular causality is commonly applied in different branches of science and various fields of life. (Witherington D.C. 2011, PP. 66:68).

For instance, counseling and psychotherapy is a domain reflecting circular causality. For instance, the relationship between the agent and the counselor reflects that kind of causality. Circular causality can be traced effectively when a counselor seeks to give a plausible explanation for agent's behavior. For instance, a counselor may use group therapy sessions for rehabilitating behavioral problem of an individual who suffers definite form of disorder. In this case, a counselor depends on group therapy sessions where he allows to a group of individuals who do suffer from same disorder to share their own experiences with his agent. The aim for such sessions is to give an opportunity to behavioral changes to take place over both his new agent and other clients with same disorder.

On the other hand, the agent who suffers from behavioral problem, within such group therapy, he has an influence over individuals who have same disorder respectively. He may have an influence on them, and he may be an effective cause towards changing their own behavioral problems and beliefs. In this manner, changes take place in mutual way as planned by a counselor himself. Individuals may have an influence on the agent, the same agent comes later and by transferring his own experience, he affects individuals. Here the counselor succeeded to bring about this form of mutual influence to lead behavioral changes of his clients. In accordance to the above mentioned, it is necessary to ask, what characteristics of circular causality are giving it its unique feature?

#### **Aspects of circular causality:**

**A-** Evenness it indicates to the fact that both alternatives, either cause or effect, are ontologically equal. Both alternatives have equal chance to affect the other and to lead change upon another alternative. This is a main difference between linear causality and circular causality. For instance, in linear causality when we say the father is the cause of son's existence, it is father who is ontologically precedes the son's existence not vice versa. While, in circular causality two alternatives have the same chance to be either a cause or an effect. For instance, two friends George and Peter are driving a car traveling to another city, while

driving on road, they had a car crash and the ambulance left both to the hospital. George was in dire need for blood transfer and his friend Peter donated with two liters of his blood that is similar to George's blood. After Peter saved his friend's life, Peter suffered from concussion and brain bleeding which requires blood transfer that has been done through George who feels well now and finds it is his duty to help his Peter. In this example, we encounter two objects have same and equal chance to be a cause for another. It could be Peter who needed blood transfer instead of George as a result of car crash. Both Peter and George are potential cause to each other, and both have ontological equality to play the role of cause. It depends on the context itself which gives one alternative the priority to be a cause and it replaces its function later to be an effect instead of being a cause and vice versa in the same context. Another example reflecting ontological evenness characteristic is an example showing two opponents are fighting together using a sharp instrument where each one of them caused a fatal injury to his opponent. The fight ended up with a result that both of them were killed due to that fatal injury. In that example, we can clearly see that A is the cause of B death and in the same time, B returns to be the main and the only cause of A death. Both alternatives are ontologically equal to each other no one comes after the other alternative, but both have the same chance to be a cause, and both have an opportunity to lead towards a death of the other. Here it is claimed that both variables are ontological evenness, and both are equal in respect to ontological precedence to be a cause. Let us discuss another example showing the ontological evenness of mutual causality.

The present example reflects the nature of processes and operations taken place these days in the field of bioethics and the procedures required. For instance, a young man wants to be a single father, so he decided to go to the Egg bank to choose two different eggs from two different female donators with different races that he likes with no discrimination and no priority. He must choose one egg and keeps the other frozen for years. He randomly chose X to get fertilized where he got a boy has a mixed feature. The father looked after his son and due to the father illness, he wrote his will stating that his son must get Y frozen egg fertilized to earn his wealth. Here the son brought his late father's wish into existence. When we think critically about that example apart from its ethical side, we can clearly see that both X and Y had equal chance to get fertilized by the late father. Both eggs had same ontological evenness to come into existence after that part of X egg that was an effect earlier with the father, turns to be a cause of Y. Here there are reciprocal effect of both alternatives and same ontological chance to be the cause of each other. Let us now discuss the second characteristic of mutual causality.

**B-** Epistemological Symmetry is relatively related to ontological evenness. Both alternatives have the chance to precede the other and have logical necessity to lead the changes taken place over the other element. Every single element of the system has the chance to affect the other element of the chain and the element having logical priority to come first, becomes the cause of the other element. The opposite way of thinking also takes place here, the effect may have the chance to precede and having logical necessity to replace its position in the chain from effect to be a cause. For Example, in experimental studies, the researcher seeks to study the effect of a variable on the other variables measuring its impact. Therefore, he selects a variable to measure its effect the independent variable while the other variable that be affected is called a dependent variable. Respectively, when a researcher designs an experiment, he sometimes restores to mutual effect of variables. This methodological procedure means that if the study has two variables X and Y, then the researcher designs an experiment where X plays the role of an independent variable and measuring its effects on Y. On the other hand, he redesigns his experiment to select Y to play the role of an independent variable while X returns to be a dependent variable. Both variables represent epistemological symmetry and have chance to mutually affect each other .

**C-** One of the unique characteristics of circular causality is repeating pattern. The pattern that organizes the nature and relationship between variables of the system from one side and the system of interaction itself where the correlations take place between its elements. It is a relationship, reflecting a nature of correlation between a system that is holistic and invariant from one side and its manifolds that are particulars and variant from the other side. Association between manifold within the structure leads to a pattern describes interaction between manifold within the structure. It is claimed the pattern of interaction is not constant and does not draw a specific form of correlation that is irreversible. On the contrary, the pattern that organizes the relationship between elements of the structure is flexible allowing its elements to associate variously depending on the path of correlation that is a sign or equation categorizing as an invariant. Respectively circular causality is as double-faced causality classified as a mutual causality if correlation is exclusive to two variables forming the pattern giving them its uniqueness. Besides, pattern of correlation classified as a sequential causality if correlation is inclusive dealing with more than two variables. This form of causality is a transitive causality. For instance, if A causes an effect to B within a certain form of determinates and in certain order,

then type of causality is transitive form of causality. A transitive causality is a sequential causality, and it will be discussed later. What distinguishes between linear and mutual causality depends on the relationship between the system and its manifold. Ontological status and logical necessity based on relationship between the system and its elements. (Hassan, 2007, P. 132).

### 3- Sequential Causality:

Sequential causality reflects a certain type of correlation depending on pattern of order and arrangement among manifolds. Sequential causality is defined here, as a form of causality referring to patterns of order that based on steps in a process or event that grounded on an order. (MacArthur D. G, & others: 2014, pp 469–476).

But events and processes could be arranged in steps but the order organizing arrangements among its elements, can be different. It is important to distinguish between sequential order and chronological one. The last one refers to the process where elements take place in order of time itself. While the former refers to steps in a particular process. Chronological order points out to the fact that events may be ordered chronologically either by going forward in time or backward in time. For instance, a group of steps are constructed together to produce a final product. As in scientific experiment or in industrial product, the result of experiment or outcome of industrial process can be ordered either forwardly in time as A leads to B and that leads to C and so on. Or backwardly in time by saying that the final product that is C brought up by B and B brought up by A and so on. These steps are arranged using a reverse chronological order. Sequential order points out to steps in a process or event mechanically where the target is focused on association of steps sequentially apart from any other invariant like time for instance. When someone gets in a car and presses a start engine switch electrical power transfers to generate mechanical power leading a movement and so on. It is a series of steps are organized in a certain sequentially order. Another example one's life is a group of stages that entirely depends on each other from birth as a step to infantile, passing through childhood, to adolescence, up to adulthood to elderly and these steps end up to death where the sequentially of the life chain stops. For instance, A either affects B either positively or negatively. This effect does not stop in the interaction between A and B but may goes beyond B and affects what it follows. In the development of a baby, he or she may eat or drink a toxic substance that may not affect his or her present stage of development but may go beyond that to affect his entire life. Sequential causality does not work apart from other types of causality. It is

partly a form of circular causality. Therefore, I argue that one can distinguish between two forms of sequential causality.

**A-Closed sequential causality** is type of sequential causality is a form of circular one because it starts from one element that is a direct cause of next effect, and this effect will be a cause to what it follows until we reach to premier element of the series of interactions. Here interactions move sequentially from A to B from B to C from C to D from D to A. This is a circular causality has a sequential nature. For instance, if a son behaves good, his parents usually ignore to reward him for behaving well, the parents' negative response affects son's behavior that turns to be violent and brutal. Such cruel behavior let parents to pay more care and attention to their son, the parents' care and well attention led their son to behave well and showing good manner once again.

**B- Opened sequential** is a continuous chain of steps based on each other. One-step leads to another until dynamic interactions between the elements of a system are motionless and inactive state. This form of causality may be stopped deliberately as in mechanic systems, or it may be self-sustained as in evolution raised by Darwin or in creation as theists tremendously advocate argument of creation. (Darwin 1859). For Darwin evolution is a process evolves and changes over time due to changes in both physical features and behaviors. These changes lead natural organisms to adapt in new environment and help them to survive. For natural organism to adopt. It requires a series of causes and effects that transfer sequentially without loops in the series. it is a necessarily and natural order where changes take place by passing from cause to effect which in turn becomes a cause for another effect and etc. the most famous example effecting open sequential causality was Darwin's note on the evolution of the whale from a hunting bear. (Barnes,L.1984,P.21).

Although Darwin's assumption concerning evolution of the whale from wild mammals was criticized. However, some other research indicated to the rightfulness of Darwin's assumption through fossils. Flower pointed out there are similarities between wild mammals and whales (Flower, 1883: 180-181) It is claimed that whales are evolved from other extinct species as the following; Indohyus, Pakicetus, Ambulocetus, Rodhocetus, Dorudon and modern Balaena as shown in the following figure.

The modern whales and other mammals should be related to previously living ancestral species, through a process of “descent with modification.” In accordance to that claim the living organisms and ancestral ones refer to one



family. Van Valen in 1966 found evidences supporting such conclusion by indicating there was a kind of ties between whales and mesonychid condylarths ( primitive species existed millions years ago that were ungulate carnivores close in size to wolves ) depending on jaws features. New scientific evidences support such claim ( Van Valen,1966,P.126 ). See also Thewissen,J.G.& others,2007.P. 112).

These studies reflect what we call open sequential causality that is responsible for producing such forms of primitive wild mammals ascending towards whales. Besides, there is an inherent epistemological characteristic associated with open sequential causality. This is reversibility where sequentially can be accounted either from the first step as a progressive process or the last step as a regressive process. For instance, states of water vapor (gas) can be turned into a liquid state by a process of condensation and this later state can be turned into ice (solid) through a process of freezing. Here we can notice a process of progress ahead. On contrary, ice state can be turned into liquid by a process of boiling and this later state can be turned into vapor. This example from physics reflects characteristic of reversibility inherent in open sequential causality.

Another example reflects reversibility is devolution. It refers to changes taken place over organisms not progressively but regressively. Organisms develop and change to an inferior or less advanced creatures. Here we can see open sequential causality but starts from the last step upward to first step reversibly. The same view applies also to development of state or civilization. For instance, history shows that great civilizations or states grew up and developed through gradual steps and regular factors leading to its flourishing. For example, Islamic civilization developed as a result of certain factors each factor led to others upward constructing great Islamic civilization. For instance, religious factor and allies of Muslims led to political one, which led to economic one and so on. Reversibly is traced in decline of civilization where same factors and processes that led to development of civilization are nearly the same reversibly led to its declination. Sequential causality is either downward from first cause or premier step (completion) towards final step as in declination of civilization or upward as in its survival. There is a slight change taken place over sequential causality particularly in exact sciences comparing to humanities. Let us discuss another part of our argument that is called contextual causality.



### **Contextual Causality and Relativity of Perspective:**

Contextual causality is defined as "a form of association between elements where there is possibility for each element to associate with other elements differently in respect to the context determining form of association". In other words, contextual causality has nothing to do with temporal precedence of elements and which elements existentially precedes the other elements where the priority was given to the elements that existentially comes early. But every element of the context has a real chance to lead association between elements and respectively to represent the context itself. Accordingly, each element of context has a chance to be an invariant to represent the whole context. Linear, circular and sequential causality has a central presupposition that is a cause is always temporal and existential preceding the effect. This view led to another sort of preference that is epistemological superiority of cause over effect. In linear causality, one finds difficulty to imagine a cause becomes an effect since it precedes effect either ontologically or temporally. In addition, there is one chance for the cause becomes an effect or vice versa as indicated in a circular causality. Finally, there is a limit chance for the cause to be an effect or vice versa as in the case of sequential causality.

On the contrary, contextual causality offers an open horizon of associations giving opportunities for elements to enter into series of association depending on the invariance leading association. We claim there are two meanings of contextual causality can properly reflect its own nature. Causality of situational action based on daily interactions and causality of scientific action based on a philosophical and theoretical perspective called structural idealism.

A- Situational actions may take place randomly in daily situations where every element of situation has an equal chance to lead association and therefore the situation may re-arrange differently in respect to the invariant that will lead association. For instance, two commuters are on train during the travel each one of them keeps his glance on the window staring at objects and various animals in the farm while they are passing through. Although they are glancing at the same farm but each one has his own perspective " an invariant" where objects of the farm associated and led to a conception may differ from other commuter's perspective. This understanding well explained in the following example. It shows how one takes into account the context depending on the arrangements of elements. For instance, someone needs to travel to another city to meet his

relative. In this situation, association between elements are arranged depending on invariant he selects. These elements are the followings:

- 1- Transportation whether he travels by car, train, or flight.
- 2- The budget he can afford.
- 3- Time and atmosphere. It shows how timing is a factor in a process of plan and it relatively differs from a person to another depending on priorities along with nature of atmosphere at the time of travel.
- 4- Comfortability. It shows that stander of pleasure and enjoyment one gets during travel.
- 5- Occasion. Whether family duty, fun or regular visit
- 6- Who with. Whether traveling alone or with a person and expenses of travel.
- 7- Importance of person whom you meet.

These elements of the situation may associate differently in respect to the invariant one selects and to which he gives his priorities. Along that, a web of associations is created, and it shows the flexible nature of association. The following diagram shows the flexible nature of association.

We can notice from the previous example that the serial steps of association between those elements are determined depending on the selective element that is here is the invariant. For instance, if one chooses the price then it will represent his priority and the other elements will be arranged accordingly in respect to that invariant that is nothing more than the cause itself leading to creating effects. The same view is applicable if he chooses the importance of the person whom he visits that will be turned over to be an invariant and accordingly representing a cause of association. Here we can see the flexible nature of associations and the possible arrangements that can be created between the elements of the context. In other words, the context itself is transformable depending on the element that represents invariance of association. Another example of contextual causality that reflects the premier meaning that is situational action. Let us suppose that a young man who is about to marry and looking for an apartment to live in. there are few elements that play role to take his decision. Among these elements, the rent, how far from his workplace, services provided, comfort level and finally, his wife's will.

All those elements composing the situation where every element of that manifold has an equal chance to be an invariant that will lead association between elements. For instance, if a young man chose the rent and his budget monthly, he would give less concern about other elements. Therefore, the whole

situation will be formed in respect to the rent that is here representing an invariant of the action. Another different outcome can be derived if a young man chose to respond to the distance between his workplace and the apartment to be very close to save time and not to spend too much for transportation. We can see notice that every element has an equal chance to lead the association where the outcomes necessarily differ in respect to the invariant a young man chose according to his own decision and his ability to relate between elements of the situation. Let us now discuss the second pattern of contextual causality that is called causality of scientific action.

The second meaning of contextual causality can properly be discussed in the light of structural idealism. Structural Idealism is an epistemological account that can contemplatively reflect the nature of contextual causality. We discussed early epistemological bases of structural idealism and we indicated that structural idealism is an epistemological account that well fits recent views and applications in advanced sciences and future sciences. (Hassan, M. 2007 & also 2014) Therefore, advanced sciences and new applications of science led to untraditional view of analysis and synthesis of knowledge. Respectively, such development led forward to an open horizon of deduction and imagination that may go beyond the limits of reality and its objects. In respect to that view, we discussed two forms of structural idealism that are; Internal Structural Idealism (ISI) where its analysis is provided to reality and our experiences. The object of knowledge within ISI is restricted to the limits of our objective world and the product of that thought is measured by the limits of physical existence and can never go beyond it. Therefore, this view represents the objective world. On the contrary, Transcendental Structural Idealism (TSI) where the object of knowledge and experience does transcend the objective reality as shown in new fields of scientific research and investigation. (Hassan, M:2007 &2014)

The object of knowledge is pure object and pure possibility that is not conditioned by the limits of physical and objective world. Therefore, I have discussed earlier that the object of knowledge within Structural Idealism is pure object and mere possibility. The only difference in both versions ISI and TSI that object of knowledge is pure possibility dedicated within the limits of physical and objective world, while the object of knowledge within TSI is pure one that may transcend our objective experiences and the limits of physical realm. in other words, physical experience does not provide us with objects are not even existed and we have no experience about their existence, however we still have a belief that one day they will be existed and will be familiar for

individuals as we can trace such objects in fictions. Here the question remains how pure possible idea and its structure can have a chance to exist in the external world. In respect to that view causality can be represented and discussed in the light of structural idealism in its two versions.

We noticed earlier that scientific causality has a firm pattern where association between cause and effect has a necessary bond that is at the same time inflexible. An example of that is linear causality where cause has epistemological and ontological precedence over effect. The same view can be seen in both circular and sequential causality where the effect has a chance to play the role of cause and leads association as in circular causality or the effect has two chances if the chain of association contains three elements as we discussed in closed sequentially. On the contrary, contextual causality raises a form of causality differs from the above-mentioned types of causality, because every element of association has an equal chance to lead association.

On the contrary, contextual causality provides a theoretical framework to explain association between elements in stretchy way because association between elements here formed in respect to the context itself not any temporal or ontological precedence of cause over effect. The form of association is displayed in respect to the invariant one chooses to lead association. In the light of that view, the effect differs and determines because of invariant that forms the type of association between elements. Every element within the context has a chance to be an invariant of association. Let us raise the following example that shows the importance of context that determines the form of association. If we have two different watches having same design, same battery, same features and accuracy, then one watch remained as it is in the same circumstances and within the physical realm. On the contrary, the other watch has been taken to the external space. It will not well display itself; the time will be behind clockwise comparing to other watch that properly works within the limits of physical world. This present example reflects how context itself plays a drastic role in association. This understanding is a peculiar feature of contextual causality that supplies its elements with elastic and stretchy characteristics comparing to three types of causality that provide firm and conformity characteristics and does not put in its account the context itself and its changes taken place over it. This flexible characteristic is the peculiar aspect of contextual causality that transcends the limits of physical world and its temporal and existential conditions. The question to be raised now is how can we explain contextual causality in both exact sciences and humanities? Let us discuss the following examples on contextual causality from the perspective of structural idealism.

For instance, if we pick up an example in organic chemistry and look at the bonds among cells such bonds may differ, and form of association may alter in respect to invariant that one may choose to lead association between cells. A new transformation in the structure of bond will take place because the relationship between the individuals or cells changes in respect to that invariant. Under normal conditions, one notices that bonds between natural cells have a certain shape, while when we deliberately change normal condition by injection cells with new experimental vaccine never tested before, a new bond between cells will be formed. Even in the case of developing skins and face features, a physician injects cells with Botox substance. The results are not the same with every individual, the result is not necessarily identical, however, it differs in respect to the nature of cells, the age, patient with disease or not. Here, one can see the outputs depends on the invariant that dominates that determines how the elements associate and how possible the form of association could be. If the age is the invariant, then association "outcome" will differ from a young individual. On the other hand, if the individual with a disease, then the association may differ from a person with no disease. Respectively, this view offers a possible form of association, and the result should not be if A then B but if A then few possible chances for B.

An example reflects the flexible feature of association as raised by TSI is in the field of cloning and reproduction. In natural circumstance, parents are the cause of a child where they have both existential and temporal superiority over child that comes to existence later.

The following example reflects scientific imagination and is to be classified as a scientific fiction but raises a possibility of investigation that may change our view on scientific causality. It is argued here that structural idealism opens a possible door for new epistemological discussions that lead to raise new philosophical issues. one of these issues related to scientific causality that is epistemological and ontological superiority of cause over effect. For instance, a young girl wanted to keep her egg in eggs bank for future. This young girl got married and had a boy called William. Few years later, she could not have another baby due to health problem, so she asked her son William to go to eggs bank and fertilize her egg that kept it earlier. She had a condition, if William wants to inherit her wealth; he needs to fertilize her egg. Apart from its ethical aspect, William did exactly what his mother desired. Few months later, a woman who hired her to get pregnant with that fertilized egg, she gave a birth to a female baby. This female baby in fact, is William's sister and at the same time is

his daughter. Although her substance was older than her father, but her father who at the same time her brother is the cause of her real existence. In respect to that view, we have a case of what science can create in the future and such cases do lead an epistemological shift to our concept on causality. Since the cause acquired new epistemological and ontological characteristics will lead to a theoretical framework differs from philosophical literatures on causality. The cause becomes in the light of structural idealism a pure possible idea that has a probable existence that may be achieved in the future.

Another example reflects that nature of cause as raised by structural idealism is a flying car. Sometimes scientists think in a transcendental way in a sense that what they think about has no real experience supported by the physical world. In this context, the idea that has no evidence of its real existence is considered the cause of the physical object that will exist later even though it is not yet existed. In case of a flying car, there are different elements that may consist of the physical object such as type of engine, horsepower, type of tires, pattern of wings, weight, speed, shape and material of its components. Every element of this compound may consider an invariant that led the transformation and may affect the outcome of the flying car. Every single element represents a probable and possible cause that may determine the form of association between the other elements. For instance, if a scientist chooses the engine to be the invariant, it determines the type and size of tires, the material alloys forming the shape of car, and so on. Here engine is the cause that forms the association and brings the effect. This view may change, and we encounter a new different transformation if the scientist choses alloys forming the shape of car to be an invariant. In this case, we witness different web of relationships and accordingly association between elements. To that extent, we tried to indicate that it is the context, where the association between variables, has higher importance than shedding light on the variables and the process of association itself regardless of the context. This understanding raises new epistemological and ontological theses need to be discussed in respect to advanced research in science.

### **Conclusion:**

This paper presents a serious trial reflecting our concern about some problematic issues that new developments and applications of sciences may expose in our present days and future. To sum up, this paper seeks to give some insights on scientific causality, and we indicated to three types of scientific causality linear, circular and sequential. We tried to give some epistemological and ontological characteristics for each type of them. On the contrary, this paper

raised concept of contextual causality. We distinguish between two forms of contextual causality; situational action based on our daily interactions and scientific action based on a philosophical and a theoretical perspective called structural idealism. In the light of that view, we discuss some example and possible scientific experiences that need different explanations apart from those presented by former conception on causality.

It is concluded that causality in its traditional presuppositions encounters difficulties and challenges since its epistemological framework does not fit new developments in science. It is also shown that contextual causality has two meanings alternatively suit recent development in science. It is also shown that new concepts needed to be created to fit major challenges pop up due to development of science. Finally, it is suggested that structural idealism is capable to give a proper explanation to experiences and scientific facts since it deals with possible experiences and with an open range of probabilities, where concern does not be given to rigid relationships among manifold of series but the context itself that endows free associations among the members of the manifold that represents the science of our times.



## References

- Baldan, P., Corradini, A., Montanari, U**(2001:1-49) Contextual Petri nets, asymmetric event structures, and processes. *Information and Computation*.(171)1-49.
- Barnes LG.** (1984)*Search for the first whale*. Ocean's March-April; 17 (2): 20-3.
- Campbell, D.T.** (1974). 'Downward causation' in hierarchically organized biological systems. In F.J. Ayala & T. Dobzhansky (Eds.), *Studies in philosophy of biology: Reduction and related problems* (pp. 179–186). London: Macmillan.
- Darwin C.R.** (1859) *On The Origin of Species*. New York. Random House.
- Floor.W.H**(1883) *On the arrangement of the orders and families of existing Mammalia*. Proceedings of the Zoological Society of London. Aug (1):178-86.
- Geisler J.H. & Theodor J.M.** (2009). *Hippopotamus and whale phylogeny*. *Nature*. 458: E1-E4.
- Hassan, M** (2007) *Cassirer and Structuralism of Perception: an application of group theory to Gestalt* .PhD Thesis, Durham University, UK.
- Hassan, M** (2014). *Lecturers on Philosophy of Science*, Lambert Academic Publishing, Berlin.
- Hassan, M** (2014). *Scientific Models and Representation of the Objects: A Critical Attempt to Examine the Trustfulness of Michael Weisberg's Philosophical Account on Models*. *Humanities and Social Sciences Review*, Volume(8) Number(1). USA.
- Jonathan Wells,** (2017) *Zombie Science* (Seattle: Discovery Institute Press, 107-112. <https://evolutionnews.org/2018/07/from-bears-to-whales-a-difficult-transition>.
- Kant, E** (1912) *Prolegomena to Any Future Metaphysics*, edit by Carus, P, Third Edition, The Open Court Publishing Company, Chicago. U.S.A.
- Kant, E** (2004) ) *Prolegomena to Any Future Metaphysics*(Ed) Hatfield, G, Cambridge : Cambridge University Press.
- MacArthur D. G, T. A. Manolio T.A&C. Gunter.C**(2014) *Guidelines for Investigating causality of sequence variants in human disease*. *Nature* volume 508, pp 469–476.
- Massimo, B, Tiziana,C & others** (2015. *Models of Circular Causality. International Conference on Distributed Computing and Internet Technology*, Dept of Mathematics, University of Trento, Italy,1-20.



**Mcglade, J** (2014) *The times of History: archaeology, narrative and non Linear causality*. From Time and Archaeology(ed) Murray, T. Routledge.

**Nikaido M., Rooney A.P., Okada N.** (1999). *Phylogenetic relationships among cetartiodactyls based on insertions of short and long interspersed elements: Hippopotamuses are the closest extant relatives of whales*. Proceedings of the National Academy of Sciences U.S.A. (96)10261-10266.

**Russell, B.** (1922). *Free Thought and Propaganda*, Memorial Lecturer. Whatt &Co, London.

**Smith M., Karam E.** (2018) *Linear Causality in Family Systems Theory*. In: Lebow J., Chambers A., Breunlin D. (eds) Encyclopedia of Couple and Family Therapy. Springer.

**Smith, Z & Arrow H**(2010) *Evolutionary Perspectives on Religion: An Overview and Synthesis*. The Journal of the Evolutionary Studies, Volume 2(2), pp. 48-66.

**Thewissen J.G.M., Cooper L.N., Clementz M.T., Bajpai S., Tiwari B.N.** (2007). *Whales originated from aquatic artiodactyls in the Eocene epoch of India*. *Nature*. 450:1190-1194.

**Van Valen L.** *Deltatheridia*, (1966) *A new order of mammals*. Bulletin of the American Musuem of Natural History.132:1-126.

**Witherington D.C.** (2011) *Taking Emergence Seriously: The Centrality of Circular Causality for Dynamic Systems Approaches to Development*. *Human Development* (54), PP.66–92.

**Yang A., Peng C& Huang N** (2018) *Causal decomposition in the mutual causation system*. *Nature Communications* volume 9, Article number: 3378.

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