

QIYAS IN ISLAMIC AND MODERN SCIENCES

SOBHI RAYAN*

This study introduces a comparison between Qiyas (analogy) in classical Islamic sciences and in modern Western sciences. It sheds light on the similarity and difference between them. We notice that the modern theories of Qiyas depend on the Qiyas notion that was put by classical jurists, but differ from them in certain methods of application and agree with them in others. This large similarity between methods clearly points out the extent of effect of Islamic sciences on the development of Western sciences. Among the effects is the movement of Qiyas as an experimental method from Islamic sciences to modern sciences in the West.

Key Words: *Science, Islamic Qiyas, Analogy, Fiqh, Theology*

Introduction

This study compares between Qiyas (analogy) in Islam and theories of Qiyas in modern sciences and focuses on similarity and dissimilarity between them. The comparison depends on several modern theories that played a significant role in the development of modern sciences such as Francis Bacon's theory, John Stewart Mill's theory, and Dedre Gentner's theory. Besides, the study depends on Qiyas that was established by Moslem 'Ulama as a main scientific method in religious and natural sciences. Moslem scientists define Qiyas in the following way: "the specific partial thing can transfer its ruling to another partial thing as they share certain attribute, and that attribute imposes participation in ruling if certain evidence confirms it."¹ Al-Imam al-Ghazali defines it as: "attaching a certain event that has no ruling to a similar event that has a ruling in the ruling that is mentioned in the text, because the two events are equal in the cause ('illa) of this ruling."² Ibn al-Hajib says that Qiyas is equality of a Fari' (branch) with an Asl (Source) in the cause ('illa) of the ruling. The meaning

* Al-Quds University, E-mail: Sobhi.rayan@gmail.com

of Fari' (branch) is an image that is attached to another in judgment/ ruling due to the existence of an obligatory cause ('illa) of ruling. The Asl (Source) is the image to which the Fari' is attached. There is no obligatory role. Moslem jurisprudents call the Asl (Source) the place of agreement and the Fari' (branch) the place of disagreement.³

In his book *A System of Logic*, the British philosopher John Stewart Mill (1806-1873) looks for common and different attributes between two fields and classifies them into two different categories. He says that the Qiyas is "a competition between known points of agreement and known points of difference."⁴ Besides, modern theories of Qiyas depend on the same idea of Qiyas:" There is a general agreement that analogical reasoning that involves the transfer of relational information from a domain that already exists in memory (usually referred to as the source or base domain) to the domain to be explained (referred to as the target domain)".⁵

Genter says that "Analogical mapping is in general a combination of matching existing predicate structures and importing new predicates."⁶ In view of these definitions, it is possible to say that "The purpose of solving problems by analogy is to reuse past experience to guide the generation of the solution for new problems, avoiding a completely new search effort."⁷

It is noticed that the definition of Qiyas in modern sciences is identical with the Islamic definition as both definitions agree that the central idea in Qiyas is the transfer of information between two fields, which are the origin/source and the target, on the basis of the similar relationship between them. The source is the existing side and the target is the side that should be interpreted.

This means that Qiyas requires the existence of two similar fields, where the interpretation of the target field is done by dependence on the available information in the source field.

Although the definition of Qiyas in the classical and modern theories of Qiyas deals with the same idea, the theories differ and are distinguished in their methods of research and the ways that lead to solution. Therefore, this study tries to introduce modern theories in Qiyas and compare them with Islamic theories.

Francis Bacon's Inductive Methods (1561-1626)

Bacon is considered to be the first scientist who introduced a new experimental method in the European thought in his book: *Novum Organum Scientiarum* ('New Method', 1620). This method consists of three stages:

1. List of the present things, which is a list that includes the samples in which the phenomenon exists in various and different forms.
2. List of the absent things, which is the parallel list in which the phenomenon disappears. This state means that against each condition of 'presence' we should bring a condition in which the phenomenon is 'absent' regarding that specific condition, whether the condition of 'absence' is one or more than one.
3. List of gradualness in which we register the conditions in which the phenomenon increases and register the conditions in which it decreases.

It is noticed that these stages in Bacon's method had been dealt with by Moslem scientists in a deep and elaborate way in the ninth century. They put the methods of '*al-Sabrwa al-Taqseem* (examination and isolation of the attributes), and *Dawaran (rotation/ change co-extensiveness)*, which will be dealt later in this study. However, the difference between them is that Bacon believes that his method leads to certainty, while the Islamic theory is based on probability.

Bacon's importance in developing modern sciences lies in his refusal of Aristotle's method that is based on formal logic, and in his new method that depends on induction.⁸

The great similarity between Islamic Qiyas and Bacon's method is attributed to the effect of Islamic sciences on the Western thought, especially on Bacon, who had studied at Islamic universities in Spain, and had the merit of creating the experimental method.⁹ Probably, Bacon employed the studies of Ibn al-Haytham (965-1039) and the Latin translations of his works.¹⁰ Consequently, through his encouragement to the employment of experiments in scientific

research, Ibn al-Haytham played an important role in deciding the scene of modern sciences.¹¹

However, we find that Qiyas among Moslem scientists is more thorough and deeper than Bacon's, which can be attributed to the efforts of many Moslem scientists who worked on developing Qiyas during several centuries. Bacon's method was exposed to lots of criticism and objections and was considered by certain scientists as inaccurate and is merely bits of advice and instructions that are offered to the experimenter during the experiment or merely useful hints that help him in the course of the experiment.¹²

John Stewart Mill's Inductive Methods (1806-1873)

John Stewart Mill put five methods for Induction:

1. Direct method of agreement

This method maintains that we have to wait for a group of conditions that are specific to a certain phenomenon. If we find that a certain factor remains existent in a constant way, despite the change in the premises, we should consider this factor as a cause ('illa) of the phenomenon or its result, and the basis of that is the agreement between the *cause* and the *effect* ('illa and ma'lul) in its occurrence.¹³ In other words, if we have different conditions which have one constant and steady element, this element should be considered 'illa/ cause of the occurrence of the phenomenon that is common between the different conditions. It is possible to express this method symbolically as:

A B C D takes place with w x y z

A E F G takes place with w t u v

The consequence is that A is the cause of W

This method of agreement was known among the scientists/ 'ulama' of foundations-of-jurisprudence by the name of Tard/ co-extensiveness, which indicates that "the attribute, depending on what is adjacent to it, which joins it and never separates from it, should be the ruling."¹⁴ "Tard/ co-extensiveness confirms the ruling with the attribute, which we did not know that it is appropriate, and not

obligatory to the occasion in all the different images that are different from the place of contention, i.e., its existence in all conditions except the image of disagreement, overcomes the doubt that it is 'illa / cause, and thus, the conflicted thing is joined to the more general and more likely".¹⁵ al-Sarkhasi defines Tard/ co-extensiveness as "the existence of the hukm/ ruling when the attribute exists. Some 'ulama maintain that the ruling exists when the Tard exists and is absent when the Tard is absent".¹⁶

2. Method of Difference or Correlation of Difference

If two sets of events agree in all aspects except one, and the result changed because of this difference, there must be a causal ('illa) relationship between this aspect and the resulting phenomenon. It is possible to express this idea symbolically as:

A B C D takes place with w x y z

B C D takes place with Y Z

Therefore, A is the cause ('illa), or the influencer or part of the cause ('illa) W.

This method was known among the fundamentalists by the name of 'al-Aks/ the Opposite", and it means "selecting the hukm/ ruling by selecting the attribute"¹⁷ al-Ghazali explains this rule saying: "the hukm/ ruling is suspended by the suspension of parts of the 'illa and its conditions, and does not appear with the appearance of the part."¹⁸ Ibn al-Haytham applied this method on his light-experiments, and we can refer to limit (hudd) of those samples, and we mean by that "if the movement of light along a straight line lags, the 'illa differs. (He says: if there are several candles in different places and all of them are opposite to one hole, and the hole leads to a dark place, and opposite that hole in the dark place there is a wall or the hole is met by a thick body, the lights of the candles appear on that body or that wall in a scattered way, and after those candles above the straight zenith that passes through the hole; and if one of the candles is concealed, the light of the candle that is opposite of the hole in the dark place is cancelled, and if the curtain is raised, the light returns to its place."¹⁹

John Stewart Mill, however, expresses his idea about the 'al-'Aks in its simplest ways through making comparison between two conditions, saying: (if we find two conditions: a condition that has a phenomenon and a condition that doesn't have a phenomenon, but

they share everything except one thing that appears in the first condition but does not appear in the second, we conclude that this thing is the 'illa /cause). In this limited comparison Mill agrees with Ibn al-Haytham, who generally compares two similar images of phenomena, in which the *effect/ ma'lul* disappears due to the disappearance of the 'illa/ cause but the *hukm/ ruling* appears in the other with the occurrence of the *effect/ ma'lul*.²⁰

3. Joint Method of Agreement and Difference

If we have two cases in which the phenomenon occurs and it is noticed that the two cases differ in everything except one factor, and if we have another two cases in which the phenomenon does not occur, and it is noticed that the two agree in one item only, which is the absence of that factor, we conclude that the factor that exists in the first two and absent in the other two is the cause ('illa) of the phenomenon. To sum up: if the cause exists, the effect exists and if the cause is absent, the effect is absent.

A B C occurs with x y z

A D E occur with X V W and also B C occur with Y Z

The conclusion is that A is the cause or the effect, or part of the cause X.

It appears that if we have two chains of parallel phenomena, the first chain consists of preambles and the second consists of the results. We find also that if there is a certain change in the results according to the change in the preambles, there must be a certain causal connection between the two chains. This method was known by the scientists ('ulama') of jurisprudence by the name 'rotation' (dawaran), which combines the two methods of Tard and 'Aks (co-extensiveness)' which indicates that the *hukm/ ruling* exists if the attribute exists, and the *hukm/ ruling* does not exist if the attribute is absent.

The applications of this principle in natural science is clear as in Ibn al-Haytham, who employs the rule of Dawaran/rotation to prove his hypotheses about light, which is: "Let's take the example of the experimenter who performs an experiment on a house in a dark night. The house has a door of two shutters. The experimenter brings a

number of candles and put them opposite to the door separated. The experimenter enters the house and shuts the door but leaves the shutters not fully closed. He keeps a small opening between the shutters and looks at the wall opposite the door. Then he looks at the wall opposite the door. If he finds scattered lights on the wall with the same number as the candles, and then he conceals one of the candles, the opposite light of that candle will disappear, and if he lifts up the curtain, the light returns."²¹

4. Method of Residue

This is the method of correlation and concomitance in motion, which means that any change that takes place to the cause /i'lla entails a change in the effect/ ma'lul. This method does not require finding the relation between the two phenomena, but it aims to define the relationship between them a quantitative definition, like the *opposite concomitance* (Tanasub 'Aksi) between the size of gas and the pressure that is put upon it.²²

ABC occurs with x y z

B is known as a cause of L

C is known as a cause of Z

Therefore, **A** is the cause/ 'illa or the **effector of X**.

For the fundamentalists, this method is compatible with the relationship between cause/ 'illa and ruling/hukm, but al-Muntasher method says that Taqseem (isolation of attributes) should not occur between *negation* and *confirmation* and should spread on parts that (al-Saber) the examiner recounts."²³

However, al-Taqseem al-Muntasher (the scattered isolation of attributes) for the fundamentalists is distinguished by confining the attribute between negation and confirmation, non-confining it between them due to the large inter-wining of these attributes and graduation that reaches the finite and the infinite in gradualness and relative change."²⁴

Through his gradualness in power and weakness, Ibn al-Haytham continues to clarify the gradualness in illustrations of the pictures of colors that are connected with the pictures of light and says that: (It

was shown by induction that the pictures of colors are always weaker than the colors themselves). The more the pictures get farther from their base/source, the weaker they become. Besides, the pictures of lights become weaker from the lights themselves, and the farther they go, the weaker they become. By induction, it was shown that if strong colors are in dark places, and the lights on them are slight, those colors appear dark, and cannot be distinguished by eyesight. The case of transparent colored objects is the same; if light on them is strong, their colors appear in their backs on the opposite objects to them, but if the light is weak, only a shadow appears behind them. If the observer looks at a thick object on which an image might shine on, he will recognize that image from another image that returns to him from that image, and this second image will be weaker than the first image on that object and the first image is weaker than the color itself).²⁵

There is no doubt that the list of gradualness of images of heat that Francis Bacon speaks about, and that start with heat in solid objects and end as a feeling and sense is certainly a parallel attempt of Ibn al-Haytham's attempt to prove the gradualness of images of light, which start with the existence of the image in the color and ends with the recognition of the image. Bacon defined 41 states of the images of gradualness of heat. In this list, Bacon was not able to define every image of heat in a scientific way as he admits, and this is what Stepinge confirmed in her introduction about modern logic. What characterizes Ibn al-Haytham from Bacon is his ability to organize and compare and put the necessary conditions such as the necessity of light movement in time, no matter if this movement occurs in a single period of time, or continuous successive periods of time, in addition to his clarification of the weakness of sight in its ability to recognize this movement²⁶.

5. Method of concomitant variations

If we have a phenomenon that includes a group of elements that show the relationship between one another by the previous methods, what remains of them is related to the connection of cause/'illa and effect/ ma'lul. An example to that is this: if we tie a magnetized needle

to a thread of silk, and then move it above a copper pot, we will see that its return to stability is faster, and we have no choice but factors that can be considered a cause/'illa of this phenomenon: resistance of air and resistance of the silk-thread. If the effects of these two factors are excluded, then we have only one cause to accept, which is: the copper pot, which hinders the movement of the needle.

A B C occur with x y z

A ± B C is the result/ effect x ± y z

Thus, the relationship between A and X is causal.

The method of concomitant variations was introduced by the fundamentalist Abu al-Hussein al-Tayyib (436 H.) in his explanation of *Maslak al-Sabrwa al-Taqseem* (Method of examination and isolation of the attributes). He argues that they refer to the unanimous agreement of the 'Ulama or analogists on the justification of the source, and differ on its cause, and thus it is cancelled except one, which tells its correctness." This is true if the experiment is done on agreed causes, and it is enough to cancel what is thought to be inappropriate to the origin/ source, and the variation is considered the cause/'illah. Similarly, Abu Ishaq al-Shirazi (476 H.) says that "all the attributes are negated and cancelled except one, which turns to be the correct one."²⁷

The fundamentalists introduced the method of *Tanqih al-Manat* (editing and distinguishing) as a method that combines the four previous methods in order to determine the cause/'illa or the general description/attribute by deleting other things, and in order to reveal the truth of cause and its explanation. This revelation and explanation is completed only by *ijtihad* which leads to keeping away preconditions and obligation by way of deletion, and determining the nearest obligation, and verifying it, and with it, the determination and distinguishing of the obligatory relationship for the ruling is achieved. This relationship as a cause/'illa might have special attributes that are not included in the ruling, and this requires deletion of these collective characteristics and attributes. The attributes that are not valid for justification are eliminated and what remains is the observer of the other attributes. These remaining variations/ attributes are

revealed by way of deleting and eliminating anything else, and this is what the scientists/ulama of u'sul (sources) call "tanqih" – editing and distinguishing.

To sum up, this method is limited to 'elimination' and 'determination'. If the methods of Dawaran or Tard and Aks, and Sabr and Taqseem seek to determine the existence of cause/illa or its non-existence, i.e. *edawarn* of the cause/illa with its effect/ma'lul whether it exists or does not exist, this method seeks accuracy in determining the fundamental description of the cause/illa no matter if this cause consists of one attribute, on which the hukm/ruling depends, or several attributes. Then, it looks through the characteristics of these attributes to determine their properties and efficiency in the ruling instead of being satisfied with the determination of the cause/illa of hukm/ruling. Al-Sabaki expresses this method saying: "The text of the phenomenon indicates the justification by an attribute, eliminates its particularity from consideration, and makes the ruling dependent on the more general, or, its attributes substitute the ruling; some of them are excluded from consideration and *ijtihad* (independent reasoning), and the ruling is made conditional by the concomitant variation and its outcome is *ijtihad* in and determination"²⁸.

The Structure-Mapping Theory

The modern theories of Qiyas/ analogy depend on the traditional idea of Qiyas, which is the existence of similarity and sharing between two different fields, and they try to develop methods and styles to determine common attributes between the two fields. These fields differ in the manner of determining the important common attributes, which have some relation with the outcome. Will the determination be quantitative or qualitative? Will it be according to meaning of syntax and grammar or the relations between the attributes or between things?

The central idea in structural mapping is that an analogy is a mapping of knowledge from one domain (the base) into another (the target), which maintains that a system of relations that holds among the base objects also holds among the target objects. Thus

analogy is a way of focusing on relational commonalities independently of the objects in which those relations are embedded.²⁹

The Structure-Mapping Theory Rule³⁰

1. The central claims of the structure-mapping theory are that analogy is characterized by the mapping of relations between objects, rather than attributes of objects, from base to target;
2. The particular mapped relations are those that are dominated by higher-order relations that belong to the mapping.

Analogical teaching aims to trace the effect of learning by the method of Qiyas/ analogy and its similarity between the beginning stage of 'similarity' to the last stage of 'storing' of some new items of information. It is possible to analyze the process of spontaneous analogical learning into sub-processes:³¹

- a) Reaching the system of 'base'
- b) Conducting the mapping operation between the 'base' and 'target',
- c) Assessment of conformity
- d) Storing of deductions in the target, and sometimes,
- e) Deducing the common means.

The Theory of Structure-Mapping agrees with Islamic Qiyas in the central thought about the concept of Qiyas, which is the movement of information from the 'Asl/source/ origin to the branch/Far'i because of their participation in similar attributes or causes. Besides, in the sub-processes of Qiyas, we find that Islamic Qiyas gives a large interest in the Asl /source and considers the cause of Asl ('illat al-Asl) and its hukm/ ruling as the most important part in the Qiyas process.

We find the equivalent to the sub-processes of Qiyas in Masalik al-'Illa (Methods of identification of effective causes). For example: the two measures of (a) *reaching the system of 'base'* and (b) *conducting the mapping operation between the 'base' and 'target'*. These two measures are defined in Islamic Qiyas as the process of Sabr and Taqseem (examination and isolation of the attributes), which refers to the search

in the attributes of Asl (source) and Fari' (branch) and the comparison between them; the equivalent of (c) Assessment of conformity. The equivalent to this measurement in Islamic Qiyas is the process of *Dawaran* (rotation/ change coextensiveness), which deals with the examination of the extent of correspondence between the attributes of the branch (Fari') and the attributes of the 'Asl (source). Regarding (d), *storing of deductions in the target, and sometimes*, and (e), *deducing the common means*, we find equivalent aspects in Islamic Qiyas. For example: in the process of Sabr and Taqseem, (examination and isolation of the attributes), the effective and non-effective attributes in the ruling/ hukm are classified. In addition, the effective attributes are kept while the non-effective ones are negated. After finding out the effective attributes, they are moved from the ruling of Asl to the ruling of hukm al-Fari'.

However, the difference between the two approaches of Qiyas is that the Structure-Mapping Theory claims that the analogical comparison should be established on the relations between subjects (things and objects) and not between attributes of subjects. Islamic Qiyas distinguishes between effective and ineffective attributes, the suitable and the unsuitable, and the appropriate and the inappropriate. This distinction between attributes depends on the degree of relationship between attribute and the cause/'illa in ruling/ hukm.

For example, the Theory of Structure-Mapping distinguishes between two types of comparisons of solar system: object-attributes, such as YELLOW (sun), and relations between objects, such as REVOLVE AROUND (planet, sun).³²

On the other side, Islamic Qiyas is not limited to searching relations between objects, but looks for the relations between effective cause and ruling/hukm. This cause/ 'illa is likely to change from one issue to the other in quantity and quality, but this is dependent on the nature of the studied issue and the purpose of the research. In other words, the cause/ 'illa such as "revolution of the sun" can be another issue where the cause/ 'illa is an attribute such as 'color"

Classification in Structure-Mapping ignores the significance of attributes of things that might have an important role in dealing

with certain issues. It also ignores the relations between the qualitative attributes and is satisfied with the quantitative relations. This does not suit the issues where the meaning has great significance in determining them.

The second difference is the search for structure-relations between attributes, which have no relation with content and meaning. These are quantitative relations rather than qualitative ones and any quantitative change in the attribute affects another attribute.

There is a group of qualities that define this solar system and include the following relations:³³

- (1) DISTANCE (sun, planet)
- (2) ATTRACTIVE FORCE (sun, planet)
- (3) REVOLVES AROUND (planet, sun)
- (4) MORE MASSIVE THAN (sun, planet)

One symptom of this systematicity is that changing one of these relations affects the others. For example, suppose we decrease the attraction between sun and planet; then the distance between them will increase; all else being equal. Thus relations (1) and (2) are interrelated. Again, suppose. We reverse relation (4) to state that the planet is more massive than the sun; then we must also reverse relation (3), for the sun would then revolve around the planet.

Dependence of this theory on grammatical knowledge to represent knowledge rather than on the content of a certain field does not fully correspond with the juristic Qiyas, because addition and shortage in cause/ 'illa does not affect the result of ruling/hukm. For example: intoxication is the cause of prohibition of alcohol/ wine and it is not related to the rate of intoxication if it is excessive or not excessive but to its existence or absence. On the other side, this theory can be appropriate to juristic issues where the quantity or abundance or shortage plays an important role like the issues of: frequent item of news, individual opinion, unanimous opinion, certain special unanimity, Qiyas of similarity, norms, closing expediencies, and deduction. It works also in penalties, "it is known that these four crimes (lying, robbery, adultery, and murder) have different ranks in shortage or abundance, and different degrees in their intensity of

damage and its lightness, like the rest of sins in their largeness or smallness and between them. As a result of difference in ranks of crimes, the degrees of punishments must be different as well.”³⁴

It is noticed that Islamic Qiyas deals with different kinds of attributes and is not confined to syntactic attributes; it includes the content and a net of different relations between the Asl/source/origin and branch/ Faru’ and Cause/ ‘illa and Hukm/ ruling in quantity and quality.

Gentner says that “the hydrogen atom is like our solar system.”³⁵ This comparison seeks to find out similar relations between two different systems

This type of Qiyas was not dealt with by Moslem scientists, as we do not find in Islamic Qiyas a system that includes numerous relations on another system that is similar to it. However, they used Qiyas to deal with juristic issues and natural phenomena, which is a research that is based on comparison between two issues rather than relations between two systems. Such comparison aims to find out the cause/ illa that is suitable to the ruling/ hukm, or find out a relation between the conditions of the cause/ illa such as (ma’lul) effect, (munasaba) appropriateness, Tard (coextensiveness) in an issue or a certain phenomenon and to compare it with the group of relations in the new issue.

Conclusion

We conclude from the previous comparison between the two theories of Qiyas that similarity between the two theories is based on the central idea of Qiyas and the use of similar analogical methods, especially in Islamic Qiyas and the methods of Frances Bacon and Stewart Mill. However, the difference between them is not considered a contradiction, and it should be understood as a multiplicity in research methods and a response to the modern scientific development.

The use of Qiyas in research of sciences in both Islamic thought and Western thought is a substitution to Aristotle Syllogism, which prevailed in sciences for several centuries. It is the movement at the level of methodology from the method of deduction to the method

of induction. We also notice that many Moslem and Western scientists criticized Aristotle’s Syllogism and considered it invalid for the development of sciences, especially their experimental type.

It is possible to argue that the interest of Moslem scientists in establishing and developing Qiyas as a scientific method contributed to the development of human and natural sciences. Besides, the movement of Qiyas to the Western thought had a prominent role in developing modern sciences. In fact, it is considered to be the main method in modern science.

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30. See: DedreGentner, "Structure-Mapping: A Theoretical Framework for Analogy", *Cognitive Science*, Volume 7, Issue 2, pages 155–170, April 1983.
31. DedreGentner, "The mechanisms of analogical learning", p. 200.
32. DedreGentner, "Structure-Mapping: A Theoretical Framework for Analogy", p. 159.
33. DedreGentner, "Structure-Mapping: A Theoretical Framework for Analogy", p. 163.
34. Ibn al-Qayyim al-Juayyeh, *Flam al-Muwaqqi'inan Rab al-Alamin*. Vol. 2, Beirut, Dar al-Jil, 1973, p. 114.
35. Dedre, Gentner, "Structure-Mapping: A Theoretical Framework for Analogy", p. 159.