Does all knowledge have an epistemic foundation? If so, then explain what such foundations must be like and evaluate how extensive our knowledge is in the light of this requirement. If not, then explain why.

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INTRODUCTION

Knowledge requires a justified true belief. Beliefs are justified only when they can be supported by a reason which makes them likely to be true. The reasons themselves, however, can require further justification. One philosophical position – called foundationalism – holds that knowledge can be based on beliefs with a special epistemological status called "epistemic foundation". In this essay I will argue that, not only foundationalism, but all knowledge has an epistemic foundation, and I will explain what such foundations are likely to be.

THE STRUCTURE OF KNOWLEDGE

The Greek philosopher Plato defined knowledge as "justified true belief". Although this definition is now considered insufficient for knowledge, Plato's proposition that knowledge consists of "beliefs" is still widely accepted. Justification also remains a plausible necessary condition for knowledge, since the acceptance of an unjustified belief requires a leap of faith – a notion which runs contrary to the notion of "knowledge". In epistemology – the study of knowledge – justification is understood as "support", "ground", or "reason" which can be offered in favour of a belief. The only way to support or ground a belief is by offering a further belief. Doing so, however, invites the question "What grounds the supporting belief?". This problem – known as The Agrippa's Trilemma – is attributed to the Greek philosopher Agrippa the Sceptic. It can be summarised in the following way:

All attempts to defend a belief invite one of the following three alternatives:
- an infinite chain of justification in which each supporting belief appears once – called a *regressive argument*.
- a circular chain of justification in which a supporting belief re-appears – called a *circular argument*.
- a chain of justification which ends when no further justification is provided – called an *axiomatic argument*.

The regressive argument can be illustrated with the fable that the Earth is supported by a giant turtle. This inevitably invites the question "What supports the turtle?" Even if we are prepared to accept that there is something supporting the turtle, and so on "all the way down", we will not be able to arrive at a secure foundation, as each support requires a further support, and so on, indefinitely.

A prominent example of a circular argument is the attempt to define the notion of "fairness". Most of us believe that fairness is a form of justice, yet when challenged to define "justice" we would likely use the word "fairness". Doing so, however, brings us back to our initial position, which means that defining "fairness" with "justice", and – subsequently – "justice" with "fairness" – has not furthered our understanding of the concept. This makes it difficult to see how circular arguments can make genuine contributions to knowledge.

An example of axiomatic argument is "The internal angles in any triangle add up to exactly 180 degrees". This statement – made by Euclid – was asserted rather than defended, and it seemed so obviously true that any theorem proven from it was also deemed true. Yet the truth of this statement was challenged when Spherical Geometry was introduced in the 19th century.

THE WAY EACH ALTERNATIVE IS DEFENDED

Agrippa's trilemma can be unsettling, as none of its three alternatives can be said to be capable of securely grounding a belief – the support provided within each alternative is left exposed to further challenges. However, all three alternatives have been defended by philosophers as being capable of providing an adequate support for a belief, and therefore each is potentially capable of contributing to knowledge.

A prominent defence of the circular argument is W. V. O. Quine's claim that even circular beliefs can be justified by virtue of coherence with a background web of beliefs forming one's worldview. This view, called *coherentism*, comes with a proviso that only a sufficiently large circle of justification can play such supporting role (Quine, 1969).

The defence of axiomatic arguments – called *foundationalism* – rest on an assumption that some beliefs are self-evidently true, and, therefore, self-justifying. Descartes, for instance, argued that the foundation of knowledge were beliefs "immune to doubt" (Descartes, cited in Pritchard, 2014: 37).

A defence of the regressive argument – called *infinitism* – was provided by Peter D. Klein, who claims that "The Principle of Avoiding Circularity" and "The Principle of Avoiding Arbitrariness" leave infinitism as the only viable alternative to coherentism and foundationalism (Klein & Turri, 2019).

THE FRAMEWORK OF JUSTIFICATION
Although Foundationalism, Coherentism and Infinitism rely on three different defence methodologies, all three use a shared set of principles, introduced by Plato and Aristotle. Together, they are said to form the "laws of logic" and have been the orthodoxy in Western logic for over 2,000 years.

One of them is the Principle of Identity which states that any proposition is identical to itself, in other words A is identical to A. Another is the Principle of Excluded Middle – or *Tertium Non Datur* in Latin – which states that for any proposition, either the proposition itself is true or its negation is true; every claim must be either true or false, and no other options are given. Perhaps the most important of the set is the Principle of Non-Contradiction, which states that contradictory propositions cannot be true simultaneously – if A contradicts B, either A can be true or B can be true; and if one of them is true, the same – or its equivalent – cannot be false at the same time. A reason for insisting on the Principle of Non-Contradiction is yet another principle: "From contradiction anything could follow" – contradictions have been compared to "explosions" which shatter the coherent chain of logic, leading to absurd results. An abhorrence of contradiction is apparent in the writings of many philosophers; Avicenna (Ibn Sina) allegedly declared that anyone who denies the law of non-contradiction should be beaten and burned until he admits that to be beaten is not the same as not to be beaten, and to be burned is not the same as not to be burned.

The role of these principles in epistemology can be compared to Kuhn's *disciplinary matrix* (Kuhn, 1970: 182). According to Kuhn, before a scientific inquiry can begin, the scientific community must first agree upon answers to fundamental questions, such as: what are the central questions in a particular discipline, what counts as evidence, what counts as a solution to a problem, and so on. A disciplinary matrix is a set of answers to such questions. These answers provide the *framework* within which the discipline operates. They also encompass scientists' shared values – for instance, preferred types of explanation over other explanations, and so on (Kuhn, 1970: 182).

If we accept that epistemologists and logicians are a community of enquirers, before their epistemic investigation can even begin, they must agree upon answers to fundamental questions, such as: which principles are central to logic, what counts as justification for a belief, and so on. The Principle of Identity, the Principle of Excluded Middle, and the Principle of Non-Contradiction, together with the principle "Only true justified beliefs count as knowledge" provide the basic answers – and

therefore, the *framework* – within which epistemology operates. These principles also encompass epistemologists' and logicians' shared values, for instance, their abhorrence of contradiction and their insistence on coherent chains of propositions.

It is not obvious, however, that these classic logic principles are not arbitrary, since they succumb to the third horn of Agrippa's Trilemma: they have been asserted with no justification other than abhorrence of contradiction and insistence on coherence. Moreover, modern logicians have adopted some radically new principles, which cannot be said to be building onto the classic ones. Fuzzy Logic, for instance, is an important alternative approach to the Principle of Excluded Middle, as well as to the Principle of Non-Contradiction. This new type of logic – introduced in 1965 by Lotfi Zadeh – stems from the belief that not all propositions fit neatly within a binary option of truth vs falsity. Instead, fuzzy logic considers propositions on a continuum of *degrees* of truth, which can range from perfect truth to perfect falsity, and anything in between (Zadeh, 1965). For example, the presence of autism is a matter of degree within a *spectrum*. Crucially, Fuzzy Logic rejects the claim that contradictory propositions cannot be both true and false simultaneously, as it allows for borderline cases in which a statement could be simultaneously half-true and half-false (Zadeh, 1965).

CONCLUSION

The development of Fuzzy Logic counts in favour of seeing the classic logic principles not as "laws" of logic, but as *foundational beliefs*. If this is accepted, we would be compelled to admit that all knowledge defence methodologies are foundationalist in some respect. Even Coherentism and Infinitism progress from a set of assumptions believed to be self-evidently true. Crucially, a defence methodology cannot even begin without a set of foundational beliefs, since such beliefs form the very structure of knowledge justification. And if we accept that all knowledge justification progresses from a set of foundational beliefs, we must also accept that such beliefs form the foundations of knowledge. It would follow that all knowledge has epistemic foundation.

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