Entelekya Logico-Metaphysical Review
Vol 8 No 1 May 2024: 11-26

Place and Reliability of Aristotle's Induction in the Scientific Process

MURAT KELİKLİ
Afyon Kocatepe University

Research Article
Submitted: 14.02.2024 | Accepted: 27.03.2024

Abstract: This article analyses the relationship between deduction and induction by focusing on Aristotle's knowledge acquisition processes. The deductive and inductive processes in Aristotelian science are analyzed in depth, and it is emphasized that these two processes are, in fact, interrelated. It is claimed that induction and deduction use logical inference but are not themselves an inference. The structure of inductive inference is determined, and the deductive inference and the inferential part of the scientific process are given. Furthermore, the article addresses the reliability of the inductive process, emphasizing the difficulties in obtaining accurate results. In conclusion, it is shown that Aristotelian science has a fundamentally intuition-based part and plays an important role in the scientific process.

Keywords: Aristotle, induction, deduction, scientific process, intuition.

MURAT KELİKLİ ✉
Afyon Kocatepe University, Faculty of Sciences and Literature, Department of Philosophy
Ahmet Necdet Sezer Kampüsü, Afyonkarahisar, 03204, TR [kelikli@gmail.com.tr]

Introduction

First and foremost, I aim to demonstrate that the scientific definition of induction, based on the definition provided by Harman & Kulkarni in this context, differs from Aristotle's conception of induction. Consequently, my goal is to illustrate that distinct interpretations of induction and Aristotle's induction necessitate different frameworks.

In Aristotle's process of acquiring knowledge, there are two seemingly opposite processes such as deduction and induction. Aristotle scrutinized deduction extensively as a formal process. However, the process of induction is analyzed separately concerning its formal structure in Prior Analytics and its process-dependent explanation in Posterior Analytics and Topics. My objective is to demonstrate that, these two processes are not different from each other in the light of the evaluations in the analyses made by considering these two perspectives separately.

Watson asks how to make the transition from the inductive conclusion “effect”, which only establishes “fact”, to the demonstrative conclusion “cause”, which establishes “cause”.[1] In order to seek an answer to this question, in the first section we establish the connection between the formal inductive relation given in Prior Analytics and the deductive structure. Thus, I would like to see the process by which the principle of Aristotelian sciences will be obtained as the relation of deduction and induction.

Deduction requires that a correct conclusion is always obtained from the correct premises. In induction, on the other hand, the correct conclusion is not always obtained from the correct premises. Sometimes wrong conclusions are also obtained. In this context, the third chapter is devoted to the question of the reliability of the knowledge obtained from induction.

Although Welch criticized the presence of intuitionism in Aristotle's inductive process due to its lack of empiricism, he could

[1] John Watson, “Aristotle’s Posterior Analytics: II. Induction,” *Philosophical Review* 13, no. 2 (1904), 146.

not provide a comprehensive assessment because he did not establish the structural place of intuition in this model. In the fourth chapter, we aim to determine the role of intuition in both induction and Aristotle's induction.

As a result, I believe Aristotelian science has an intuitive dimension. Thus, I will argue that Aristotle's induction is a part of the scientific process and that Aristotelian science is a structure that is questioned and open to improvement.

In this article, we will only deal with a part of Aristotle's scientific process based on inference, and we will not address Aristotle's general reasoning and its projection into the soul.

1. Is Induction an Inference?

Mathematical induction is perhaps the most widely recognized and formalized form of induction. Cajori suggests that the term "mathematical induction" originates from the induction seen in the natural sciences.[2] To briefly define mathematical induction, it is the process of proving that the proposition p(n) is true for n+1 by assuming it to be true for n. Harman & Kulkarni's proposed definition of induction states that from "Many many Fs are known to be G," "There are no known cases of Fs that are not G," and "a is F," one can infer the corresponding conclusion of the form "a is G".[3] Here we start with the prior assumption that F is G. The induction is that it is not known that there is a particular F that is not G. Thus, it is concluded that all individual F's are G. For example, since all the crows we see are black, our process of obtaining the universal proposition "all crows are black" with the belief that the next crow we will see will also be black is induction. In other words, we now have the belief that we will not come across a non-black crow.

There is no difference between mathematical induction and

[2] Florian Cajori, "Origin of the Name 'Mathematical Induction'," *The American Mathematical Monthly* 25, no. 5 (1918), 198.

[3] Gilbert Harman and Sanjeev R Kulkarni, "The Problem of Induction," *Philosophy and Phenomenological Research* 72, no. 3 (2006), 559.

induction, at least in ordinary structures there is compatibility. For an assumption n, it is shown that n + 1 is true, and every subsequent F is G, i.e. there is no F that is not G. However, in non-ordered structures, it can only be shown by reductio ad absurdum that an assumption true for n is true for another m.

Aristotle's induction is quite different from induction and mathematical induction. Aristotle considered induction as a process of inference. Accordingly, although there is a relation between two terms in induction and mathematical induction, in Aristotle's induction, since it is an inference, there is a relation between three terms. In addition, Haltmayer states that induction will be quite different from what is understood today in terms of its structural aspect in obtaining principles.[4]

Harman & Kulkarni state that deductive logic is not a theory of reasoning, it is a theory of conclusion. Because reasoning is based on assumption and is a psychological process.[5] Induction is a reasoning process. Harman believes that the rules of inference are not the rules of deduction.[6] However, McCaskey thinks that induction is not an inference.[7] In terms of Aristotle's induction, both views are partly right, induction and deduction use rules of inference as a syllogism, but they are not inference itself. It would be different to analyse inference and to analyse its place in the scientific process.

2. How is the Inference Obtained by Induction

Aristotle expresses induction as an inference, explaining that the major end is in the middle term by the minor end.[8] That is, if M is taken as the middle term between P and S, it will be proved that P belongs to M by means of S. For example, P: “long-lived”, M:

4 Stephan Haltmayer, “Prinzip im Anschlub vor Allem an die Zweite Analytik,” *Felsefe Arkivi* 28 (1991), 171-72.

5 Harman and Kulkarni, “The Problem of Induction,” 562-64.

6 Harman and Kulkarni, “The Problem of Induction,” 562.

7 John P McCaskey, “Freeing Aristotelian Epagoge from *Prior Analytics* II 23,” *Apeiron: A Journal for Ancient Philosophy and Science* 40, no. 4 (2007), 365.

8 Aristoteles, *Aristotelis Opera*, ed. Immanuelis Bekkeri, Academia Regia Borussica (Apud Georgium Reimerum, 1831), I, 68b15.

"gall-less animals", S: "man, horse, mule, etc.". All S is P and all S is M, so that:

Man, horse, mule, etc., are long-lived,

Man, horse, mule, etc. are the gall-less animals,

Therefore, the gall-less animals are long-lived.

SaP & SaM ∴ MaP. In other words, proving that MaP exists through S is induction. Here, if S is converted by M and the middle term is not expanded, MaP necessarily exists.[9] Notice that this is not a valid inference. In order for it to be a valid inference, the second premise SaM must be turned into MaS. Thus, the inference in the form of Barbara is established as SaP & MaS ∴ MaP There, SaM can be turned into MaS only if the terms of the premises are identical. The inductive method constitutes a syllogism made in the reverse order of nature, which follows the path of the deductive method. Here, the major term becomes the minor term, the minor term becomes the middle term, and the middle term becomes the minor term. The fact that the middle term can be met by the minor term requires that their contexts are the same.[10] With the not expanded of the middle term, Aristotle states that this identity must be preserved.

If two predicates belong to a subject and one of the terms is converted by the other, the other predicate will also belong to the converted predicate. Here it is necessary to recognise that S consists of general entities. Because induction begins with the enumeration of all that exists. S consists of individual subjects, and induction consists of all individual subjects.[11] The syllogism in this form provides the first and unmediated premises. The reason for this is that in cases where the middle term is present, deduction (syllogism) is used for proof, and if the middle term is absent, induction is used for proof.[12]

9 Aristoteles, *Aristotelis Opera*, I, 68b16-25.

10 Hamdi Ragıp Atademir, *Aristo'nun Mantık ve İlim Anlayışı* (Ankara: Ankara Üniversitesi İlahiyat Fakültesi Yayınları, 1974), 139.

11 Aristoteles, *Aristotelis Opera*, I, 68b29.

12 Aristoteles, *Aristotelis Opera*, I, 69b30-32.

This shows us that induction is the opposite of deduction, but they are not contraries. As we see here, the middle term is unknown. In deduction, the middle term is known, whereas in induction, the middle term is unknown.

The knowledge of the observer and the reasoner are different; the reasoner may miss the knowledge of what is, and therefore cannot have the knowledge of what is individually. This is also the case in the cooperation of different sciences. Aristotle gives the example of a physician and a geometrician knowing that an arc-shaped wound heals late; the physician knows that this wound heals late, but the geometrician knows why it heals late.

Inference of cause, AaB & CaA ∴ CaB

Inference of what is, BaA & CaB ∴ CaA

Induction, CaB & CaA ∴ AaB

There are three terms in inference. Accordingly, the relationship between A and B, between A and C, and between B and C. The terms between which the connection in the conclusion is established give the type of inference.

In Posterior Analytics I,13, Aristotle gives an example for the inference of what is and the inference of the cause. A: "being near", B: "not twinkling", C: "be the planets".

What does not twinkle is near,

The planets do not twinkle,

Therefore, the planets are near.

Another inference is,

What is near do not twinkle,

The planets are near,

Therefore, the planets do not twinkle.

The first inference belongs to what is, and the reason for being close is not to vibrate, the middle term here belongs to what is, not to the cause. However, in the second inference, the cause of not shaking is being close, the middle term here belongs to the cause. The inferences belonging to what is and the inferences belonging

to the cause are different in terms of the placement of the terms. In the inference from what is, the propositions "the planet do not twinkle" and "what does not twinkle is near" are accepted by induction or sensation, they are not premises. The fact that the syllogism does not consist of premises gives the knowledge of what is, while the fact that the syllogism consists of direct premises gives the knowledge of the cause. In this case, the inference of induction:

The planets do not twinkle,

The planets are near,

Therefore, what is near do not twinkle.

Scientific research is the search for the cause. For one who does not know whether the cause is existent or not, it is impossible to know what the object is. When we know that the cause exists, we know its nature in the same way as we know that it exists. For example, A: "eclipse", B: "the earth blocking the sunlight", C: "the moon". To investigate whether the moon is eclipsed is to investigate whether B exists or not. If there is a cause, A also exists. However, if the premises are direct, we know the thing and its cause together; if they are not direct, we know the thing but not the cause. In this case, the middle term is B: "moonlight fails to produce shadows when there is no visible presence between us and the full moon", if B is in C and A is in B, then A is in C. That is, we know that the moon is eclipsed, but we do not know why. After we know that the moon is eclipsed, we investigate B, "is it the earth cutting the sun?", "is it the rotation of the moon?", "is it the extinguishing of the moon?". The definition of A is that the eclipse is the earth cutting off the light. If there is a middle term other than this, it will be one of the causes.[13] As a result, the scientific process:

1 CaB has a research premise such as and

2 research subject is C,

3 the predicates of the investigated C are analysed, for an A,

[13] Aristoteles, *Aristotelis Opera*, I, 93a5-93b8.

4 If there is identity between A and C,

5 It is taken as a principle that AaB is correct,

6 The sign of the relation between C and A is B,

7 Since AaB will be true for A which is the predicate of C

8 our research suggestion is that CaB is caused by A.

In the scientific process, deduction proves that the minor term is in the major term by means of the middle term. Induction proves that the major term is in the middle term by means of the minor term. For this reason, knowledge known by deduction is more known and comes first. Knowledge known by induction is clearer.[14] However, in the sense that it can only be known, the knowledge of deduction will be after the knowledge of induction. Induction provides the principles that constitute the necessary premises for deduction.[15] Therefore, the cause comes first and then the effect, but the cause cannot be known without knowing the effect. In other words, A is the cause of CaB, and the existence of CaA is prior. CaA happened so that CaB was realized. In this case, AaB had to be the principle.

Aristotle defines induction as the transition from the particular to the universal,[16] and from the partial to the universal or from the known to the unknown.[17] In other words, the inference that leads to the discovery of AaB and its being taken as a principle is induction. Therefore, CaB must first be known so that A's causality can be known. Scientific research is established to show that A is the cause. The whole assumption in induction is the identity of A and C and is the sensitive point of the whole scientific process.

3. Is Induction Reliable?

The difference between the inductive accounts in Posterior Analytics and Topics lies in their focus and purpose. While Poste-

[14] Aristoteles, *Aristotelis Opera*, I, 68b35-36.
[15] Aristoteles, *Aristotelis Opera*, VIII, 993a.
[16] Aristoteles, *Aristotelis Opera*, IX, 1139b26; I, 105a13.
[17] Aristoteles, *Aristotelis Opera*, I, 156a.

rior Analytics is concerned with how scientific syllogisms are derived, Topics is concerned with the use of induction as a type of argument to establish general propositions from particular instances.[18] In Posterior Analytics 100b5ff, Aristotle speaks of induction as a process of the mind. The process of induction given both in Posterior Analytics and in Topics is an account of how the identity between the middle term and the research subject of inquiry is established in inductive inference. In this case, the process mentioned in Topics and the process mentioned in Posterior Analytics are the parts of inductive inference that should be considered together. What both approaches offer us is how to obtain the identity.

Watson says that induction will be completed when, by an examination of various particulars, it is possible to arrive at a proposition (κατὰ παντός) that is true without exception.[19] Here Watson's expression "without exception" is quite precise. Accordingly, the result obtained by induction is expected to be certain and necessarily true.

In the example given by Aristotle in Prior Analytics, the proposition constituting the major premise of the syllogism, "the gall-less animals are long-lived" is a law.[20] The animals counted here are not the only gall-less animals.[21]

We see that Aristotle divides the concept of identity (sameness) into three: identical in number, identical in kind, and identical in genus. Aristotle's identity here is not identity in number. Aristotle says that man and horse are identical in being animals,[22] and it is neither necessary nor probable that those who are identical in genus are identical in number.[23]

In this case, Aristotle does not aim for the number of given

[18] Jaakko Hintikka, "Aristotelian Induction," *Revue Internationale de Philosophie* 34, no. 133-134 (1980), 424.
[19] Watson, "Aristotle's Posterior Analytics: II. Induction," 146.
[20] Aristoteles, *Aristotelis Opera*, I, 77a.
[21] Aristoteles, *Aristotelis Opera*, IV, 506a.
[22] Aristoteles, *Aristotelis Opera*, I, 103a8-14.
[23] Aristoteles, *Aristotelis Opera*, I, 152b31-32.

gall-less animals to be equal, but for them to be equal in form. Because, according to Aristotle, induction is a method closer to sensation,[24] and even states that induction is impossible without sensation.[25] However, Aristotle, who says that sensation does not inform the universal,[26] also says that the genera cannot be considered and counted one by one to reach the universal.[27] Therefore, induction based on sense cannot be the tool of necessary science, that is, it does not fulfill the condition of the first and unmediated principles on which all knowledge must be based.

Moreover, some problems arise with the requirement that the knowledge of principles must precede the knowledge of results. Because in induction, knowledge of principles is desired to be obtained as a result. This narrows the scope of induction considerably.

Despite these deficiencies in induction, Aristotle states that it is necessary to know by induction and that sensation will be the source of knowledge in this way.[28] If sensation is absent, the corresponding science will necessarily be absent.[29] In this process, the middle term emerges after induction and deduction and gives the cause. This process exists entirely to find the middle term. Therefore, deduction and induction exist for the middle term; these processes are established to provide the middle term.

According to Aristotle, the only way to reach universal knowledge is induction.[30] Furthermore, Aristotle places induction at the center of his theory of knowledge, saying that the universal must be known in order for the individual to be known.[31]

Watson says that, unlike modern scientific methods, Aristotle believed that induction would not lead to the establishment of a

[24] Aristoteles, *Aristotelis Opera*, I, 78a.
[25] Aristoteles, *Aristotelis Opera*, I, 81b5.
[26] Aristoteles, *Aristotelis Opera*, I, 82b28.
[27] Aristoteles, *Aristotelis Opera*, I, 80a5.
[28] Aristoteles, *Aristotelis Opera*, I, 100b10.
[29] Aristoteles, *Aristotelis Opera*, I, 81a38.
[30] Aristoteles, *Aristotelis Opera*, I, 81a40.
[31] Aristoteles, *Aristotelis Opera*, I, 103a10-15.

proposition that is truly universal, that is, true for all members of a class, intrinsically true, and true for the class. According to him, Aristotle sees the purpose of science as discovering the reason for the existence of a particular property in an individual thing, rather than simply observing and describing phenomena.[32]

Harman & Kulkarni argue that it is a mistake to define the problem of inductive reliability by comparing it with deductive reliability. This is because deductive rules are rules about what is deduced; they are not rules about what can be deduced from what.[33] According to Harman & Kulkarni, the reliability problem of induction; The problem of induction arises because inductive reasoning is not necessarily truth-preserving. That is, even if an inductive method has produced accurate results in the past, there is no guarantee that it will continue to do so in the future.[34] In other words, what is true up to n is not guaranteed to be true for n+1. However, mathematical induction claims to guarantee this. Welch says that a quantitative inductive approach with statistical analysis and probabilistic reasoning would be efficient. Harman & Kulkarni try to provide evidence that the reliability of induction will be increased with Statistical Learning Theory for situations that give the correct result with the correct premises in induction.[35] Groarke claimed that Aristotle's induction can be applied to statistical induction:

> Aristotle does not conceive of the inductive syllogism as a statistical argument. But even statistical inductions could be cast into the general form of an inductive syllogism. Suppose we set out to study premature morbidity among smokers. We study three sample populations, A, B, and C, and discover that more than 15 per cent of smokers in each sample die before they reach the age of fifty. We conclude that more than 15 per cent of smokers die before they reach the age of fifty. We can easily express this line of reasoning as an inductive

[32] Watson, "Aristotle's Posterior Analytics: II. Induction," 156.
[33] Harman and Kulkarni, "The Problem of Induction," 564.
[34] Harman and Kulkarni, "The Problem of Induction," 560.
[35] Harman and Kulkarni, "The Problem of Induction," 561.

> syllogism. Define our terms: S, individual sample populations such as A, B, C (etc.); P, having a morbidity rate of more than 15 per cent for individuals less than fifty years old; and M, populations of smokers. The inductive syllogism will take the form, "All sample populations A, B, C, etc., have a 15-per-cent mortality rate for individuals less than fifty years old. All sample populations A, B, C, etc., are populations of smokers. Therefore, all populations of smokers have a 15-per-cent mortality rate for individuals under fifty years old." Symbolically, "All S is P. (All S is M, convertible to) All M is S. Therefore, all M is P."[36]

The Adaptation here is not an inductive inference of Aristotle. If "All sample populations A, B, C, etc., have a 15-per-cent mortality rate for individuals less than fifty years old" is true, than for individual A, "A have a 15-per-cent mortality rate for individuals less than fifty years old" must be true. Also, it must be true for individual B and individual C, etc. I would like to draw attention to Aristotle's example; from the statement "the gall-less animals are long-lived" it can be said that "Man is long-lived". However, here person A does not predicate P. Because the proposition P is incorrectly constructed, in fact, P: "die less than fifty years old" so that an inductive syllogism can be established. Thus, M can be taken as the cause, i.e. M is the cause of S. The desired statistical evaluation is that M is 15 per cent of P. That is, 15 per cent must be the predicate of M. The attribution of the property "being 15 per cent of P" to M is the subject of another research. In that case, we can see that statistical induction would not be suitable for Aristotelian induction. Because this investigation of quality will not be a causal investigation, but an investigation of the accident. Although Groarke himself says that statistics will not be suitable for Aristotle's induction due to this accidental and contingent feature,[37] we have seen that it will not be structurally possible.

The question of the reliability of Aristotle's induction depends

[36] Louis Groarke, *An Aristotelian Account of Induction: Creating Something from Nothing* (Montreal: McGill-Queen's University Press, 2009), 133.

[37] Groarke, *An Aristotelian Account of Induction*, 225.

on the establishment of identity and cannot be subjected to a statistical or probabilistic evaluation. Nevertheless, Hintikka says that Aristotelian induction was used to develop scientific theories and models based on empirical observation and logical deduction, but Watson argues that modern scientific methods go beyond Aristotle's system and require more rigorous and systematic investigations to establish causal relationships.[38]

4. Intuition in Induction

In Posterior Analytics, Aristotle says that induction is a mental process, while in Topics I,2 he says that it is known dialectically. What is the relationship between these two approaches? Welch seeks an answer as to how this relationship should be. Welch points out that both induction and dialectics have an important place in scientific research. He argues that induction is necessary for discovering generalisations and patterns in empirical data, while dialectics is necessary for critically evaluating and correcting our theories and hypotheses. Thus, he determines that these two methods complement and strengthen each other.

In the structure in which we obtain the knowledge of the universal, which is the process by which we obtain principles from our experiences, Aristotle's access to universal knowledge from experiences seems empty. However, in Physica I, 1, he separated intuitive (γνώρισμος) knowledge from the absolute and gave the principles intuitively. Therefore, the acquisition of universal knowledge, which will be the principle from experience, will be realized intuitively. Here, the decision that repeating n times with experience will be true for the n+1th time will be an intuitive leap, and n+1 is the intuitive leap point. McKirahan says that there is no need for a fixed number of experiences to be realized for induction, in some cases even a single experience will be sufficient.[39]

[38] Watson, "Aristotle's Posterior Analytics: II. Induction," 146.

[39] Richard D. McKirahan, *Principles and Proofs: Aristotle's Theory of Demonstrative Science* (Princeton: Princeton University Press, 1992), 251.

In Aristotle's process, we see that this intuition is in the establishment of identity. For this reason, mathematical induction and Aristotle's induction are quite different processes. As we can see, this difference is both structural and in the process where intuition emerges. That is, while there is an acceptance of the existence of a universal proposition in induction, in Aristotle's induction there is the establishment of identity.

Human beings think that time will be infinite with the idea that every moment of time will come afterwards. This intuition is the acceptance that our life will be eternal with the arrival of a moment after the moment we live. Thus, man accepts death, but does not accept that he will die. This is the thought that connects people to life.

We cannot say that we have taken the same number of examples for the intuitive leap we would accept for an inductive evaluation about a common characteristic of the students in a class and for the intuitive leap about the common characteristic of a nation. This in itself reveals that there should be a statistical evaluation made within the inductive evaluation.

Conclusion

In conclusion, we have attempted to demonstrate that induction plays a pivotal role in Aristotle's scientific process and what this role entails. We have observed that induction is both an indispensable component of the scientific research process and a factor influencing its certainty. This process differs from today's scientific understanding.

Aristotle's understanding of induction was accepted as a mental-psychological process of humans. However, the fact that scientific findings are accepted not only as perceptions but also as a reality that science goes through its own experience process shows that the idea of science actually works with an inductive approach. Aristotelian science develops principles based on inductive inferences and this enables science to grow and develop. In

this context, we can observe that Aristotelian science has a structure that is prone to development rather than sterility. However, we agree that there is doubt about the absolute reliability of Aristotle's induction. In my opinion, this is a very useful situation for Aristotelian science. Because science can make intuitive breakthrough points by overcoming such doubts, and its reliability can increase as experience increases. Aristotelian science has a structure whose reliability increases as it develops. However, it will still have shortcomings due to its imprecision, and this will make questionability possible.

Haltmayer attributes the basic principle on which Aristotle's relation between induction and deduction is based on the fact that its own existence is an undoubted fact.[40] Thus, we should say that Aristotelian science is based on the principle of human existence, and Aristotelian science is human-centered. This shows that the search for perfection in today's understanding of science is not equivalent to the Aristotelian understanding of science. Therefore, we see that Aristotelian science is different from the modern understanding of science on the basis that it is human-centered through induction.

References

Aristoteles. *Aristotelis Opera*. Ed. Immanuelis Bekkeri. Academia Regia Borussica. Apud Georgium Reimerum, 1831.

Atademir, Hamdi Ragıp. *Aristo'nun Mantık ve İlim Anlayışı*. Ankara: Ankara Üniversitesi İlahiyat Fakültesi Yayınları, 1974.

Cajori, Florian. "Origin of the Name 'Mathematical Induction'." The *American Mathematical Monthly* 25, no. 5 (1918): 197–201.

Groarke, Louis. *An Aristotelian Account of Induction: Creating Something from Nothing*. Montreal: McGill-Queen's University Press, 2009.

Haltmayer, Stephan. "Prinzip im Anschlub vor Allem an die Zweite Analytik." *Felsefe Arkivi* 28 (1991): 165–74.

Harman, Gilbert, and Sanjeev R. Kulkarni. "The Problem of Induction."

[40] Haltmayer, "Prinzip im Anschlub vor Allem an die Zweite Analytik," 173.

Philosophy and Phenomenological Research 72, no. 3 (2006): 559–75.

Hintikka, Jaakko. “Aristotelian Induction.” *Revue Internationale de Philosophie* 34, no. 133-134 (1980): 422–39.

McCaskey, John P. “Freeing Aristotelian Epagoge from *Prior Analytics* II 23.” Apeiron: *A Journal for Ancient Philosophy and Science* 40, no. 4 (2007): 345–74.

McKirahan, Richard D. *Principles and Proofs: Aristotle’s Theory of Demonstrative Science*. Princeton: Princeton University Press, 1992.

Watson, John. “Aristotle’s Posterior Analytics: II. Induction.” *Philosophical Review* 13, no. 2 (1904): 143–58.