**Coursework Title**
That which can be asserted without evidence can be dismissed without evidence. (Christopher Hitchens). Do you agree?

**Word Count**
1590

**Supervisor Comments**

**Candidate Declaration**
I confirm that this work is my own work and is the final version. I have acknowledged each use of the words or ideas of another person, whether written, oral or visual.

**Teacher Declaration**
I confirm that, to the best of my knowledge, the material submitted is the authentic work of the candidate and the word count is accurate.

**'That which can be asserted without evidence can be dismissed without evidence.' (Christopher Hitchens). Do you agree?**

A valid assertion or knowledge claim presupposes, inherently, the support of evidence by which it has been verified or justified. Hitchens' statement stands as a truism, as such, in its dealing with 'evidence' as a general term for methods of justification and ways of knowing. Yet the statement appeals to a rhetorical impetus, where the word 'without' is striking. Implicitly, there is a value judgement attached to evidence. This raises the following question: what nature of evidence has universal value, and is indeed acceptable as 'evidence'? If the value of a way of knowing is deemed unacceptable, knowledge claims founded on its evidential basis should be dismissed. Yet often knowledge claims create their own rules of evidence according to the areas within which they are formulated. As such, an ultimate definition for 'evidence', which might settle this issue, may be out of reach. Methods of justifying knowledge claims in Mathematics, where intuition plays a vital role in mathematical law and understanding, supplies a case for examination. In a disparate case, it is worthwhile to consider the nature of knowing in the arts, where the role of emotion and subjective human experience frustrates attempts to provide objective evidence as a foundation of collective knowledge.

Mathematics is heralded by some as the 'purest science'. It has gained this reputation by virtue of its use of the formal proof – a method of logical justification that transcends the mere concept of a 'good reason'; the proof embodies reason. However, knowledge claims in Mathematics exist within a system whose rules are asserted 'without evidence'. These assertions are axioms, which cannot have an evidential basis. In spite of this, they possess a knowledge value that is difficult to dismiss. For instance, that parallel lines extended to infinity do not meet is a foundational axiom of two- and three-dimensional Euclidean geometry.[1] Clearly, this knowledge claim cannot have any empirical basis due to its reference to infinity. Even so, the knowledge value of this statement is irrefutable; it has great import in the working out of properties of two- and three-dimensional space, and provided the conceptual underpinnings of the theorisation of physical space until the 19th century. Nonetheless, its evidential basis is centred on intuitive understanding; that is to say, one feels it to be true without conscious reasoning. Axioms have been called 'self-evident', but perhaps this justification pertains to faith more than it does to reason, and should therefore be

[1] Eric W. Weisstein, 'Euclid's Postulates', in *MathWorld--A Wolfram Web Resource*, <http://mathworld.wolfram.com/EuclidsPostulates.html> [accessed 20 January 2013]

dismissed. Certainly, by Hitchens' statement, this would constitute a valid cause for the dismissal of the axiom as a knowledge claim.

However, the dismissal of the fundamental principles of Mathematics would clearly pose a problem. It would invalidate the existence of Mathematics as an area of knowledge. Conversely, while axioms cannot outright be 'dismissed without evidence', they do not have to be accepted as truth. In the 19th century, Lobachevsky problematised Euclidean geometry, and questioned the assertion that only one possible geometry existed.[2] This led to the emergence of non-Euclidean geometry, yielding new ways of conceptualising physical space, and providing the mathematics crucial to Einsteinian relativity and the 20th century's revolution in theoretical physics. By considering the implications of the treatment of a knowledge claim as false, contrary to dismissing it 'without evidence', revolutionary progress was brought about on the shoulders of a new school of thought.

Acknowledging intuition as a form of justification in Mathematics is crucial to understanding that reason is not its sole way of knowing. In a Maths class, a student may intuitively spot the next few terms of a sequence. When asked to provide evidence for her answer, the student responds, 'I can just see it.' In that scenario, the teacher would not dismiss the student's answer as baseless, as that would discourage her and be useless in the way of obtaining a verified answer. In the field of mathematical discovery, this anecdote is revealing. There are examples of theorems arising in mathematics without the conscious mind having worked out a complete proof. Poincaré describes his discovery of the Fuchsian functions in the context of subconscious development, where 'Ideas rose in crowds' during a bout of insomnia.[3] In another case, Ramanujan's mock modular forms are only now being proven.[4] These forms came to Ramanujan in dreams, revealed, as he believed, by the goddess Namagiri.[5] Even 'without evidence', an alleged product of divine revelation no less, results like these of Ramanujan seem to have had major consequences in the development of communications technology and computing.[6] Mathematical ability is to some extent an ability to intuitively

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[2] John J. O'Connor and Edmund F. Robertson, 'Nikolai Ivanovich Lobachevsky', in *The MacTutor History of Mathematics Archive*, (2000) <http://www-history.mcs.st-andrews.ac.uk/history/Biographies/Lobachevsky.html> [accessed 7 January 2013]

[3] Henri Poincaré, *The Foundations of Science: Science and Hypothesis, The Value of Science, Science and Method*, trans. by George Bruce Halsted (New York: The Science Press, 1913), p. 387.

[4] Live Science Staff , 'Ramanujan's Mock Modular Forms', *The Huffington Post*, (2012) <http://www.huffingtonpost.com/2012/12/27/ramanujans-mock-modular-forms_n_2371680.html> [accessed 20 January 2013]

[5] Ibid.

[6] Raymond Hill, *A First Course in Coding Theory* (Oxford: Clarendon Press, 1986), p. 125.

see patterns, and those who cannot see them may dismiss 'without evidence' what appears to be 'without evidence'. Yet unproved results can be useful, and be demonstrated later through proof as pieces of the greater mathematical puzzle materialise.

If Mathematics seems a closed system, where laws are intuitively known and knowledge claims constitute the product of intuitive, or even subconscious, pattern-spotting, the use of intuition points to a limitation of its appeal to objective, shared and repeatable experience. This limitation becomes manifest in the questioning of religious statements of belief – which Hitchens no doubt has in mind. Where a mathematician may appeal to an intuitively evident pattern, and be accepted, a Christian's appeal to the testimony of personal religious experience may be dismissed as evidence in support of God's existence. What is peculiar to the dismissal of the Christian's justification is the perceived lack of knowledge value in emotion or subjective experience. Yet knowledge claims founded on unrepeatable, subjective experience do have a knowledge value in an area such as the arts. The personal response of a theatre critic or music critic to an unrepeatable event such as the staging of a play or concert performance is not invalidated because of its subjective basis. As an account of the performance, it can contribute to a body of interpretive knowledge concerning the work of a particular dramatist or composer. As with mathematical ability, literary or musical sensibility share subjective understanding that can be 'dismissed' by the uninitiated. But where Mathematics has the method of formal proof, the arts have a tradition of knowledge founded on human experience that is arguably 'without evidence' in view of its subjective basis. Contrary to Hitchens' statement, this nature of knowing cannot be dismissed.

The problem associated with knowing by emotion is that knowledge originating on a subjective level is incommunicable. For instance, if a patient complains about back pain at a doctor's appointment, he cannot provide evidence for the sensation. Equally, the physician cannot dismiss the claim. 'Sensations, feelings, insights and fancies,' states Aldous Huxley, 'all these are private and, except through symbols and at second hand, incommunicable.'[7] By Hitchens' statement, it follows that private knowledge, which cannot be demonstrated empirically or by reason, can be dismissed. Literary works are in a sense formed on the backs of authors' private knowledge. Dismissal of its knowledge value would accord with Socrates' condemnation of literature as a source of irrationality. Through his attack on 'poetic

[7] Aldous Huxley, *The Doors of Perception* (London: Chatto & Windus).

mimesis', he states that poetry nourishes emotion at the expense of reason.[8] Yet private knowledge, and its record, offers a way of knowing through vicarious living through, and does have knowledge value in the context of historical and cultural understanding. The arts have a means of creating 'symbols' through which subjective knowledge can be transferred, and one appeals to one's self or one's feeling as a method of justification.

Acquiring knowledge is not necessarily a pursuit of truth. In the arts, there are cases of multiple 'truths' coexisting, invalidating the concept of a 'right answer', where personal interpretation as a form of evidence confounds objective assessment. In Browning's "Porphyria's Lover", the ending is one of ambiguous meaning:

> 'And thus we sit together now,
> And all night long we have not stirred,
> And yet God has not said a word!'[9]

Tone in poetry is one of the least certain aspects of literary analysis. In "Porphyria's Lover", the speaker strangles his lover and exclaims at the silence of God. It is unclear whether the statement is said elatedly or in frustrated disbelief – that is, whether the speaker is glad for escaping damnation or frustrated that he has not provoked God into existence. Neither reading can be rejected, but neither can both be true due to mutual exclusivity. They contrarily coexist. This does not mean to say these assertions, or any assertion in evaluation of tone, are 'without evidence'. Instead, they exist within an area of knowledge where reason cannot apply, as knowledge claims are formed on the basis of subjective response. Yet this is no more grounds for dismissal than the intuitive self-evidence of the laws of Mathematics.

In creation of an absolute value judgement where a knowledge claim is either with or 'without evidence', time taken to critically assess the nature of knowledge claims is declared unnecessary. This is a potentially dangerous form of chauvinism, where one way of knowing or form of evidence may be raised above others as the best for acquiring knowledge. In Mathematics, however, if knowledge is declared derivable only from empirical evidence, its fundamental axioms are in turn invalidated. This invalidates mathematical reasoning on the grounds that it is founded on a flawed system. Equally, knowledge in the arts, which is derived from private knowledge, lacks the objective coherency and certainty of empiricism or

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[8] Raphael Foshay, 'Mimesis in Plato's *Republic*', in *Anthropoetics*, 15.1 (2009) <http://www.anthropoetics.ucla.edu/ap1501/1501foshay.htm> [accessed 20 January 2013] (para. 4 of 14)

[9] Robert Browning, 'Porphyria's Lover', *The Oxford Book of English Verse: 1250-1900*, ed. by Arthur Cuiller-Couch (Oxford: Oxford University Press, 1919), p. 212.

reason. Yet to dismiss the knowledge value of subjective knowledge is to dismiss the arts as an area. Since there is no universal standard for evidence, Hitchens' statement is unviable in a greater sense of the nature of knowing – if quite pithy.

Word count: 1,590

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