

# **Theory of Knowledge Essay**

Are facts alone enough to prove a claim? Discuss with reference to any two areas of knowledge.

**Word count: 1600**

## Exploration - Main Content

“Are facts alone enough to prove a claim?” With a lens focusing on two distinct areas of knowledge - Natural and human science- we will journey into the complex interplay of facts, interpretation, and evidence, uncovering whether the solidity of facts is truly adequate to substantiate a claim. For this essay, a fact will be defined in the context of the natural and human sciences. A fact is an observation or statement that has been confirmed through empirical evidence and rigorous scientific methodology.

Throughout the history of the human gain of knowledge, facts have always been used to provide additional evidence to prove whether a claim is true or not. In the natural sciences, empirical observations and experiments create the building blocks of understanding phenomena from a microscopic to a cosmic scale. Without evidence, in the form of facts, a claim could only be supported by a subjective and personal point of view, which can be detrimental to the persuasion of the claim. However, in the human sciences, the interpretation of data often requires a hypothesis or a theory showing that bias is almost always existent, meaning that a claim always needs a personal affirmation or bias to be created. Despite that, in terms of proving the claim, facts are not necessarily needed. Both of these claims whether facts alone are or not enough to prove a claim will be discussed throughout this essay.

An example of the natural sciences that effectively portrays both claims is Dark matter. Dark matter is a term created by Swiss astronomer Fritz Zwicky in 1933, the term was created to explain gravitational phenomena in the universe.<sup>1</sup> However, its existence remains an unproven theory. It is a fact that visible matter such as stars, galaxies, and galaxy clusters, rotate at speeds that should tear them apart if only the visible matter’s gravitational effects are

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<sup>1</sup> de Swart, J. (2019)

considered.<sup>2</sup> Thus, a claim may be made: Dark matter must exist to account for unseen matter providing the additional gravitational effects keeping the visible matter from tearing apart. Visible matter solely, can't explain these phenomena. There is factual evidence of gravitational effect anomalies on visible matter calculated through gravitational lensing, thus some sort of phenomena, dubbed dark matter, must exist to create these anomalies. However, these gravitational effects alone do not prove the existence of dark matter, in fact, it merely suggests our lack of understanding of the composition of the universe. Dark matter is one possible explanation, but as commonly seen in the search for knowledge in the natural sciences, there most likely isn't only one answer. Without direct or empirical evidence of the actual existence of dark matter (Scientists have yet to observe or measure dark matter so it may not exist at all) the gravitational anomalies found throughout the universe could decisively be caused by other unknown forces or phenomena that have not yet been discovered. As seen in various debunked theories throughout all of natural science, for example: in astrophysics, The Steady State theory, debunked through cosmic microwave background radiation,<sup>3</sup> The Geocentric Model, Planet Vulcan, and more. Theories in science are rarely certain to be safe from being debunked later on with further undiscovered research. Thus there is no actual way to prove the theory of dark matter with solely the fact that there are unexplainable phenomena on visible matter.

While theories like dark matter remain unprovable, fields like palaeontology offer claims that are directly validated by discoverable evidence, such as fossils. The existence of fossil records provides evidence of the existence of prehistoric life but it's not definite proof due to various factors. Palaeontology dates back to the 18th century, however fossil records date as far back as 3.5 billion years ago through Cyanobacteria from Archaean rocks.<sup>4</sup> It is a

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<sup>2</sup> NASA (2011)

<sup>3</sup> The Editors of Encyclopedia Britannica (2019)

<sup>4</sup> Berkeley.edu. (2020)

fact that there are fossils hidden beneath the sediment through various processes of natural preservation in particular geographical areas. Thus the claim is made that the presence of fossils alone is enough to prove that dinosaurs once roamed a particular geographical area. This demonstrates how concrete facts in the form of fossil evidence are essential in validating historical claims in the natural sciences, and that these facts alone are enough to prove the existence of prehistoric life. However, the absence of fossils does not necessarily conclusively prove that prehistoric life did not exist in that given geographical area, because fossils may have not yet been discovered or have been destroyed in the area. In addition, even with the presence of fossils in the given area, it is not 100% definite that the lifeform fossil discovered is from that particular area, since it may have relocated itself while it was alive, moved by currents in the sea or rivers, was naturally moved by the separation of Pangea (The prehistoric supercontinent where all known continents were conjoined) or other irrelevant movement.<sup>5</sup> This example together with the dark matter example further emphasises the idea that knowledge is constantly evolving, insinuating that claims are almost always indefinite since there are always going to be potential undiscovered facts or interpretations which can modify a claim.

The process of proving a claim relies on the combination of facts within an elaborative structure such as a theory or a hypothesis. With this a claim can be made: Facts do not inherently speak for themselves, they require interpretation or context, thus facts alone are not enough to prove a claim. A great example of this can be found in my Geography internal assessment, where I created a hypothesis claiming that “There is a positive correlation between pedestrians and touristic resources”<sup>6</sup> I utilised The Central Place Theory by Walter Christaller, “which suggests that settlements (in this case, areas with touristic resources) serve

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<sup>5</sup> Wegner, A (2019)

<sup>6</sup> Snippet from my own Geography IA

as central places which provide goods and services to their surrounding areas. Therefore, places with more touristic resources are likely to attract more pedestrians, much like central places attract more consumers due to their increased service availability.”<sup>7</sup> Upon using another theory to prove my own, I then used factual evidence in the form of a pedestrian versus touristic resources map, which highlighted that there were large clusters of people near restaurants, hotels, and touristic attractions, further proving my hypothesis. However, these facts/evidence in the form of maps, graphs, and theories did not conclusively prove this claim, since there were exceptions and negative correlations also present in the maps and graphs. For example, the pedestrian x touristic resources map also showed that there was a residential area with lots of pedestrians, and hotels with few pedestrians, which went against my hypothesis. This, however, could be explained to be due to other factors such as weather, time, and season which are very hard to control in a geographical investigation. Therefore, this leads us to question the claim’s universal capability compelling us to reassess or refine our claim based on these expectations. Highlighting that knowledge is not simply a product of raw facts but a more complex amalgamation of interpretation and context in addition to these facts.

Just as my IA revealed the insufficiency of facts alone to prove a claim, so does the example of urbanisation. Urbanisation is often linked with air pollution, for example in Hong Kong, the relationship is not definitive as evidenced by countries like Sweden. Pollution is a worldwide problem which affects every single lifeform on the planet. Many consider pollution, man’s worst and most devastating invention, with this a geographical hypothesis can be made: Urbanisation leads to increased air pollution. This claim can be supported by various maps, graphs, and theories. For example, Hong Kong is one of, if not the most,

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<sup>7</sup> Extract from my own Geography IA which used this website as reference: Malczewski, J (2009)

urbanised country in the world.<sup>8</sup> Moreover, it also has one of the highest indexes of air pollution in the world<sup>9</sup>, further strengthening the implication where urbanisation leads to air pollution.<sup>10</sup> This hypothesis can also be proved by various theories and articles such as the Urban Heat Island Effect or the Industrialisation theory and National Geographic's statement that urbanisation causes "Poor air and water quality, insufficient water availability"<sup>11</sup> and other consequences. This implies that a Geographical hypothesis or theory can be proved solely by facts. However, not all urban areas demonstrate high indexes of air pollution, there are many highly urbanised countries such as Sweden and Copenhagen<sup>12</sup>, both these countries support and emphasise the use of bicycles rather than cars so emissions are decreased. They also have various environmental policies and increase their use of renewable energy every year.<sup>13</sup> This illustrates how urbanisation can be managed in a way that minimises air pollution rather than increasing it. Highlighting how a claim, in the form of a hypothesis or theory, can't always be solely proven by facts since the facts supporting the initial hypothesis do not provide contextualization and broader environmental and geographical considerations. This is particularly true in geography where hard-to-measure or even unmeasurable facts such as quality of governance, societal values, and environmental awareness play pivotal roles in analysing and defining data. The exceptions emphasise the requirement for nuanced interpretation, demonstrating that facts alone are not enough to prove a claim.

In conclusion, the use of both areas of knowledge, natural and human sciences, reveals a complex interplay between facts and other elements in proving claims. While facts undeniably serve as critical building blocks of claims, the examples of astrophysics,

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<sup>8</sup> TheGlobalEconomy.com. (n.d.)

<sup>9</sup> www.iqair.com . (n.d.)

<sup>10</sup> Zhan, C , et al. (2023)

<sup>11</sup> National Geographic (2009)

<sup>12</sup> Statista. (2017), urbandevelopmentcph.kk.dk. (n.d.) , www.iqair.com. (n.d.)

<sup>13</sup> www.ccacoalition.org. (n.d.) , urbandevelopmentcph.kk.dk. (n.d.)

palaeontology and geography demonstrate that facts rarely stand in isolation, and pose more questions than answers. Facts are crucial but are not always sufficient to conclusively prove a claim. Each fact must be comprehensively contextualised within the conceptual model and tempered through the awareness of exceptions, anomalies, and future discoveries which might challenge or modify existing claims.

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