

AN ANALYSIS OF THE DEMARCATION PROBLEM IN PHILOSOPHY OF SCIENCE AND ITS APPLICATION TO HOMEOPATHY

Alper Bilgehan YARDIMCI*

ABSTRACT

This paper presents a preliminary analysis of homeopathy from the perspective of the demarcation problem in the philosophy of science. In this context, Popper, Kuhn and Feyerabend's solution to the problem will be given respectively and their criteria will be applied to homeopathy, aiming to shed some light on the controversy over its scientific status. It then examines homeopathy under the lens of demarcation criteria to conclude that homeopathy is regarded as science by Feyerabend and is considered as pseudoscience by Popper and Kuhn. By offering adequate tools for the analysis of the foundations, structure and implications of homeopathy, demarcation issue can help to clarify this medical controversy. The main argument of this article is that a final decision on homeopathy, whose scientific status changes depending on the criteria of the philosophers mentioned, cannot be given.

Keywords: Demarcation Problem, Scientific Status of Homeopathy, Falsifiability, Puzzle-solving, Anarchist Method, Pseudoscience

BİLİM FELSEFESİNDE SINIR ÇİZME SORUNUNUN ANALİZİ VE HOMEOPATİYE UYGULANMASI

ÖZ

Bu makale, bilim felsefesinin önemli konularından biri olan sınır çizme sorunu açısından homeopatinin bir ön analizini sunmaktadır. Bu bağlamda, Popper, Kuhn ve Feyerabend'in sınır çizme sorununa yönelik çözümleri sırasıyla verilecek ve onların ölçütleri, homeopatinin bilimsel durumu üzerindeki tartışmalara ışık tutacak şekilde uygulanacaktır. Homeopatinin Feyerabend tarafından bilim, Popper ve Kuhn açısından ise sözde bilim olduğu sonucuna varmak amacıyla, homeopati sınır çizme ölçütleri çerçevesinde incelenmektedir. Sınır çizme tartışması homeopatinin temellerini, yapısını ve sonuçlarını analiz etmek için yeterli araçları sunarak bu tıbbi tartışmayı netleştirmeye yardımcı olabilir. Bu makalenin temel argümanı, bahsi geçen filozofların ölçütlerine bağlı olarak homeopatinin bilimsel durumu hakkında nihai bir kararın verilemeyeceğidir.

Anahtar Kelimeler: Sınır Çizme Sorunu, Homeopatinin Bilimsel Durumu, Yanlışlanabilirlik, Bulmaca-çözme, Anarşist Metot, Sözdebilim

* Dokuz Eylül Üniversitesi Felsefe Bölümü Öğretim Elemanı.
b.alperyardimci@gmail.com

FLSF (Felsefe ve Sosyal Bilimler Dergisi), <http://flsfdergisi.com/>

2018 Bahar/Spring, sayı/issue: 25, s./pp.: 91-107.

ISSN 2618-5784

Makalenin geliş tarihi: 26.02.2018

Makalenin kabul tarihi: 09.04.2018

I. Introduction

In the history of science, the scientific status of disciplines has been mainly discussed in terms of their methodology, theory and research especially at the early stage of their development. The same situation appears in homeopathy as well. The scientific position of homeopathy is still a matter of debate from the beginning of its emergence until now. The discussion of what can be considered as science or what can be considered as pseudoscience is known as the demarcation problem. Assessing the demarcation problem from the viewpoint of the philosophy of science is related to how to distinguish science from non-science¹ or more specifically from pseudoscience².

Homeopathy can be classified as the specific example of the demarcation issue in the philosophy of science, particularly with its implication to practical fields. It is surprising to seeing that the philosophers of science have not sufficiently tended to this discipline. This work will try to fill this gap to do so. Firstly, the theoretical background of demarcation problem will be provided by Karl Popper, Thomas Kuhn and Paul Feyerabend. Subsequently, homeopathy will be examined in terms of their criteria. This article will finally present an investigation of homeopathy from the view of the philosophy of science, which tries to elaborate the debate over its scientific status.

II. Popper and His Method of Falsification

The idea of demarcating science from pseudoscience is largely argued by Popper. He considers pseudoscience as non-science³ and assesses the problem as the "key to most of the fundamental problems in the philosophy of science"⁴. The logical empiricist claims that science can be separated from non-science with the verification of facts and observations. However, Popper argues that verifiability cannot be a scientific standard of scientific theory or hypothesis⁵. Thus, the demarcation principle has to be falsifiable rather than verifiable: "statements or systems of statements, in order to be ranked as

¹ Resnik, D. B. (2000), "A Pragmatic Approach To The Demarcation Problem", *Studies in History and Philosophy of Science*, Vol. 31, No. 2, p. 249.

² Laudan, L. (1983), "The Demise Of The Demarcation Problem", in *Physics, Philosophy and Psychoanalysis Edition*, Dordrecht, Reidel, p. 112.

³ Evans, R. (2005), "Science, Technology, & Human Values, Demarcation Socialized: Constructing Boundaries and Recognizing Difference", *Sage Publications*, Vol. 30, No. 1, p. 4.

⁴ Popper, K. (2014), *Conjectures and Refutations: The Growth of Scientific Knowledge*, Routledge, London, p. 42.

⁵ Hansson, S. O. (2008), "Science And Pseudo-Science", *The Stanford Encyclopedia of Philosophy* (Winter 2017 Edition), Edward N. Zalta (ed.), forthcoming URL = <http://plato.stanford.edu/archives/win2017/entries/pseudo-science/>

scientific, must be capable of conflicting with possible or conceivable observations”⁶.

Theories are evaluated as scientific if they are incompatible with probable empirical observations, and conversely, if they are compatible with all possible observations. The important idea is that empirical arguments and evidences are able to characterize the science which can be falsified with these discoveries. This situation is clearly explained by Popper with his following writing:

“But I shall certainly admit a system as empirical or scientific only if it is capable of being tested by experience. These considerations suggest that not the verifiability of the system but the falsifiability of the system is to be taken as a criterion of demarcation. In other words, I shall not require of a scientific system that it shall be capable of being singled out, once and for all, in a positive sense; but I shall require that its logical form be such that it can be singled out, by means of empirical tests, in a negative sense: it must be possible for an empirical scientific system to be refuted by experience”⁷.

Besides, Popper refuses inductive logic, resulting precisely from its failure of offering a favourable demarcating feature of the empirical, non-metaphysical, character of a theoretical system⁸; alternatively saying, it is not able to present an appropriate standard for demarcation. Popper claims that the scientists, in fact, do not use induction in order to get accurate information in their works.

Nevertheless, in the traditional view such as philosophical opinions put forward by Bacon and Newton, the very first step is pure observation in the formation of theories. In other words, observations and experiments are initially used by the scientist after reaching the hypotheses or theories. Popper characterizes this problem as the problem of induction and he explained that *“It is usual to call an inference ‘inductive’ if it passes from singular statements (sometimes also called ‘particular’ statements), such as accounts of the results of observations or experiments, to universal statements, such as hypotheses or theories”⁹.*

Then he continues; *“now it is far from obvious, from a logical point of view, that we are justified in inferring universal statements from singular ones, no matter how numerous; for any conclusion drawn in this way may always turn out to be false: no matter how many instances of white swans we may have observed, this does not justify the conclusion that all swans are white”¹⁰.*

⁶ Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge*, p. 39.

⁷ Popper, K. (1959), *The Logic Of Scientific Discovery*, Hutchinson, London, pp. 40-41.

⁸ *ibid.*, p. 56.

⁹ *ibid.*, p. 4.

¹⁰ *ibid.*, p. 4.

We could summarise his attitude like 'theory prior to observation'. Induction could not be defined as a typically reliable method of scientific investigation and illation. For this reason, he declares that demarcating science from pseudoscience on the base of its inductive methodology cannot be possible. Therefore, his solution to this problem is deductive approach, which can be seen as follows:

*"If the singular conclusions turn out to be acceptable, or verified, then the theory has, for the time being, passed its test: we have found no reason to discard it. But if . . . the conclusions have been falsified, then their falsification also falsifies the theory from which they were logically deduced"*¹¹. Hence, Popper prefers advocating deductive testing of theories rather than inductive testing overall.

According to Popper, refuting the theory with conceivable events determines whether it is scientific or not. In other words, theory should be evaluated as scientific if it is falsifiable¹². Hence, falsifiability can be taken as a demarcation criterion but not verifiability. Each genuine test of a scientific theory, in that case, is an enterprise to refuse or to falsify it from a logical standpoint, and one true counter example falsifies the whole theory. For instance, when we observe lots of white swans, we cannot express this statement: 'all swans are white'. However, observing only one black swan will be enough to reach the statement that 'some swans are not white'. Accordingly, it can be said that although scientific laws are not completely verifiable, it is certainly falsifiable¹³.

Scientific results did, and can, come up in a variety of means and a scientist in a particular case might mis-formulate a theory for his or her own interest whilst it is of no consequence the philosophy of science is concerned. There is no practice like induction operating as the path to the destination of scientific theories. This view is also seen by Albert Einstein with his statement that *"there is no logical path leading to the highly universal laws of science. They can only be reached by intuition, based upon something like intellectual love of the objects of experience"*¹⁴.

From Popper's perspective, problems occur prior to observations in science. Furthermore, a well-known case can be illustrated here to understand this statement. Sir Isaac Newton discovered gravity, because the problem of falling objects on the earth arose first, then the observations in exploring the supporting experiments and evidences are conducted. It is also

¹¹ *ibid.*, p. 10.

¹² *ibid.*, p. 27.

¹³ Thornton, S. (1997), "Karl Popper", *The Stanford Encyclopedia of Philosophy* (Winter 2011 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/win2011/entries/popper/>.

¹⁴ Einstein, A. (1935), *The World As I See It*, Trans: A. Harris, John Lane, London, p. 125.

the common proceed in scientists researches that only after a problem is grappled can the plan of observations be constructed. Otherwise, following the inductive method (i.e. observations prior to problems) scientists would be obliged to observe every single event (including those which could be largely irrelevant, misleading and distracting) in real life to draw a trustworthy conclusion which is highly impossible¹⁵.

In the light of this criterion of demarcation, disciplines such as physics and chemistry are accepted as science among others. Even if Psychoanalysis has many valuable and authentic conclusions, it is evaluated as pre-science by Popper, since psychoanalytical theories could not reach the recognition standard as scientific theories until they are proved to be falsifiable. Popper argues that Astrology must be regarded as one of the basic examples of pseudo-science. Astrologers, as he identified and insisted through the focus on testability, do not shoulder the responsibility of the theory being falsified, such that any setback can be claimed as liable for without the whole theory being at stake:

“Astrologers were greatly impressed, and misled, by what they believed to be confirming evidence – so much so that they were quite unimpressed by any unfavourable evidence. Moreover, by making their interpretations and prophecies sufficiently vague they were able to explain away anything that might have been a refutation of the theory had the theory and the prophecies been more precise. In order to escape falsification they destroyed the testability of their theory”¹⁶.

Consequently, a theory can be evaluated as scientific when and only when it distinguishes the class of basic statements into the two non-empty sub-classes as follows:

- (a) *“First, the class of all those basic statements with which it is inconsistent (or which it rules out, or prohibits): we call this the class of the potential falsifiers of the theory.*
- (b) *Secondly, the class of those basic statements which it does not contradict (or which it ‘permits’)”¹⁷.*

We can put this more briefly by saying: whether a theory is capable of being falsified or not depends on the existence of its possible falsifiers.

¹⁵ Thornton, “Karl Popper”, 1997.

¹⁶ Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge*, p. 49.

¹⁷ Popper, *The Logic Of Scientific Discovery*, pp. 65-66.

III.Kuhn's Puzzle-Solving Criterion

Thomas Kuhn composed their own views, like many other philosophers, based on Popper's statements on the demarcation issue. Although Popper and Kuhn reached an agreement on what can be classified as science or pseudoscience (e.g. astronomy and astrology), they presented opposite philosophical stands in the argument of demarcation hallmark¹⁸.

As it can be seen from the former chapter, the major focus should be given to very unusual and infrequent cases when the whole theory is in peril. However, this method cannot be utilised to summarize the whole scientific approach in Kuhn's opinion¹⁹ (1974: 812). As he claimed: "*Popper's demarcation criterion is adequate and necessary for the distinguishing of empirical domains from non-empirical ones; but it is insufficient for distinguishing mature sciences from proto-sciences, or even from astrology, without the addition of a fair number of new elements*"²⁰.

Kuhn asserts that only in 'normal science' period, which occurs at the uncommon turning point of scientific revolution, the criteria can be found to distinguish science from other non-science attempts. "*In fact, there does exist a demarcation criterion which serves to distinguish mature sciences from all other disciplines, empirical and non-empirical alike: a special and characteristic kind of progress*"²¹.

In the normal science period, scientists' responsibility is to solve puzzles provided by 'paradigm', other than to question basic theories. The definition of paradigm is given in Kuhn's book, "The Structure of Scientific Revolutions", which also clarifies how a new paradigm replaces the old one in a scientific revolution. He argues that scientific progress, in contrast to common belief, is not only a permanent progress towards increasingly true theories but the idea that more truths about the world are generated by science is broken by revolutionary changes in paradigm²².

According to Kuhn, paradigm is the commonly accepted measurement concerning how to view the world by the scientific society²³. An old paradigm can be modified or changed by a new one when its puzzle-solving function dramatically lessens the confidence of scientists. This whole

¹⁸ Mayo, D. G. (1996), "Ducks, Rabbits, And Normal Science: Recasting The Kuhn's-Eye View Of Popper's Demarcation Of Science", *The British Journal for the Philosophy of Science*, Vol. 47, No. 2, p. 280.

¹⁹ Kuhn, T. (1974), "Logic Of Discovery Or Psychology Of Research?", *P.A. Schilpp, Open Court*, La Salle, p. 812.

²⁰ Quay, P. M. (1974), "Progress As A Demarcation Criterion For The Sciences", *Philosophy of Science*, Vol. 41, No. 2, p. 154.

²¹ *ibid.*, p. 154.

²² Kuhn, T. (1970), *The Structure Of Scientific Revolutions*, 2nd ed., University of Chicago Press, Chicago, p. 82.

²³ *ibid.*, p. 98.

development can be considered a scientific revolution. As the new paradigm is normally superior to the old one in solving puzzles, the scientific society hence replace its common beliefs to this new standard and method (while in some occasions it is due to the former generation of scientists ending or losing powers). After the new paradigm is generally accepted and the revolution comes to an end, we then reach the period which Kuhn names as ‘Normal-science’²⁴.

The new paradigm is distinguished from the old one and it is not compulsorily closer to the truth in general. While a new paradigm is able to solve puzzles, the old one is not able to respond to the problems of the earlier by using a different conception of science. That is why the older paradigm could be neglected due to lack of interest, fashion and so on.

When it comes to puzzle-solving, the present theory is both affirmed and needed to provide the definition to the puzzle. From Kuhn's perspective, *“it is normal science, in which Sir Karl's soft of testing does not occur, rather than extraordinary science which most nearly distinguishes science from other enterprises”*²⁵, and that is why a demarcation criterion must acquire the reference of the relevant testing in normal science. It is the ability of puzzle solving that is seen as the demarcation criterion for Kuhn and he sees it as the main characteristic in normal science²⁶.

A comparison of astronomy and astrology can be illustrated here to offer a more explicit understanding of Kuhn's opinion on demarcation. Astronomy has a puzzle-solving action and should be classified as science consequently. For instance, if an astronomer experience scientific failures in his theory, he can solve the emerging puzzle by improving measurement methods, correcting formulas or adjusting the theory. Conversely, there is no such puzzle for astrologers since in that area *“particular failures did not give rise to research puzzles, for no man, however skilled, could make use of them in a constructive attempt to revise the astrological tradition”*²⁷, which results in the fact that astrology has never been a real science. Neither because of the failure of being falsifiable nor even because of the explanations of failed assumptions from astrologers. It is the puzzle-solving engagement to be key in distinguishing science and non-science disciplines²⁸.

However, Popper expressly shows his disagreement on Kuhn's demarcation criterion that considering the capability of puzzle-solving as the standard to demarcate science from pseudoscience can be misleading²⁹. Since

²⁴ *ibid.*, p. 112.

²⁵ Kuhn, “Logic Of Discovery Or Psychology Of Research?”, p. 801.

²⁶ *ibid.*, p. 803.

²⁷ *ibid.*, p. 804.

²⁸ Hansson, “Science And Pseudo-Science”.

²⁹ Popper, K. (1974), *Reply to My Critics*, Open Court, La Salle, p. 977.

there are various puzzle solving activities can be found in astrologers' work, according to Popper, and hence Kuhn's criterion commits him to define astrology as a science. Unlike Kuhn, Popper grouped puzzles to "*minor problems which do not affect the routine*" but he supposed Kuhn's assertion can create "*the major disaster*" of a "*replacement of a rational criterion of science by a sociological one*"³⁰.

IV.Feyerabend and Anarchist Method

Paul Feyerabend is also concerned with the demarcation problem in science as he approached the problem from a different point of view. According to Steedman, Feyerabend is one of the most efficient and productive figures in the philosophy of science, since scientific methods and theories of knowledge have been affected by Feyerabend because of his unusual and anarchist scientific methodology³¹.

Defining the meaning of anarchy can help us to understand his anarchist views clearly. Drawn from the Oxford Dictionary, anarchy means "*a state of disorder due to absence or non-recognition of authority or other controlling systems*"³². From this point, the idea that the rigid rules, regulations and laws of science are stipulated by scientists, was rejected by Feyerabend³³.

It might appear that he did not use a scientific method to gain accurate and precise information. In fact, Feyerabend obtains plenty of precise information from scientific research through his anarchist method. Moreover, he established his own anarchist theory of knowledge and tried to explain the anarchist method in his book 'Against Method'. The main claim in the anarchist method of Feyerabend is as follows; "*there are no methodological rules or prescriptions that are immune from criticism in the production of scientific knowledge. If anyone insists on a rule it must be 'anything goes' or something equally vacuous*"³⁴. From this quote, it can be seen that Feyerabend was against any rules and methods of science, because he claimed that strict rules and laws in science impede the growth of knowledge³⁵. For these reasons, the appropriate scientific methodology for Feyerabend was described as 'anything goes'. He coined the 'anything goes' as

³⁰ Popper, *Reply to My Critics*, pp. 1146-1147.

³¹ Steedman, P. (1982), "Theory and Society", *Springer*, Vol. 11, No. 5, p. 724.

³² Oxford Dictionaries, *Anarchy*, 2018.

³³ Hands, D. W. (1977), "Against Method: Outline Of An Anarchistic Theory Of Knowledge By Paul K. Feyerabend", *Journal of Economic Issues*, Vol. 11, No. 4, p. 898.

³⁴ Steedman, "Theory and Society", p. 725.

³⁵ Nagel, E. (1977), "Against Method: Outline Of An Anarchistic Theory Of Knowledge By Paul K. Feyerabend", *American Political Science Association*, Vol. 71, No. 3, p. 1134.

a scientific method in order to use in his own scientific works rather than other methods.

Additionally, Feyerabend also maintained his anarchist method for the demarcation problem. He had been questioning that the commonly disputable issue about demarcation was insidious since practically a demarcation criterion is not the determinant in science development given another thought. But some philosophers, instead, were searching a justification of position from which public discourses can be under the domination of science³⁶.

As Feyerabend argued, science does not actually possess a unique region following its logic or method meanwhile there was no claim made by scientists to particular authority can be formally and universally endorsed³⁷. Dating back from the very elementary scientific exercise, there has been no rule or means not to be broken down or opposed for the purpose of progressing scientific awareness. Science cannot emerge automatically without human's consistent questioning and intellectual pursuing³⁸. It can be evaluated that the border of science is meaningless because science, in fact, itself does not need a demarcation criterion.

The key point is that he did not totally reject non-scientific alternatives as distinguished from the Popper and Kuhn. For example, non-scientific options in pharmaceutical activities such as selecting alternative medicines sometimes might work better than some scientific procedures (due to the limited knowledge of the involvers at a certain time etc.). For instance, controlling diabetes could be easier with some alternative medicines than normal medicines. Feyerabend claimed that science should not be conceived as the one and only source of knowledge. As asserted by Feyerabend, religions and astrology cannot be used for researches but evaluated as caricatures of the real science and that is why they can only provide us some partial information other than broadening our horizons of knowledge³⁹. However, it is clear that science, on the whole, is more effective than traditional beliefs⁴⁰.

³⁶ Taylor, C. A. (1996), *Defining Science: A Rhetoric of Demarcation*, University of Wisconsin Press, Wisconsin, p. 113.

³⁷ Feyerabend, P. (1978), *Science In A Free Society*, Verso, London, 1978, p. 19.

³⁸ Feyerabend, P. (1975), *Against Method: Outline of an Anarchistic Theory of Knowledge*. Verso, London, p. 56.

³⁹ *ibid.*, p. 78.

⁴⁰ *ibid.*, p. 82.

V.Homeopathy Under the Lens of Demarcation Criteria

Homeopathy is the pharmacological discipline based on the doctrine of Similia Similibus Curentur⁴¹ - let likes be cured by likes - and is defined by the Oxford English Dictionary as "a system of complementary medicine in which ailments are treated by minute doses of natural substances that in larger amounts would produce symptoms of the ailment"⁴². The history of homeopathy dates back to the works of Samuel Hahnemann in the late 18th century, who first coined the word 'homeopathy'. The concept of homeopathy is originated from the words of 'homoios' and 'pathos', using as 'similar' and 'suffering' in Greek language respectively.

Although Hahnemann graduated from the medical department, he maintained his life by translating medical and scientific books since he left practicing of medicine due to its chaotic position in his time. He "became disenchanted with the unhygienic and often brutal medical techniques such as purging, emetics, bloodletting, and the use of large doses of chemical agents such as mercury and arsenic that were used in the late 1700s"⁴³. He thinks that science and its consequences was not controlled by any certain law and principle⁴⁴. Under these doubts while translating a part of Scottish physician Dr. William Cullen's *Materia Medica* from English to German, a fanciful method of treatment implemented with cinchona bark attracted Hahnemann's attention and he started to seek the questions of "How the drugs act and cure diseases? How cure occurs? Why diseases become chronic and what are the obstructions to cure?"⁴⁵ (1984: vi). These are accepted as the fundamental questions of the medicine as well. After that he worked on various substances by experimenting them on himself and others in order to improve new treatment technique, homeopathy. Finally, he reached the point that "what a substance can produce in a healthy person can also cure in a sick person"⁴⁶.

As it is known that Hahnemann ceased to work on medicine due to its lack of law and principle. He thinks that old-fashioned medicines concentrated on methods of treatments that were excessive and constantly gave more harm than good. In his own words "It is not I who is at fault, it is the art of medicine which is wrong. I know that I can prescribe as well as the best of

⁴¹ Vithoukcas, G. (2002), *The Science of Homeopathy*. B. Jain Publishers, New Delhi, p. 9.

⁴² Oxford Dictionaries, *Homeopathy*, 2018.

⁴³ Synovitz, L. B. and Larson, K. L. (2013), *Complementary and Alternative Medicine for Health Professionals: A Holistic Approach to Consumer Health*, Jones and Bartlett Learning, Burlington, p. 128.

⁴⁴ Vithoukcas, *The Science of Homeopathy*, p. 4.

⁴⁵ Hahnemann, S. (1984), *Organon Of Medicine*, 6th. Edition, Trans. RE Dudgeon, B Jain, p. VI.

⁴⁶ Vithoukcas, *The Science of Homeopathy*, p. 4.

*those who now give medicine, but if I am convinced that the sick will do better with no medicine at all – God help me! I will practice no more*⁴⁷. After discovering⁴⁸ (or developing) homeopathy, he claims that homeopathy is able to resolve these shortcomings and it could cure all or virtually all diseases⁴⁹.

Hahnemann explains his arguments about homeopathy in his book ‘Organon of Medicine’. On the basis of his views, the principles of homeopathy can mainly be grouped under five main titles.

- The fundamental principle is law of similar in homeopathy. Through research and practice, he claimed that the body is capable of healing itself and the ‘like cures like’ principle is the main argument for the treatment of person at first. A substance producing disease in a healthy person is used to reveal a remedial reaction in someone who possess a similar disease⁵⁰ (Hahnemann, 1984: paragraph 22-28).
- The second principle of homeopathy is the idea of fundamental force which is named as ‘Vital Force’. According to this principle, Vital Force organizes all the functions and sensations of the body. Holistic approach is seen in this principle, when a person gets sick, sickness affects not only his/er body but also his/er mind and spirit. Disease and related symptoms show up because of the instability of Vital Force. Proper homeopathic remedy helps to stimulate and strengthen the person's immune system and eliminates the symptoms of disease while balancing the Vital Force.
- The third principle concerns the making and the implementation of the drug, the ‘Potentized Remedy’. In contrast to other medicines, homeopathic cures made from natural substances which is extracted from plants, minerals or animals. These medicines are seriously diluted during preparation process and they are shaken by being hit on a hard surface before application, because it is found that more dilution of substance reduces the side effect of medicines. So that the dynamic nature of the drug is activated by this way.
- The fourth and the fifth principle are minimum dose and single remedy. In the homeopathic treatment method, the least amount of medicine is given to the patient in order to increase beneficial effects and decrease side effects of it. The patient's response to the drug is

⁴⁷ *ibid.*, p. 4.

⁴⁸ Even if the discipline of homeopathy was known by Hippocrates and Paracelsus before, Hahnemann was the first person to provide practical application to homeopathy in the art of healing (Vithoulkas, 2002: 3).

⁴⁹ Loudon, I. (2006), “A Brief History Of Homeopathy”, *Journal of the Royal Society of Medicine*, Vol. 99, No. 12, p. 608.

⁵⁰ Hahnemann, *Organon Of Medicine*, paragraph 22-28.

effective in determining the dose of the drug. Only one homeopathic cure is given at any one time.

As it can be seen that the discipline of homeopathy generally based on the law of similars, Vital Force, potentized remedy, minimum dose and single remedy. What is important in the homeopathic treatment method is the patient and individual, not the disease. While contemporary medicine aims to destroy microbes, homeopathy activates the defence mechanism of the body to overcome the disease by the theory of similarity. Like cures like is the concept of personalized treatment, which distinguishes homeopathy from a contemporary medicine with a sharp line. According to this theory; there is no sickness, there are sick people. To conclude, homeopathy treats the individual rather than the disease and the treatment is individualised for each patient.

To discuss scientific status of homeopathy it was initially observed that homeopathy wants to make sick people healthy like other medical approaches with its particular techniques and practices. In general sense, the scientific status of homeopathy is discussed by two questions, which include theoretical and empirical inquiry.

- *“Is there a plausible theory that explains how homeopathy could work? Is it the sort of intervention that we would expect to be effective, given what we know about the world?”*
- *“Is there empirical evidence that homeopathy is effective?”⁵¹.*

Those who criticize homeopathy generally state that it is insufficient to answer these two questions. Any empirical evidence cannot be found in this discipline. Even if there is, it would be inadequate and unsatisfactory for the validity of homeopathy. From a theoretical perspective, homeopathy is not seen as reasonable as chemistry and medicine since we have no idea about how it works. That is why, homeopathy should not be considered as science.

On the other hand, supporters of homeopathy are divided into three parts. First, they assert that there are ample explanations about how homeopathy can be effective. Second, the others claim that they don't need a theory which explains how homeopathy works, because the evidence of its effectiveness is quite powerful. The last, they question the necessity of scientific explanations, since they think that homeopathy has a different paradigm and cannot be evaluated by the criteria of western science.

⁵¹ Sehon, S. and Stanley, D. (2010), “Evidence And Simplicity: Why We Should Reject Homeopathy”, *Journal of Evaluation in Clinical Practice*, Vol. 16, No. 2, p. 276.

VI. Conclusion

The discussion whether homeopathy is science or pseudoscience enters specifically into the field of philosophy of science. It is known that Popper, Kuhn and Feyerabend approach this issue from a different point of view. According to them, the discipline of homeopathy has to meet their demarcation criteria (if any) to be considered as science.

Many claims in homeopathic method are based on the former studies which show positive results. In homeopathy, it is accepted that if a treatment was effective and helped to recover many people in the past, it will be effective in the future. As Hahnemann states in his book; *“we could cite very many examples of homoeopathic cures brought about by natural diseases with similar symptoms. But since we require precise and indubitable data we shall confine ourselves to the small number, always true to type, arising from unvarying miasms, which give them a distinct name. Smallpox, prominent among them and so notorious for its many violent symptoms, has removed and cured a host of ills that have similar symptoms. How common are the ophthalmias of smallpox and how violent, even to blindness! Through inoculation smallpox completely and permanently cured chronic eye inflammation in a case cited by Dezoteux and in another cited by Leroy. A person who was blind for two years after the suppression of a scalp eruption completely recovered his sight after smallpox, according to Klein”*⁵². This method of reasoning is acknowledged as induction: to achieve universal statements through inference from the particular statements, which is found by Popper as an unpleasant way of obtaining scientific knowledge. As Popper says that the method of induction cannot be used in scientific research since it is not able to provide accurate information to researchers. However, application of homeopathic treatment relies on induction. Homeopathy requires verification in order to maintain its scientific position. However, Popper presents the principle of falsification in order to assess theories as scientific. He states that verification of data cannot strengthen the scientific status of homeopathy because it is not the criterion that distinguishes science from pseudoscience. As long as a theory is falsified by facts, it can be accepted as science. In other words, no matter how many instances of disease we observe, this does not justify the conclusion that all diseases are treated by homeopathy. Even if the treatment made by homeopathy was wrong, it would not be blamed by its supporters, because they would seek different approach or experiment to justify their theory with their findings rather than denying it. From Popper’s point of view, his criteria would not be met by homeopathy, because he would claim that homeopathic claims must be falsifiable to be considered scientific. For this reason, homeopathy should be considered as pseudoscience from his point of view.

⁵² Hahnemann, *Organon Of Medicine*, paragraph 46.

Besides, Popper wants to demarcate not only pseudoscience but also metaphysics from science as he refuses metaphysical statement because it impedes the development of science. According with Popper’s demarcation between empirical science and metaphysics, to belong to empirical science, a hypothesis or theory must have empirically testable consequences, but the idea of Vital Force in Homeopathy is not based on facts and cannot be tested by experiment. The concept is used as metaphysically by Hahnemann: “*in the state of health the spirit-like vital force (dynamis) animating the material human organism reigns in supreme sovereignty*” (1984: paragraph 9). That is why, it should be considered as non-science or even metaphysics, but it can optimistically be considered by Popper that homeopathy may be a useful guide to science like Democritus’ contribution to atomic theory.

From Kuhn’s perspective, if a discipline is being dominated by a paradigm that constitutes puzzles to be solved, it can be regarded as mature science. Kuhn states that in normal science period, paradigm is not under debate and leaves no more obscure or important question. However, homeopathy does not meet the requirements of paradigm given by Kuhn, because the scientific status of homeopathy and its application to medicine such as the Potentized Remedy are still open to discussion. Homeopathy does not have puzzle solving tools and workable paradigm to successfully guide its work. It leaves questions unanswered and is not able to solve puzzles. Homeopaths and supporters of homeopathy claim that their theory belong to the part of a new paradigm for medicine, Kuhn would find this claim unfounded, since homeopathy cannot discard competing paradigms and cannot defeat current western medicine. Actually, homeopathy has no paradigms at all. That is why, homeopathy would be accepted by Kuhn as non-science and classified not in the period of normal science but in the period of pre-science due to lack of dominating paradigm.

Lastly, Feyerabend’s stance is more radical than others. He argues that there is no scientific method common to all scientific discipline and therefore ‘anything goes’ in science. Feyerabend’s analyses of science can be applied to homeopathy as well. Feyerabend refuses any methods in science and rejects the idea that the method of Western science is superior to the methods of other sciences, which is why he finds any methods or demarcation criteria unnecessary in science. From his perspective of ‘anything goes’, homeopathy might be considered to be a scientific theory and it can be judged as science like western medicine.

To sum up, drawing the boundaries of science is one of the significant problems in the philosophy of science, and this problem has been discussed by many philosophers. Three main approaches have been examined within this paper related to the problem of demarcation in science and its application to homeopathy: the falsifiability criterion used by Popper, the puzzle-solving tool given by Kuhn, and the anarchist method created by Feyerabend.

Popper and Kuhn’s approaches might be considered as two opposite sides. While Popper claims that the falsification is the proper way to divide science and pseudoscience, Kuhn argues that puzzle solving plays a crucial role for showing the differences of science from other disciplines. However, Feyerabend’s approach is radically different from Popper and Kuhn, because he denies any methodological rule which restrains the science in a negative way. As a result of their criteria being applied to homeopathy, it is completely pseudoscientific and should be denied from Popper’s side. In terms of Kuhn, homeopathy is prescientific, it first needs to create its paradigm and then develop a period of normal science. For Feyerabend, homeopathy can be considered as science. As a review of their findings, it can be understood that comprehending the scientific status of homeopathy varies depending on their criteria. For this reason, it is not possible to make certain decision on its scientificity.

"An Analysis of the Demarcation Problem in Philosophy of Science
and its Application to Homeopathy"
Alper Bilgehan YARDIMCI

REFERENCES

- Einstein, A. (1935), *The World As I See It*, Trans: A. Harris, John Lane, London.
- Evans, R. (2005), "Science, Technology, & Human Values, Demarcation Socialized: Constructing Boundaries and Recognizing Difference", *Sage Publications*, Vol. 30, No. 1, pp. 3-16.
- Feyerabend, P. (1975), *Against Method: Outline of an Anarchistic Theory of Knowledge*. Verso, London.
- Feyerabend, P. (1978), *Science In A Free Society*, Verso, London, 1978.
- Hahnemann, S. (1984), *Organon Of Medicine*, 6th. Edition, Trans. RE Dudgeon, B Jain.
- Hands, D. W. (1977), "Against Method: Outline Of An Anarchistic Theory Of Knowledge By Paul K. Feyerabend", *Journal of Economic Issues*, Vol. 11, No. 4, pp. 897-899.
- Hansson, S. O. (2008), "Science And Pseudo-Science", *The Stanford Encyclopedia of Philosophy* (Winter 2017 Edition), Edward N. Zalta (ed.), forthcoming URL = <http://plato.stanford.edu/archives/win2017/entries/pseudo-science/>.
- Kuhn, T. (1970), *The Structure Of Scientific Revolutions*, 2nd ed., University of Chicago Press, Chicago.
- Kuhn, T. (1974), "Logic Of Discovery Or Psychology Of Research?", *P.A. Schilpp, Open Court*, La Salle, pp. 798-819.
- Laudan, L. (1983), "The Demise Of The Demarcation Problem", in *Physics, Philosophy and Psychoanalysis Edition*, Dordrecht, Reidel, pp. 111-128.
- Loudon, I. (2006), "A Brief History Of Homeopathy", *Journal of the Royal Society of Medicine*, Vol. 99, No. 12, pp. 607-610.
- Mayo, D. G. (1996), "Ducks, Rabbits, And Normal Science: Recasting The Kuhn's-Eye View Of Popper's Demarcation Of Science", *The British Journal for the Philosophy of Science*, Vol. 47, No. 2, pp. 271-290.
- Nagel, E. (1977), "Against Method: Outline Of An Anarchistic Theory Of Knowledge By Paul K. Feyerabend", *American Political Science Association*, Vol. 71, No. 3, pp. 1132-1134.
- Oxford Dictionaries (2018), *Homeopathy And Anarchy*. (08.01.2018). <https://en.oxforddictionaries.com/definition/homeopathy> and <https://en.oxforddictionaries.com/definition/anarchy>
- Popper, K. (1959), *The Logic Of Scientific Discovery*, Hutchinson, London.
- Popper, K. (1974), *Reply to My Critics*, Open Court, La Salle.

- Popper, K. (2014), *Conjectures and Refutations: The Growth of Scientific Knowledge*, Routledge, London.
- Quay, P. M. (1974), "Progress As A Demarcation Criterion For The Sciences", *Philosophy of Science*, Vol. 41, No. 2, pp. 154-170.
- Resnik, D. B. (2000), "A Pragmatic Approach To The Demarcation Problem", *Studies in History and Philosophy of Science*, Vol. 31, No. 2, pp. 249-267.
- Sehon, S. and Stanley, D. (2010), "Evidence And Simplicity: Why We Should Reject Homeopathy", *Journal of Evaluation in Clinical Practice*, Vol. 16, No. 2, pp. 276-281.
- Steedman, P. (1982), "Theory and Society", *Springer*, Vol. 11, No. 5, p. 724-728.
- Synovitz, L. B. and Larson, K. L. (2013), *Complementary and Alternative Medicine for Health Professionals: A Holistic Approach to Consumer Health*, Jones and Bartlett Learning, Burlington.
- Taylor, C. A. (1996), *Defining Science: A Rhetoric of Demarcation*, University of Wisconsin Press, Wisconsin.
- Thornton, S. (1997), "Karl Popper", *The Stanford Encyclopedia of Philosophy* (Winter 2011 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/win2011/entries/popper/>.
- Vithoukias, G. (2002), *The Science of Homeopathy*. B. Jain Publishers, New Delhi.

“An Analysis of the Demarcation Problem in Philosophy of Science
and its Application to Homeopathy”
Alper Bilgehan YARDIMCI