

## Introduction

It is often taken as given that a thesis should be of a certain structure. Some would have it that a thesis should be an argument, and that it should flow seamlessly from one page to the next. In order to achieve this requires an acceptance of certain things that the subject of this thesis brings into question. The problem of 'meaning' is a philosophical problem still not resolved. If natural language were efficient it would not be necessary to have judges to interpret the law. Formal languages might offer something that is more efficient but which formal language should be the superior to guide the lesser formal languages. Does logic determine arithmetic or does arithmetic determine logic? What is logic and what is arithmetic?

A contemporary lively debate in the public domain is the authority of science to take the lead role and place metaphysics a poor second. In order to provide some depth to the debate the philosophy of science should be considered. This thesis is in large part concerned with the philosophy of science. It concentrates on the metaphysical thought of William Kingdon Clifford. Clifford was a person that possessed rare ability in mathematics. If Clifford were to be drawn into this current dispute which side would have a claim on his thought? I find the debate superficial and have little interest in it. Grouping together people to make up teams might have a purpose but assuming it does it is something I would rather avoid. In order to arrive at some understanding of the thought of Clifford it would be unhelpful to consider him to be in a group that had a common objective. Clifford did have friends and did have strong 'opinions' on certain matters that relate to groups that would place limitations on his speculative metaphysic. I would suggest that this side of Clifford's thought is contained in what could be loosely termed his ethical writings. I have little interest in ethics. I have lived in five countries on three continents. I have made friends in all five, but I would find it impossible to find any common metaphysical position that would enclose them into a group.

In order to appreciate Clifford it is necessary to keep in mind the period in which he lived. What had come before Clifford is not what came before you or I. What came after Clifford would be unknown to Clifford. It has been said that Clifford did ground work that led to the work of Einstein. This is defensible but equally defensible is that Einstein's grandfather led to the work of Einstein. There is the danger of thinking that because the work done in the 20<sup>th</sup> Century has proved valuable then all that came before was a slow progress to the inevitable. This can be erroneously taken as giving the illusion that what we 'know' now is a progression from what was known then. Standing on the shoulder of giants. A great deal of productive work can be achieved by standing on the shoulder of giants, but some very gifted individuals leap from the shoulder to the head and then leap into the air. I suggest that Clifford was one such person.

John Harrison and George Daniels are of interest to me. Both were artisans that built time pieces. Harrison is credited with building the first time piece accurate enough to provide for a practical determination of longitude at sea. His grasshopper escapement was used in his early wooden clocks. George Daniels created the co-axial escapement in the 20<sup>th</sup> Century.

Harrison was an artisan. An artisan is a skilled manual worker who makes things; one of these things could be time pieces. Harrison was more than an artisan, he was self educated in mathematics and 'science'. Harrison is not recognised as a mathematician, scientist or artisan, rather he is recognised as the person that created a time piece capable of determining longitude at sea. A person can be an artisan capable of constructing fine time pieces. A person can be a scientist yet create nothing novel that is concrete. A person can be a mathematician and devote his life to the construction of abstruse mathematical models. Harrison created the 'grasshopper escapement' which he used in his early wooden pendulum clocks. Escapements as employed in time pieces are not the result of scientific method. In the 20<sup>th</sup> C another watch maker, George Daniels created the co-axial escapement. George Daniels was an artisan. Daniels expressed how he made a watch as follows:

And so I started on this watch. I made a couple of drawings of it, I got into a bit of a tangle now and again and realised that designing watches on paper and then making them wasn't the way I was going to go through life. I had to make the watch without any drawings, and then when it was finished, make the drawings to use perhaps on some later occasion.<sup>2</sup>

My interest in mechanics, it started so early in my life that I was able early on to make comparisons in quality of workmanship and design and style and it I think it's obvious that mechanics came quite naturally to me, I didn't have to learn about them, I could just sense what was required. I never had any difficulty in learning about mechanical things. I mean a quick glance at a mechanical device and I could go away and make the whole thing from first principles. So that was very lucky for me and obviously helpful and so through a lot of association with mechanics, you know one learns to appreciate the elegance of mechanical things, especially if you study the horology of the 18th and 19th Centuries.<sup>3</sup>

If Daniels is true to his word his co-axial escapement was constructed without drawings. Daniels was capable of making engineering drawings. He says he was not capable of making his watches by first making drawings then the watch. How this is to be explained in relation to what is going on in the

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<sup>2</sup> <http://www.webofstories.com/play/10706?o=MS> accessed 30 October 2012

<sup>3</sup> <http://www.webofstories.com/play/10749?o=MS> accessed October 2012

mind of Daniels is of interest. If it were to be argued that Daniels had a mental picture of the watch prior to its construction then he would be able to draw it. This perhaps has a connection to Wittgenstein's 'Private Language Argument' and Clifford's essay 'On Some Conditions of Mental Development'.

The thesis is divided into five chapters. The first chapter discusses the world in which Clifford lived, and contains my own opinion of the personality of Clifford arrived at by reading some of his work and some works about him. The second chapter discusses Clifford's essays that are relevant to my investigation of his metaphysic. The essays are discussed in chronological order. I do not discuss Clifford's essays that concern ethics. The third chapter is an overall analysis of Clifford's metaphysic. The fourth chapter discusses various reactions to the thought of Clifford. This includes reactions during his lifetime and after his death. The fifth chapter is some concluding remarks. There is an addendum that contains some comments and opinions that I thought relevant but are additional to the main object of the thesis.

I have tried to express myself as best I can in what follows. It would not be a legitimate excuse but it might provide me some solace to consider the following quote from *The Nature of Explanation* written by K.J.W. Craik should I fail to present my feelings as intelligible thoughts:

Besides, if my view of the deceptiveness of verbal precision happens to be correct, the analysis of apparently definite perceptual situations or concepts stirs up a bottomless morass where statement becomes increasingly difficult and judgment more uncertain.

## Chapter 1 The world Clifford lived in

I wish to show how it was that the thought of Clifford brought about a change in approach to questions found in physics, mathematics and speculative metaphysics. In order to do this I must present my understanding of the world that Clifford entered. Immediately I am confronted by the impossibility of achieving this in absolute terms. Clifford was born 4 May 1845 at Exeter, England. He died 3 March 1879. He never reached his 34<sup>th</sup> birthday. If I take his active period, the period in which he formulates his thought relevant to my thesis, as being from the age of 15 when he entered King's College London to his final metaphysical essay "On the Nature of Things-in-Themselves" published in *Mind*, Vol. No. 9, pp. 57-67, I have a time window of less than twenty years. This period was one of great change. Although the changes in society are important and influence the thought of people of the time, it would be impossible and irrelevant to list them all. One that is interesting if in an oblique manner is the publication by Charles Dickens of *Great Expectations*, the first instalment appearing in 1860. Clifford's thought if anything is optimistic and full of expectations. Another that is perhaps representative of the times is the 1860 underground explosion that occurred in the Risca Black Vein Pit at Crosskeys, Monmouthshire<sup>4</sup>. The explosion killed 142 coal miners and was the sixth explosion to occur at the mine between 1842 and 1860. Not everyone was to experience the benefits of the industrialization of Britain, much less have great expectations.

Clifford became a mathematician and geometer, extending his primary vocation into the field of speculative metaphysics and speculative theoretical physics. It is this portion of Clifford's life that is relevant to my thesis.

Clifford was born the same year the great Irish potato famine of 1845 began. The famine lasted seven years. Several hundred thousand people died, and two million left for Canada and the United States of America. Clifford died the year of the 1879 Irish "mini famine". The second famine resulted in few deaths.

The famine of 1879 was not as devastating as the famine of 1845 for many reasons. Changes in food production, bulk transport by means of railways, a different approach by governments, are just some of the changes that had occurred between the two events.

The world was changing, and its rate of change was accelerating. The acceleration was facilitated by the technological advances that were the result of the Industrial Revolution.

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<sup>4</sup> <http://www.riscamuseum.org.uk/risca.html> accessed 29th Oct. 2012

## 1.1 Religion and Higher Education

One of the changes ‘in progress’ that was to affect Clifford was the role of the Church of England in the social structure of England. The entanglement of religion and government was complex in Clifford’s day. The Corporation Act of 1661 was still in force at the beginning of the 19<sup>th</sup> C. This Act required that all mayors and officials in municipal corporations had to receive the sacrament of Holy Communion in accordance with the rites of the Church of England. The Test Act of 1673 required that civil and military officers receive the Anglican sacrament. In 1828 Lord John Russell introduced the Sacramental Test Bill. Sir Robert Peel got the Bill passed in 1828 which would repeal the Test and Corporation Acts. The Catholic Relief Act of 1829 repealed the Test Act of 1678. This Act solved the problem for Catholics; however the “upon the true faith of a Christian” phrase in the new oath left Jews, Moslems, atheists etc. with a problem. The Universities Test Act 1871 allowed Roman Catholics, non-conformists, and non-Christians to take up fellowships at the Universities of Oxford, Cambridge, and Durham.

Clifford was elected to a Fellowship at Cambridge in 1868. Three years prior to the Universities Test Act 1871. Monty Chisholm writes:

William Clifford was at that stage able to push his physical and mental abilities to their limits and he appeared to be set for a glittering career in Cambridge when he was brought to a head-on collision with University authorities because of his philosophical views. At that time all Scholars were required to affirm their allegiance to the Church of England by publicly signing each year the Thirty-nine Articles of Protestant Faith which had been drawn up three centuries earlier. William had signed three times, although he had had serious doubts in 1865, and had come to feel that by agreeing to sign he had compromised his integrity. In 1866 he refused to sign. It is something of a mystery how he was elected to a Fellowship in 1868 – a declared atheist in what was still officially a rigorous Anglican Institution.<sup>5</sup>

James Joseph Sylvester studied at Cambridge a generation prior to Clifford. Sylvester was a Jew, so although he took the mathematical tripos examination in 1837 and matriculated as a student of St John’s College he could not be awarded a degree. Although he had no degree Sylvester held the chair of natural philosophy at the University of London from 1838 to 1841. He became a Fellow of the Royal Society in 1839. It was only in 1841 that Sylvester was award degrees of BA and MA. The

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<sup>5</sup> Adv. appl. Clifford alg. 19 (2009), 657–671 c© 2009 Birkhäuser Verlag Basel/Switzerland. 0188-7009/030657-15, published online October 22, 2009. DOI 10.1007/s00006-009-0188-x, accessed 13 November 2012

awards were made by Trinity College, Dublin. Sylvester was until shortly before beginning his university studies James Joseph.<sup>6</sup> The surname 'Sylvester' being added at that time.

A generation following Sylvester's problems Clifford is at Cambridge. Clifford had declared himself an atheist. Whether or not he ceased to believe in God is questionable. He certainly was prepared to mock Christianity but Christianity has no first claim on God. Maybe Clifford had a somewhat unconventional understanding of God that caused him to reject religious dogma. In 1869 Thomas H. Huxley coined the word 'agnostic'. It would be interesting to explore Clifford's understanding of the difference between an atheist and an agnostic. If an atheist is taken as being a person that believes there is no such thing as God, and an agnostic is someone who believes that nothing is known or can be known of the existence or nature of God, then maybe Clifford was an agnostic. Obviously Clifford was neither atheist nor agnostic when he first arrived at university.

Clifford was a brilliant student; however it is a mystery how he would get away with such a frontal attack on the rules of the university. Maybe the answer lies in the fact that Clifford was tolerated because he was recognised as being more than brilliant. So far I have not considered the relationship between Clifford and Sylvester. Sylvester in 1865 was an established figure on the British mathematical scene. Clifford was a student at Cambridge. Clifford had entered Trinity College, Cambridge, when he was eighteen years old. The first meeting proper of the 'London Mathematical Society' was held on the 16 January 1865. The first meeting was attended by twenty seven people. At the end of the year membership had risen to sixty. Along with Augustus De Morgan there were notable others, Sylvester, Clerk Maxwell, and Arthur Cayley. Clifford was proposed for membership at an Ordinary meeting of the Society held on the 21 May 1866, he was elected a member on 18 June 1866 at an Ordinary Meeting held at the University College. Augustus De Morgan was the first professor of mathematics at University College London, taking up the position in 1828, resigning on a 'matter of principle' in 1831; he retained the chair in 1836 to resign once again in 1866 on a matter of principle. Augustus De Morgan was a member of the Church of England but did not gain a Fellowship at Cambridge because he strongly objected to the theological test required for him to receive his MA which was required to gain Fellowship.<sup>7</sup>

At the age of twenty one Clifford was in the company of some of the most distinguished mathematicians of his day, two of whom had 'fronted' the authorities of Cambridge on the theological requirement. Maybe this goes some way to explaining why Clifford would refuse to affirm his allegiance to the Church of England by publicly signing the Thirty-nine Articles of Protestant Faith in 1866.

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<sup>6</sup> <http://www-history.mcs.st-andrews.ac.uk/Biographies/Sylvester.html> accessed 13 November 2012

<sup>7</sup> See *Mathematical Monographs*. Edited by M. Merriman and R. S. Woodward. No.17. *Lectures on Ten British Mathematicians of the Nineteenth Century*. By Alexander MacFarlane. 1916 Pgs. 20-21

There is still the mystery of how Clifford managed to become a Fellow despite refusing to affirm his allegiance to the Church of England. One answer may be that De Morgan had entered Lincoln's Inn to study for the Bar in 1826, Sylvester had decided to study law in 1843 following his return from the USA, and it was while studying law that Sylvester met Cayley who was also studying to be a lawyer. It seems to me that if the genius of Clifford has been recognised by De Morgan, Sylvester and Cayley, then they would be in a good position to put pressure on the authorities at Cambridge to let Clifford become a Fellow, and have reasons to want to. Cayley at this time was Sadleirian professor of pure mathematics at Cambridge.

Clement Mansfield Ingleby who will be encountered later was a member of the London Mathematical Society. He was elected to membership 16 October 1865, he also served on the Council during the period November 1866-1867, but left the Society in 1868.<sup>8</sup>

## 1.2 Social Changes

The social changes that took place during the 19<sup>th</sup> C are significant. Industrialisation of nation states resulted in changes in power structures that are still evident. My thesis is limited in scope and a full exposition of the history of the 19<sup>th</sup> and 20<sup>th</sup> C's is not necessary for it. There are however parts of the changes that took place that are relevant. In 1.1 changes in the religious involvement in higher education were considered. In this section I will consider the changes that took place in the perceived needs of education as they related to the society of Britain.

By the mid 19<sup>th</sup> C Britain had become an industrial nation with an Empire that spanned the world. The British Empire existed because the British military machine could police that Empire. Technology was the key to British military supremacy. In the Introduction above the work of Harrison was mentioned. Harrison provided the British navies both military and commercial an edge. His work was that of the educated artisan. Harrison is an example of the artisan overcoming a practical problem and providing Britain with an advantage over other nation states. Other nations were industrialising at the same time. The conflicts of the 19<sup>th</sup> and 20<sup>th</sup> C were fought with technology.

An industrialised nation is by its nature a complex integration of diverse enterprises. Its success depends on the numerous chains of separate industries that support the activities of the others. The Factory Act of 1802 required that children under the age of nine years be educated in elementary schools provided by the factory owners. The Labour of Children, etc., the Factories Act 1833 required that children ages nine to thirteen have two hours of education per day. The Mines and Collieries Act

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<sup>8</sup> *Proceedings of the London Mathematical Society*. Vol. 32 Reprinted 1968 for Wm. Dawson & Sons Ltd., London with the permission of The London Mathematical Society.

1842 recognised the need to oversee the production of coal. On the one hand these reforms can be seen as philanthropic, on the other they can be seen as pragmatic. If a mine ceases production, the factory has no coal supply to raise the steam to power the machinery. Factories and mines require skilled tradesmen; it therefore makes sense to educate children. The more complex the industrial complex becomes the more connected it is, and the greater is the need for technicians. Education is not only a means of enhancing the quality of life; it is a prerequisite of an industrial state.

In 1.1 above the London Mathematical Society was mentioned. This society followed on from a previous society; the Spitalfields Mathematical Society<sup>9</sup>. The Spitalfields Mathematical Society had been formed in 1717 as a club for “studious artisans”. The early members were working men wishing to improve themselves. The Spitalfields Mathematical Society can be taken as a fore-runner of the Mechanic’s Institutes. The difference between the two being that the former was initiated by the workers, the second being financed by the industrialists. Whether or not an artisan should be termed a ‘worker’ is questionable.

The role of Mechanic’s Institutes is an exemplar of the how the need for technologists by industry led to ‘ordinary people’ having opportunities for education. The Mechanic’s Institutes were financed by industrialists who realised they needed skilled educated employees. The first Mechanic’s Institute was established in Edinburgh in 1821. It would become Heriot-Watt University.

Mechanic’s Institutes were the foundation of many of the public libraries that were created following the passing of the Public Libraries Act 1850.

Harrison had been an individual that combined his skills with a powerful intellect. He was self educated. What Harrison had done as an individual was in the first half of the 19<sup>th</sup> C being organized into a national effort.

Other social changes were taking place that were of great significance. The Representation of the People Act 1832 increased the electorate from approximately 400 000 to 650 000. This improvement meant that a sixth of adult males could vote. Further extension of the franchise was provided by the Representation of the People Act 1867. The ‘ordinary people’ had access to libraries, education, and a role in government.

The demand for information relating to advancement in science and technology gave rise to numerous journals and periodicals.

These changes are far reaching.

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<sup>9</sup> <http://www-history.mcs.st-andrews.ac.uk/Societies/Spitalfields.html> accessed 16 November 2012

### 1.3 Evolution

Evolutionary theory has a history as long as geometry.<sup>10</sup> Anaximander (ca. 611-546 B.C.E.) was an Ionian philosopher. Anaximander held that the world had arisen from an undifferentiated, indeterminate substance, the *apeiron*. The Earth coalesced out of the *apeiron*, and plants and animals arose from the mud.

Xenophanes of Colophon (died ca. 490 B.C.E.) extended the thought of Anaximander by observing fossilised remains of fish and shells.

Empedocles of Acragas who lived during the 5thC B.C.E. took the thought further. He postulated that some of the first life forms were monstrous and died out. For Empedocles 'natural selection' had occurred but was not ongoing.

The following is taken from *Readings in Early Anthropology*:

The earliest text known to me on organic evolution based upon comparative considerations is that of Lucilio Vanini in 1616. The most ambitious effort in this direction was Monboddo's *Origin and Progress of Language* (1773-91); he was labelled an eccentric and became an international joke for believing that man was descended from apes.<sup>11</sup>

James Burnett, Lord Monboddo (1714-99) was eccentric. At one stage he was of the belief that humans were born with tails, which were later removed by midwives at birth. In relation to the thought of Clifford, Monboddo is of some interest. Monboddo writes the following:

But our modern philosophers seem to think, that geometry, Arithmetic, and the application of these sciences to body, is the whole of philosophy; and, I doubt, many of them believe that nothing exists except body, and its attributes.<sup>12</sup>

The consequence of this is, that our modern philosophers, even such of them as are theists, make their system of Nature much too mechanical; for they *physiologies* without Mind; and, though they allow that Mind was necessary at first to produce this universe, and set it agoing, they think it may go on without Mind, by the powers of Matter Mechanism merely: Whereas the antients thought, that the operations of Nature could no

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<sup>10</sup> See 'Evolution and Palaeontology in the Ancient World', author Ben Waggoner.  
<http://www.ucmp.berkeley.edu/history/ancient.html> accessed 16 November 2012

<sup>11</sup> *Readings in Early Anthropology* edited by J.S. Slotkin Methuen & Co. Ltd 1965, Pg. ix

<sup>12</sup> *Antient Metaphysics*, Monboddo, James Burnett, Lord. 1779, Vol. 1, Preface, Pg. i.

more go on without the constant and unremitting agency of Mind, than an universe could have been at first produced without Mind.<sup>13</sup>

Monboddo provides the following definitions of *body* and *mind*:

What *is moved*, I call *body*;--What *moves*, I call *mind*.<sup>14</sup>

Monboddo rejects the definition of body as being that which affects the senses because there is body that is not perceived by the senses. He also rejects that:

*body* is made to be that which has three dimensions, *length*, *breadth*, and *depth*, any better; for, though that be a very proper definition given by Euclid of a solid, it is not at all a proper definition of *body*; for these three dimensions are only the boundaries of *body*, of which boundaries is the science, not *body* itself, which is what is contained within those boundaries. The same objection lies against the definition which makes *body* to be the same with *extension*; for a thing is said to be *extended*, that consists of parts which are co-existent and continuous, that is, have a common boundary; and the three dimensions are but extension differently considered,.....Besides, *Space* is extended as well as *body*.<sup>15</sup>

Monboddo might have been an eccentric, but he has recognised a significant problem; the problem being the nature of consciousness or mind. Slotkin tells us that Monboddo was ridiculed for suggesting that man was descended from ape. The question that is raised by Monboddo's understanding of *body* and *mind* is what *it is* that is evolving? His reflections on the nature of Euclidean geometry and the notion that space is extended suggest that he is constructing a metaphysic that is prescient. It appears that his thought is heading in a similar direction to the thought of Gauss regarding the empirical nature of space. As will be seen later Clifford is led in his metaphysic to posit 'mind stuff'.

While thought concerning evolution prior to Charles Darwin is of interest, it was Charles Darwin and Alfred Russel Wallace that provided evolution with a firm scientific grounding. Clifford not only accepted Darwin's evolutionary theory but used it to speculate. The following is taken from *Lectures and Essays*:

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<sup>13</sup> Ibid Introduction Pg. i

<sup>14</sup> Ibid Pgs. 6-7

<sup>15</sup> Ibid

Clifford was not content with merely giving his assent to the doctrine of evolution: he seized on it as a living spring of action, a principle to be worked out, practised upon, used to win victories over nature, and to put new vigour into speculation.<sup>16</sup>

The underlying problem of evolution is that it fails to account for consciousness. The attempt to fit consciousness into the material, that is to explicate mind by body, is the problem. Darwinian evolution has not provided an answer to the mind body problem but brought it into better focus. If it is possible to argue the case for the evolution of plants and animals from inert matter, that evolution is by its nature material. The construction of consciousness from the material is required if a complete model is to be built. The insight of Monboddoo in questioning the definition of body is of import. It pre-empts the insight of Gauss that dimensions are human constructs. If dimensions are human constructs and space is empirical then the possibility that humans will evolve to become aware of higher dimensional worlds cannot be ruled out.

#### 1.4 The Metaphysical Society

The Metaphysical Society had its first meeting on the 21 April 1869. It was conceived at the home of R.H. Hutton. Hutton had staying with him the Rev. Charles Pritchard, the Savilian Professor of Astronomy, and Alfred Tennyson. The three spent time discussing speculative subjects, primarily theological in nature. The decision was made to organise a society to discuss these matters. The members included politicians, mathematicians, scientists, poets, and theologians. Members presented papers and following the reading of the papers debate took place. The debates were to remain confidential which would allow a less restricted atmosphere for the debaters. The Metaphysical Society survived until 16 May 1880. Dean Stanley, an active member of the Society, said of it: "We all meant the same thing if only we knew it."

Clifford became a member in 1874. He presented his paper 'On the Nature of Things-in-Themselves' to the Society on 9 June 1874. His essay 'On the Nature of Things-in-Themselves' that appeared in *Mind* January 1878 was a revised version of the essay of the one presented to the Metaphysical Society.

Due to the confidential nature of the papers and discussions that followed papers presented at the Society some confusion can arise when the nature of the relationships between members of the Society are considered. An example is the essay given by Clifford to the Sunday Lecture Society on 1 November 1874 and published in the *Fortnightly Review* December 1874. This has been taken by

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<sup>16</sup> *Lectures and Essays*, Edited by Leslie Stephen and Sir Frederick Pollock, Vol.1, Macmillan and Co., Ltd. 1901, Pg 42

many to be evidence that Clifford held a parallelistic position in regard to body and mind. Some have considered the essay to support Huxley's epiphenomenalism. Clifford presented this paper to a lay audience five months after presenting his paper 'On the Nature of Things-in-Themselves' to the Metaphysical Society. How the two papers can be reconciled is difficult to imagine, unless the personality of Clifford is taken into consideration.

### 1.5 Clifford's Personality

Clifford was the only child of William Clifford [1820-1878] and Fanny Clifford [nee Kingdon]. His mother died prior to his tenth birthday. His father re-married and had four more children. His second wife was Mary Fryer Clifford [nee Glendenning].

Clifford's relationship with his father and step mother can be seen in his correspondence with them.<sup>17</sup> Clifford was born into an Anglican Christian family. His father was a book and print seller, an Alderman and a Justice of the Peace.<sup>18</sup>

Clifford was intellectually gifted and possessed physical strength. Having great physical strength does not however entail good health.

Clifford married Sophia Lucy Jane Lane on 7 April 1875. They had two daughters.

Clifford was a 'workaholic'.

In order to appreciate the written work in speculative metaphysics of Clifford it is necessary to take into consideration his personality. It would be possible to take Clifford as being a Victorian child prodigy raised by a father alone from the age of nine and was a devout Christian, who rebelled. This might fit the purposes of some but it does not make sense. Clifford's relationship with his father survives Clifford's attacks on organized religion. The following is taken from 'Papers of William Kingdon Clifford':

Letter from W. K. Clifford to William and Mary F. Clifford. (Trinity College, Cambridge.) Thanks them for the gift of a dressing-gown. Is much better. Has been for a walk with Cayley and got through his Whewell lecture-'one of a course that Sidgwick has organized'-without ill effects, though it was much harder than his ordinary lectures. There is concern that the Lords may gain enough time to get the Tests Bill shelved again, but

<sup>17</sup> <http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FCLIF> accessed 22 November 2012

<sup>18</sup> Rooney, Joseph (2007). William Kingdon Clifford (1845-1879). In: Ceccarelli, Marco ed. Distinguished figures in mechanism and machine science: Their contributions and legacies. History of mechanism and machine science, Volume. Dordrecht, Netherlands: Springer, pp. 79–116.

the Master and Appleton have given good evidence before the committee. Is sorry that his parents cannot come up, though he is keen to work on some equations. Maxwell comes to see him often and gives him ideas. Hopes they are both better. 'Kate is to stay with you when I am at home.'<sup>19</sup>

The quoted letter is given the date 6 May 1871. The Universities Test Act 1871 was mentioned in 1.1 above. Clifford meets with Maxwell regularly. It would be beyond the scope of my thesis to pursue the line of inquiry into 'what was going on' regarding the 'Tests Bill'. It is not beyond the scope of the thesis to attempt to interpret the essays of Clifford in light of the background of the situation they were produced in.

Sir Frederick Pollock became a friend of Clifford's during Clifford's time as an undergraduate at Cambridge. Pollock and Clifford were born in the same year. Their friendship continued until the death of Clifford. Pollock with Leslie Stephen was to produce *Lectures and Essays, by the Late William Kingdon Clifford, F.R.S.* This book was first published in 1879 the year of Clifford's death; a second edition was published in 1886, followed by an edition of 1901. I make use of the editions of 1901, and 1879<sup>20</sup>, as well as the edition of 1886. In the Introduction to the book Pollock provides a 'Biographical' perspective of Clifford.

Pollock begins with the relationship between science and poetry. He makes the insightful comment:

...that Science and Poetry are own sisters; insomuch that in those branches of scientific inquiry which are most abstract, most formal, and most remote from the grasp of the ordinary sensible imagination, a higher power of imagination akin to the creative insight of the poet is most needed and most fruitful of lasting work. This living and constructive energy projects itself out into the world at the same time that it assimilates the surrounding world to itself. When it is joined with quick perception and delicate sympathies, it can work the miracle of piercing the barrier that separates one mind from another, and becomes a personal charm.<sup>21</sup>

Pollock provides a concrete example of the ability of Clifford to put into words his own understanding of abstract mathematical concepts. Pollock relates the following incident that occurred

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<sup>19</sup> [http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FCLIF\\_A1](http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FCLIF_A1), 13. accessed 22 November 2012

<sup>20</sup> *Lectures and Essays*, Edited by Leslie Stephen and Sir Frederick Pollock, London Macmillan and Co. Ltd., 1879

<sup>21</sup> *Ibid* [1901]Pgs. 1-2

in the Long Vacation of 1866, when he had declared his difficulty in appreciating Ivory's Theorem. The relevant text of Pollock's is as follows:

But I know that as he spoke he appeared not to be working out a question, but simply telling what he saw. Without any diagram or symbolic aid he described the geometrical conditions on which the solution depended, and they seemed to stand out visibly in space. There was no longer consequences to be deduced, but real and evident facts which only required to be seen.<sup>22</sup>

I find this reminiscence of Pollock's relevant to my understanding of not only Clifford but to the understanding of how the human mind, uniquely presented by each individual, is to be appreciated. I mentioned above George Daniels and John Harrison. Both these watchmakers created something novel. Harrison was not able to express himself well in words. He communicated by way of his mechanical constructs which did his talking for him. The poetry of motion seen in his 'grasshopper escapement' is evident. The same thing applies to George Daniels; his co-axial escapement speaks for him. Clifford could tell what he saw in words, both Harrison and Daniels communicated by demonstration.

Pollock tells us that Clifford would present a lecture with few if any previously constructed notes.

He gave most of his public lectures with no visible preparation beyond very short notes, and the outline seemed to be filled in without effort or hesitation. Afterwards he would revise the lecture from a shorthand-writer's report, or sometimes write down from memory almost exactly what he had said. It fell out now and then, however, that neither of these things was done; and in such cases there is now no record of the lecture at all. Once or twice he tried writing part of the lecture beforehand, but found it only an embarrassment in the delivery.<sup>23</sup>

This quote bears a similarity to the expressed views of George Daniels regarding his method of making a watch.

Perhaps the most telling observation of Clifford was that of Professor Sylvester, that is quoted by Pollock:

Like the late Dr. Whewell, Professor Clerk Maxwell, and Sir William Thomson, Mr. Clifford was Second Wrangler at the University of Cambridge. I believe there is little

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<sup>22</sup> Ibid [1901]Pg.5

<sup>23</sup> Ibid Pgs.10-11

doubt that he might easily have been first of his year had he chosen to devote himself exclusively to the University curriculum instead of pursuing his studies, while still an undergraduate, in a more extended field, and with a view rather to self-culture than to the acquisition of immediate honour or emolument.<sup>24</sup>

Pollock was not to become a mathematician but did study mathematics to an advanced level. He leaves it to Clerk Maxwell to pass comment on Clifford's mathematical ability. Maxwell is quoted by Pollock as follows:

The peculiarity of Mr. Clifford's researches, which in my opinion points him out as the right man for a chair of mathematical science, is that they tend not to the elaboration of abstruse theorems by ingenious calculations, but to the elucidation of scientific ideas by the concentration upon them of clear and steady thought. The pupils of such a teacher not only obtain clearer views of the subjects taught, but are encouraged to cultivate in themselves that power of thought which is so liable to be neglected amidst the appliances of education.

It must be remembered that Pollock was writing shortly after the death of a close friend. There is an observation of Clifford that Pollock makes which I take to be of great import. It is this:

His laughter was free and clear like a child's, and as little restrained by any consideration of conventional gravity. And he carried his mirth and humour into all departments of life, by no means excepting philosophy. When he came home from the meetings of the Metaphysical Society (attending which was one of his greatest pleasures, and most reluctantly given up when going abroad after sunset was forbidden him), he would repeat the discussion almost at length, giving not only the matter but the manner of what had been said by every speaker, and now and then making his report extremely comic by a touch of plausible fiction. There was an irresistible affectation of innocence in his manner of telling an absurd story, as if the drollery of it were an accident with which he had nothing to do.<sup>25</sup>

Pollock was to become a member of the Metaphysical Society in 1879, the same year that the first edition of *Lectures and Essays* was published. The Metaphysical Society did not record the debates that followed the presentation of papers. The papers themselves were not published<sup>26</sup>, although members could express their views in the journals of the day. Clifford published his essay 'On the

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<sup>24</sup> Ibid Pg. 16

<sup>25</sup> Ibid Pg. 23

<sup>26</sup> The extant papers are held in the Bodleian Library Oxford. (Metaphysical Society.) Russell, Arthur. Papers Read at the Meetings of the Metaphysical Society. [Edinburgh:] Privately Printed, 1896. 1st ed. 8vo. 98 pp. Orig. The privately printed book is very scarce.

Nature of Things-in-Themselves' in *Mind* January 1878. It is relevant that the essay published in *Mind* makes no reference to Huxley, yet in the essay as presented to the Metaphysical Society it does. In the version published in *Mind*, Spencer, Hodgson, and Tyndall are mentioned, but no mention of the Metaphysical Society is made. Tyndall and Hodgson were members of the Metaphysical Society; Herbert Spencer was invited to join but never did. It seems to me that Clifford has not transgressed the 'policy' of the Metaphysical Society regarding confidentiality in his publication in *Mind* January 1878.

The following is taken from Monty Chisholm<sup>27</sup>:

When death was very near, he had managed to write some last messages. He left detailed instructions about his academic works, which he considered the only important thing of his life and he wrote this last and most moving letter to his best friend Fred Pollock:

No words can say what a friend you have been to me, I who have had so many and so good ones, must always count you the best and the truest. I have nothing to leave you but my children, the education of which I entrust to you and to Huxley. I want them brought up without any knowledge of theological – that last syllable (!) – hypotheses at all, but if the theory should teach anything of the sort it should be set aside with the simple argument suited to the form it is presented in – for the rest of their education, which I should probably spoil I must trust you but if my most beloved and devoted wife Lucy, who is the best loved that ever lived, should survive the shock of my death, she will of course take care of such things herself.

Yours always, Willi.

Lucy did survive the shock of his death. Lucy went on to be prominent in literary circles. She endeavoured to protect her husband's reputation. The relationship between W.K. Clifford and his wife Lucy has been researched by Monty Chisholm. Information is available at this website: <http://www.williamandlucyclifford.com/research-story> . Lucy did have a full and successful life after the death of Clifford.

Pollock's book *Spinoza His Life and Philosophy* was published the year following Clifford's death. Pollock dedicates this book "To the Memory of my Friend, William Kingdon Clifford". Pollock was at this time a barrister; he was later to become one of England's most distinguished jurists. Language is the working tool of a barrister. I find it strange that Pollock would have made the comment quoted above concerning Clifford re-telling what had occurred at the meetings of the Metaphysical Society.

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<sup>27</sup> Adv. appl. Clifford alg. 19 (2009), 657–671 c© 2009 Birkhäuser Verlag Basel/Switzerland. 0188-7009/030657-15, published online October 22, 2009. DOI 10.1007/s00006-009-0188-x

Saying something to a group of friends during a light hearted conversation is different to informing the world of 'what is said'. Perhaps my interpretation of Pollock is overly cynical.

The second, and third editions of *Lectures and Essays* has a modified 'Introduction Part I Biographical' to the original 1879 Edition. The following foot note is provided by Pollock:

1 Written in 1879. A few sentences have now (1886) been added. Some verbal alterations, mostly rendered necessary by the lapse of time, will explain themselves. F. P.

The lapse of time is of seven years duration. The following is from the 1886 version:

Looking back on this brilliant piece of speculation after seven years, I suppose my sight is more impartial. I alter nothing of what I wrote in the first edition, but feel bound in sincerity to add that I cannot now accept mind-stuff. The atom of mind stuff is a "thing in itself": Clifford so described it. But the purpose of modern philosophy is to abolish things in themselves. Kant proved them unknowable: the inevitable step onward is to cast them out as illusions, though Kant would not take it. By no amount of ingenious manipulation can psychology henceforth be made to serve instead of metaphysics. Mind per se, or mind-stuff, abstracted by Clifford's or any like method from the intelligible world, is no more intelligible than matter per se. We have simplified a scientific statement, not solved a philosophical problem.

I find this rejection of mind-stuff difficult to comprehend. I have no problem with a person rejecting mind-stuff as a hypothetical 'stuff'; however Pollock rejects it as 'an atom of mind-stuff'. The relevant section of Clifford's essay "On the Nature of Things-in-Themselves" *Mind* 1878 that introduces 'mind-stuff' is as follows:

The universe, then, consists entirely of mind-stuff. Some of this is woven into the complex form of human minds containing imperfect representations of the mind-stuff outside them, and of themselves also, as a mirror reflects its own image in another mirror, ad infinitum. Such an imperfect representation is called a material universe. It is a picture in a man's mind of the real universe of mind-stuff.

The first version of "On the Nature of Things-in-Themselves" presented to the Metaphysical Society mentioned 'stuff':

But besides all these objects in our minds, there is something else, different from them, of which, however, each object is a picture; this is the thing in itself, not an object in our consciousness nor in any consciousness (except when the corresponding object is part of the action of a brain); and yet made of the stuff that minds are made of.

Pollock chooses to omit the speculative theory of ‘the space theory of matter’ that is intrinsic to Clifford’s formulation of ‘mind-stuff’. This will be discussed later. For now I would suggest that being dead Clifford is no longer capable of offering more than already exists in his recorded work, and so he can be marginalized.

In regard to Pollock’s book *Spinoza His Life and Philosophy*, apart from the dedication Clifford is mentioned thrice as follows:

and see W. K. Clifford, Aims and Instruments of Scientific Thought, in Lectures and Essays, Lond. 1879, vol. I, p. 149<sup>28</sup>

Prof. W. K. Clifford. [foot note “Since deceased”]<sup>29</sup>

Clifford, W. K., on causation, cited, 161<sup>30</sup>

Compare this with Pollock’s comment in his ‘Biographical’:

He had a high admiration for Berkeley, next only to Hume, and even more, perhaps, for the ‘Ethics’ of Spinoza. The interpretation of Spinoza’s philosophy which I have put forward on one or two occasions was common to Clifford and myself, and on that subject (as, indeed, on everything we discussed together) I owe very much to him. He was to have lectured on Spinoza at the London Institution in 1877, but his health would not allow it. There is little doubt that this would have been one of his most brilliant and original discourses.<sup>31</sup>

The letter, written by Clifford shortly before his death, mentions Huxley. Huxley was twenty years older than Clifford. He was known as ‘Darwin’s bulldog’. He was drawn into a dispute with William Samuel Lilly in December of 1886. Huxley took exception to Lilly referring to Clifford, Herbert Spencer and Huxley himself as ‘materialists’. The conflict is addressed in *Victorian Science and Literature: Volume 1*. The conflict consists of three articles presented in the *Fortnightly Review*. The conflict itself is not of much interest to me, but a comment made by Huxley is, as is the fact that the argument is representative of problems that are ongoing. He is, in my opinion, an honest man. Honesty is not truth. An honest man seeks truth, but never claims to have found it with certainty, even

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<sup>28</sup> *Spinoza His Life and Philosophy*, Frederick Pollock London C. Kegan Paul & Co., 1880, Pg.161

<sup>29</sup> Ibid Pg. 454

<sup>30</sup> Ibid Pg. 458

<sup>31</sup> *Lectures and Essays*, Edited by Leslie Stephen and Sir Frederick Pollock, London Macmillan and Co. Ltd., 1879 Pgs. 38-39

to a good approximation. This is my version of the aphorism of Gotthold Lessing.<sup>32</sup> In his letter to the *Fortnightly Review* December 1886 Huxley writes the following:

My lamented young friend Clifford, sweetest of natures though keenest of disputants, is out of reach of our little controversies, but his works speak for him, and those who run may read a refutation of Mr. Lilly's assertions in them.

Huxley, in my opinion, makes two errors in this sentence, or he is taking the barrister on at his own game. The first is that his adversary is seeking truth rather than feigning to have found it. Secondly that his adversary will interpret Clifford as Huxley interprets him.

It seems to me that Huxley sees in Clifford a fellow 'honest man' seeking for truth. His ire with Lilly results from Lilly's claim to have found it. This takes the problem back to its start. The Metaphysical Society had sought to resolve the problem and failed. If the problem is that evolutionary theory and non-Euclidean geometries have removed certainty from man's understanding of his world, and this uncertainty has potential risk for the stability of society, then it would seem the problem is still to be resolved.

It is recorded that Clifford loved to debate. He did not however attempt to change another's beliefs. If having presented his arguments for his understanding of things the other wishes to insist on his understanding, Clifford moves on. This will be seen in the debate between Clifford and Ingleby, and also in his discussions with Tait.

Clifford is difficult to classify in his metaphysic. It would not be charitable to Clifford to force his metaphysical thought into a pre-existing 'ism'. I accept Clifford was an honest man with a rare talent in mathematics. His speculative metaphysic arises from his speculations in advanced work in geometry. Gauss was gifted too but had a more sober attitude to society and his place in it. Clifford did not seek 'immediate honour or emolument'. A person that takes such a stance will be respected but, in my opinion, eventually such a person becomes an affront to others that do seek honour and emolument, or at a minimum avoid the clamour of the Boeotians.

This section is concerned with the personality of Clifford. It may be that I have strayed from discussing Clifford's personality by mentioning Pollock, Huxley and Gauss. Pollock and Huxley were close friends of Clifford, and the friends that a person has can give some insight into that person, not only from what they write of the person but what they themselves are.

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<sup>32</sup> "If God held all truth concealed in his right hand, and in his left hand the persistent striving for the truth...and should say, 'Choose!' I should humbly bow before his left hand and say, 'Father, give me striving. For pure truth is for thee alone.' Wittgenstein was to wrestle with the problem of 'truth', 'certainty', and 'knowledge' in his *On Certainty*. Karl Popper's use of 'verisimilitude' as 'closeness to the truth' is another approach to the problem.

Gauss was not a close friend of Clifford but it is safe to say that Clifford read Gauss. It seems reasonable to me that Clifford would have read the biography of Gauss written by W. Sartorius von Waltershausen. Waltershausen was a member of the British Association. The following is taken from the Inaugural Preditional Address to the Mathematical and Physical Section of the British Association at Exeter August 1869 of J.J. Sylvester<sup>33</sup>:

...Like his master Gauss, Riemann refuses to accept Kant's doctrine of space and time being forms of intuition, and regards them as possessed of physical and objective reality. I may mention that Baron Sartorius von Waltershausen (a member of this Association) in his biography of Gauss, published shortly after his death,.....

I will include here some notes concerning Gauss:

Carl Friedrich Gauss 1777-1855

Gauss was arguably one of the greatest mathematical minds. W. Sartorius von Waltershausen wrote a biography of Gauss the year following his death. Sartorius was born in Gottingen in 1809. His father, Georg Friedrich Sartorius [ after 1827 Freiherr von Waltershausen ] 1765-1828, was a professor of economics and history at Gottingen University and friend of Goethe. W. Sartorius became professor of mineralogy and geology at Gottingen. W. Sartorius made magnetic observations in various parts of Europe during the period 1834-1835. Gauss had been researching terrestrial magnetism since 1816.<sup>34</sup> Gauss lived during the period that non-Euclidean geometries were being investigated. Wolfgang Bolyai was Gauss' friend from the latter years of the 18<sup>th</sup> C. Wolfgang [ Farkas ] Bolyai's son Janos Bolyai is considered one of the founders of non-Euclidean geometry. Gauss became aware of the work of Lobachevsky in 1840.<sup>35</sup> Riemann, the third founder of non-Euclidean geometries, was a pupil of Gauss.

The role that Gauss played in the establishing of non-Euclidean geometries has been widely researched. My interest is not in the historical research into who knew what and when, rather I would consider the implications that arise from Gauss not seeing the new geometries as abstruse mathematical models but as being indicative that space was of higher dimension and empirical. Gauss never published his mathematical work on the new geometries but does mention them in his correspondence with friends and in conversations.

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<sup>33</sup> *The Laws of Verse or Principles of Versification*, J.J. Sylvester, Longmans, Green, and Co. 1870.

<sup>34</sup> *Gauss Titan of Science*, G. Waldo Dunnington pg. 117

<sup>35</sup> *Ibid* Pg. 185

According to his frequently expressed convictions Gauss regarded the three dimensions of space as a specific characteristic of human beings. People who could not understand this he humorously called Boeotians. “We can think of creatures who are conscious of themselves in only two dimensions,” he said. “Higher above us in like manner would stand those who look down on us. Certain problems pertaining to this”, he continued jestingly, he had “put aside to deal with later through geometry, in a higher state of existence.”<sup>36</sup>

Gauss says: “We can think of creatures who are conscious of themselves in only two dimensions.” He does not say they are two dimensional. Clifford would have been aware of Waltershausen. I believe this because of the following:

I may mention that Baron Sartorius von Waltershausen (a member of this Association), in his biography of Gauss (*Gauss zum gedächtnis*), published shortly after his death, relates that this great man was used to say that he had laid aside several questions which he had treated analytically, and hoped to apply to them geometrical methods in a future state of existence, when his conceptions of space should have become amplified and extended ; for as we can conceive beings (like infinitely attenuated book-worms in an infinitely thin sheet of paper) which possess only the notion of space of two dimensions, so we may imagine beings capable of realising space of four or a greater number of dimensions.! Our Cayley, the central luminary, the Darwin of the English school of mathematicians, started and elaborated at an early age, and with happy consequences, the same bold hypothesis.

Sylvester’s address at Exeter, printed in Nature Dec. 1869.

Waltershausen is in a group that includes Sylvester. The link between Waltershausen and Sylvester is important because [ I presume ] Clifford would have read this article.

Gauss and Clifford had very different personalities and lives. Gauss lived well into old age, Clifford died young. Gauss was shrewd, Clifford ingenuous.

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<sup>36</sup> Pgs. 65-66 ‘*Gauss A Memorial*’ W. Sartorius von Waltershausen, Leipzig 1856. Translation by Helen Worthington Gauss 1966

## Chapter 2 Writings of W. K. Clifford

The extant writings of Clifford can be categorised into departments. The first department is concerned with mathematics, the second with speculative physics, the third with speculative metaphysics, the fourth with the dissemination to lay audiences of the advances in scientific thought of the day, and lastly children's stories. It is important to keep in mind the intended audience for which Clifford's writings were produced. I make no claim to having the required ability in pure mathematics to be able to follow the mathematical works of Clifford. The speculative physics of Clifford are one hundred and fifty years old and so in a practical sense have been largely superseded by advances in science. The work of Archibald Wheeler may suggest that rather than being superseded they have been placed in the 'too hard' basket. Clifford's speculative metaphysics derives from his work in geometry, but a full understanding of his work in geometry is not required to follow the arguments that are metaphysical. In saying this, the problem of conceivability has raised its head. Different people have different abilities. Clifford had abilities in geometry that far exceed my own. The problem that is intrinsic to interpreting the metaphysics of Clifford is the merging of writings aimed at his peers with those aimed at the interested layman. It is unfortunate that the papers read at the Metaphysical Society have been kept in the shadows. The Metaphysical Society brought together people with different areas of expertise. In order to be constructive the discussions between the members required that the expertise of the other be recognised.

A major problem with the writings of Clifford is that they are nowhere presented as a coherent whole. Clifford had intended to publish in book form his thought. The book would have brought together, in the way he intended to, the thought expressed in the essays that are extant. It has been mentioned previously that *Lectures and Essays* had three editions, those being of 1879, 1886 and 1901. It is of interest that the 1879 Edition contains a Bibliographical section in the Introduction that does not appear in the 1886 or 1901 Editions. The 'Part III, Bibliographical' begins on page 67 of the first edition. Known essays are listed, and the editors request information from readers that have information on records of those essays for which they have no documentation as to content. On pages 71-72 of the first edition the following is found:

Clifford's actual intention with respect to all these writings was not to republish them as they stand, but to recast them in a book to be called 'The Creed of Science.' He had written in a note-book the following sketch of contents:

### THE CREED OF SCIENCE

#### I. What ought we to believe?

1. The duty of inquiry and the sin of credulity.

2. The weight of authority.

3. The nature of inference.

Is the order of the universe exact?

4. Is the order reasonable?

II. What is Science?

1. Conceptions and beliefs.

2. Knowledge is the guide of action.

3. My knowledge and our knowledge, or what is truth?

4. Truth for its own sake.

III. The History of the Sun.

1. The Sun's present work.

2. The evolution of the Earth's crust and evolution of life.

3. The age of the earth.

4. The formation of the solar system.

IV. Atoms.

1. The molecular hypothesis.

2. How far we know that it is true.

3. What we do not know.

4. The nature of the evidence for a [ ? the] hypothesis.

V. Ether.

1. Light is a change of state periodic in time and space.

2. Radiant heat (same thing) has energy, and therefore

is motion of matter.

3. Whatever motion is periodically reversed in light is continuous round an electric current.
4. Difficulties.

#### VI. The beginning and the end.

1. Are molecules eternal?
2. Thomson's hypothesis.
3. The argument from dissipation.
4. The limits of knowledge,

#### VII. Body and Mind.

1. The atomism of the nervous system.
2. The atomism of mind.
3. The parallelism of the two.
4. The great gulf fixed between them.

#### VIII. The Unseen Reality.

1. There is no matter without something like mind behind it.
2. All matter is a part of our minds.
3. The material universe is a picture of something which is like mind.
4. How far is it a true picture?

#### IX. God and the Soul.

1. Will and intelligence imply a certain organization of matter.

2. No -will or intelligence except those of men and animals has worked in the Solar System.
3. The consciousness of man breaks up at the same time with his brain.
4. Nature is uniform in human action.

#### X. Right and Wrong.

1. The facts of the moral sense.
2. The theory of responsibility.
8. The foundation of absolute morality.
4. Piety and Truth.

In the 1886 edition the Introduction does not have a 'Bibliographical'. The introduction terminates with the following:

The bibliographical sketch of Clifford's work which formed part of this Introduction in the first edition is considered to have served its turn, and is not now reproduced. The editors have not received any later information capable of giving definite results.

The sketch outline for the proposed book *The Creed of Science* is said in the first edition to have been found in one of Clifford's notebooks. I fail to see why the editors of all three editions, Leslie Stephen and Frederick Pollock, would consider this sketch outline to be no longer relevant. If nothing else it provides a skeleton of the book that Clifford never lived to write.

The following is taken from page seventy of the first edition:

In reprinting the Lectures and Essays which now appear no alterations have been made beyond such little matters of verbal and literary correction as the author would have naturally attended to if he had himself undertaken a revision with a view to collected publication ; but certain passages have been omitted which we believe that Clifford himself would have willingly cancelled, if he had known the impression they would make on many sincere and liberal-minded persons whose feelings he had no thought of offending.

This is taken from the ‘Bibliographical’ which is omitted from subsequent editions. Whether or not Clifford would have ‘willingly cancelled’ the passages is difficult to know, even if you were a person that had been a close friend of Clifford’s.

The book *Seeing and Thinking*<sup>37</sup> was published the same year as the first edition of *Lectures and Essays*. The book is referred to in the first edition of *Lectures and Essays* on page sixty nine:

‘Seeing and Thinking.’ Three lectures at Shoreditch for a University Extension Course, December 1874. These are to be published as a separate little book, according to the original intention, at or about the same time as the present volumes.

This book is constructed from shorthand notes taken at the time and diagrams provided by Professor Michael Foster.

Clifford’s book ‘*The Common Sense of the Exact Sciences*’<sup>38</sup> was published in 1885, six years after Clifford’s death. The delay in the book’s publication is explained in the Preface of the book. Clifford had left instructions that the book should “only be published after very careful revision”. Initially this work was done by R.C. Rowe, Professor of Pure Mathematics at University College, London. Professor Rowe died October 1884, having only completed a partial revision. The remaining work was undertaken by Karl Pearson. Pearson was a mathematician that had diverse interests.

## 2.1 On Some of the Conditions of Mental Development

‘On Some of the Conditions of Mental Development’, SCMD, is chosen as the first essay to examine for the following reasons: it is the first presentation made by Clifford to the Royal Institution, it presents Clifford’s thought on evolution of mind, it has within it the clash of brilliance and naivety that is Clifford.

SCMD was presented to the Royal Institution 6 March, 1868. It is the first essay presented in *Lectures and Essays*.

The theme of the essay is that of ‘evolution of mind’. Clifford does not go directly to this, he rather explores what an individual does, then makes comparisons between evolution of the body with

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<sup>37</sup> *Seeing and Thinking* London Macmillan and Co. 1879

<sup>38</sup> *The Common Sense of the Exact Sciences*, W.K. Clifford, D. Appleton and Company 1885

evolution of the mind, then assuming this is acceptable presents the question: “What is that attitude of mind which is likely to change for the better ? What is the meaning of better?” Having formulated the question Clifford then ventures a possible answer. His answer is: “The first condition then of mental development is that the attitude of the mind should be creative rather than acquisitive: or, as it has been well said, that intellectual food should go to form mental muscle and not mental fat.” In concluding his essay Clifford tells us:

It is quite possible for conventional rules of action and conventional habits of thought to get such power that progress is impossible, and the nation only fit to be improved away. In the face of such a danger *it is not right to be proper.*

I wrote above that the essay is a clash of brilliance and naivety. The brilliance is in the attempt to bring the evolution of mind to the fore, the naivety is to fail to recognise the limited application of the conclusion reached.

Kant lived prior to Darwin’s work. Kant was not living at a time when the theory of evolution had been ‘accepted’ and its possibilities could be speculated upon. However Kant was aware of the progress of man. His essay ‘What is Enlightenment’ was written in 1784. Kant was sixty years old when he wrote the essay. Clifford was not twenty three years old when he presented his thought to the Royal Institution. The following is the final paragraph of Kant’s essay:

But only the man who is himself enlightened, who is not afraid of shadows, and who commands at the same time a well disciplined and numerous army as guarantor of public peace--only he can say what [the sovereign of] a free state cannot dare to say: "Argue as much as you like, and about what you like, but obey!" Thus we observe here as elsewhere in human affairs, in which almost everything is paradoxical, a surprising and unexpected course of events: a large degree of civic freedom appears to be of advantage to the intellectual freedom of the people, yet at the same time it establishes insurmountable barriers. A lesser degree of civic freedom, however, creates room to let that free spirit expand to the limits of its capacity. Nature, then, has carefully cultivated the seed within the hard core--namely the urge for and the vocation of free thought. And this free thought gradually reacts back on the modes of thought of the people, and men become more and more capable of acting in freedom. At last free thought acts even on the fundamentals of government and the state finds it agreeable to treat man, who is now more than a machine, in accord with his dignity.

Kant has seen the problem in its wider context and provided a ‘better’ response. However the rashness of Clifford is not without merit. What he explores in considering the ‘evolution of mind’ becomes significant in his later speculative metaphysics. Clifford also points out to his audience the benefits of abstruse mathematical thought:

I am here putting in a word for those abstruse mathematical researches which are so often abused for having no obvious physical application. The fact is that the most useful parts of science have been investigated for the sake of truth, and not for their usefulness.

Clifford writes the following:

No action can take place in accordance with the character without modifying the character itself; just as no motion of a planet could take place along its orbit without a simultaneous change in the orbit itself.<sup>39</sup>

The emphasis on ‘action’ is relevant to a subsequent presentation to the Royal Institution ‘On Theories of the Physical Forces’, which will be considered below.

Clifford’s presentation of SCMD is his first to a large audience outside the confines of academia. Unfortunately Clifford is forced to publish in the ‘Pall Mall Gazette’, 24 June, 1868, an apology for not making references to his special sources of information. The following is an extract from the published letter:

He [Herbert Spencer] has, moreover, formed the conception of evolution as the subject of general propositions applicable to all natural processes, a conception which serves as the basis of a complete system of philosophy. In particular, he has applied this theory to the evolution of mind, developing the complete accordance between the laws of mental growth and of the growth of other organic functions. In fact, even if the two points which I put forward as my own—viz., the formal application of the biological method to a certain special problem, and the biological law which serves as a partial solution of it—have not before been explicitly developed (and of this I am not sure), yet they are consequences so immediate of the general theory that in any case the credit of them should entirely belong to the philosopher on whose domains I have unwittingly trespassed. The mistake, of course, affects me only, and could in no way injure the fame of one whose philosophical position is so high and so assured.

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<sup>39</sup> *Lectures and Essays*, Edited by Leslie Stephen and Sir Frederick Pollock, Vol.1, Macmillan and Co., Ltd. 1879, Pg. 79

The full letter was published in *Lectures and Essays* immediately following SCMD. The full letter is worthy of analysis and would involve discussing the thought of Spencer and how it relates to Clifford. This would require considerable work. In itself it could constitute a worthwhile piece of scholarship. I will not attempt this analysis. It would be wrong to ‘over analyse’ for my purposes. I refrain from suggesting that Wittgenstein’s ladder was founded on the sentence “But here also science kicks down the ladder by which she has risen.”, or “There is some kind of law, they say, which regulates the slow growth of each character from childhood to age; so that if you compared together all the biographies you would find a sort of family likeness suggesting that some common force had acted upon them all to make these changes.” relates to family resemblance. I refrain from drawing links from the sentence “The first indication of consciousness is a perception of difference.” to the extralogical entities that Hilbert holds to be intuitively present as immediate experience to all thought. I suppose saying I refrain from doing it means I’ve done it. Such is the morass that I have fallen into.

## 2.2 Space Theory of Matter

Clifford communicated his ‘space theory of matter’ as an abstract to the Cambridge Philosophical Society, the communication being reported at a meeting, chaired by Cayley, 21 February, 1870.<sup>40</sup> The abstract is short, yet is important in Clifford’s later speculative metaphysic; for this reason I will present the abstract:

(3) On the Space-Theory of Matter. By W. K. Clifford,

B.A., Trinity College.

[Abstract]

RIEMANN has shewn that as there are different kinds of lines and surfaces, so there are different kinds of space of three dimensions; and that we can only find out by experience to which of these kinds the space in which we live belongs. In particular, the axioms of plane geometry are true within the limits of experiment on the surface of a sheet of paper, and yet we know that the sheet is really covered with a number of small ridges and furrows, upon which (the total curvature not being zero) these axioms are not true. Similarly, he says, although the axioms of solid geometry are true within the limits of experiment for finite portions of our space, yet we have no reason to conclude that they are true for very small portions; and if any help can be got thereby for the explanation of

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<sup>40</sup> *Proceedings of the Cambridge Philosophical Society*, Vol.II, 1864-76, Cambridge University Press 1876. Pgs. 157-158

physical phenomena, we may have reason to conclude that they are not true for very small portions of space.

I wish here to indicate a manner in which these speculations may be applied to the investigation of physical phenomena.

I hold in fact

(1) That small portions of space are in fact of a nature analogous to little hills on a surface which is on the average flat; namely, that the ordinary laws of geometry are not valid in them.

(2) That this property of being curved or distorted is continually being passed on from one portion of space to another after the manner of a wave.

(3) That this variation of the curvature of space is what really happens in that phenomenon which we call the motion of matter, whether ponderable or etherial.

(4) That in the physical world nothing else takes place but this variation, subject (possibly) to the law of continuity.

I am endeavouring in a general way to explain the laws of double refraction on this hypothesis, but have not yet arrived at any results sufficiently decisive to be communicated.

The following is a timeline of certain matters pertinent to this abstract as communicated to the Cambridge Philosophical Society:

1867 Richard Dedekind published Riemann's inaugural lecture 'Ueber die Hypothesen, welche der Geometrie zu Grunde liegen' in *Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen*, vol. 13, 1867.

August 1869 J.J. Sylvester presents his Inaugural Address to the Mathematical and Physical Section of the British Association, at Exeter. In this address Sylvester makes the following mentions of Clifford:

Although no great lecture goer, I have heard three lectures in my life which have left a lasting impression as master-pieces on my memory---Clifford on Mind, Huxley on Chalk, Dumas on Farady.<sup>41</sup>

Mr. W.K. Clifford has indulged in some remarkable speculations as to the possibility of our being able to infer, from certain unexplained phenomena of light and magnetism, the fact that our level space of three dimensions being in the act of undergoing in space of four dimensions (space as inconceivable to us as our space to the supposititious bookworm) a distortion analogous to the rumpling of the page.<sup>42</sup>

At the request of the Editor of *Nature* Sylvester provided an abridgment of his Address at Exeter, which was published in *Nature* 30 December, 1869, and 6 January, 1870.

The translation of Riemann's inaugural lecture by Clifford is published in *Nature*, vol.8, 1 May, 1873. Clifford was fluent in German so would have had no problems reading the Riemann inaugural lecture as presented by Dedekind in 1867.

It will be seen that prior to Clifford's communication to the Cambridge Philosophical Society, Clifford's thought regarding space is already known to Sylvester. The abstract as presented does lay a foundation for the speculative metaphysic that Clifford presents in his essay 'On the Nature of Things-in-Themselves'.

Clifford's thought regarding the 'space theory' of matter provides us with a possible response to the problem of wave particle duality. The work of Thomas Young had shown that light had the properties of a wave. This was contra the Newtonian corpuscular theory of light. This will be considered later when I will attempt to provide an overview of Clifford's mature metaphysical position.

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<sup>41</sup> *The Laws of Verse or Principles of Versification*, J.J. Sylvester, Longmans, Green, and Co. 1870. Pg. 106, footnote.

<sup>42</sup> *Ibid.* Pg. 113, footnote.

### 2.3 On Theories of the Physical Forces

Clifford presented ‘On Theories of the Physical Forces’ to the Royal Institution on 18 February, 1870.<sup>43</sup> This presentation comes three days prior to Clifford presenting his ‘Space theory of Matter’. The two presentations are close enough in time to be considered contemporaneous. The essay begins with a quote from ‘Faust’. Clifford quotes in German. I will provide the quote and its English translation provided by A. Gillies<sup>44</sup>:

Geschrieben steht: ‘Im Anfang war das Wort!’  
 Hier stock’ ich schon! Wer hilft mir weiter fort?  
 Ich kann das Wort so hoch unmöglich schätzen,  
 Ich muß es anders übersetzen,  
 Wenn ich vom Geiste recht erleuchtet bin.  
 Geschrieben steht: ‘Im Anfang war der Sinn.’  
 Bedenke wohl die erste Zeile,  
 Daß deine Feder sich nicht übereile!  
 Ist es der Sinn, der alles wirkt und schafft?  
 Es sollte stehn: ‘Im Anfang war die Kraft!’  
 Doch, auch indem ich dieses niederschreibe,  
 Schon warnt mich was, daß ich dabei nicht bleibe.  
 Mir hilft der Geist! Auf einmal seh’ ich Rat  
 Und schreibe getrost: ‘Im Anfang war die Tat!’  
 (ll. 1224-1237)

’Tis writ, ‘In the beginning was the Word.’  
 I pause, to wonder what is here inferred.  
 The Word I cannot set supremely high:  
 A new translation I will try.  
 I read, if by the spirit I am taught,  
 This sense: ‘In the beginning was the Thought.’  
 This opening I need to weigh again,  
 Or sense may suffer from a hasty pen.

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<sup>43</sup> *Lectures and Essays*, Edited by Leslie Stephen and Sir Frederick Pollock, Vol.1, Macmillan and Co., Ltd. 1879, Pg. 109

<sup>44</sup> *Goethe’s Faust*, An Interpretation by Alexander Gillies, 1957. <http://wolffmann.com/gillies/faust-interpretation-1.html> accessed 10 December, 2012.

Does Thought create, and work, and rule the hour?  
 'Twere best: 'In the beginning was the Power.'  
 Yet, while the pen is urged with willing fingers,  
 A sense of doubt and hesitancy lingers.  
 The spirit comes to guide me in my need,  
 I write, 'In the beginning was the Deed.'

Clifford interprets the quote as four stages in a man's attempt to understand himself. Word is followed by thought, this in turn is followed by power, and lastly there is deed. Power entails force. Deed is synonymous with act.

Clifford considers two questions these being:

- 1] Why do things happen?
- 2] What is it precisely that does happen?

The first is outside the realm of science. The second is what science is about. The first may well be doubted to be within the province of human knowledge. Clifford's thought regarding what is within the realm of science and what is not reaches its mature form in his essay 'On the Nature of Things-in-Themselves', the first version being presented to the Metaphysical Society 9 June, 1874.

The essay is significant not for an interpretation of Goethe's 'Faust' but because Clifford questions continua. Clifford makes reference to 'the wheel of life'. This refers to the Zoetrope, which was patented in the United States of America in the 1860's as the Wheel of Life. The Zoetrope was a forerunner of cinematography. Still images providing the illusion of movement. Clifford writes:

Here then is an apparently continuous motion which is really discontinuous; and moreover there is an apparently continuous perception of it which is really discontinuous—that is, it seems to be gradually changed, while it really goes by little jumps. I suppose very few people have looked at this toy without wondering whether it is not actually and truly a wheel of life, without any joke at all. I mean, that it is very natural for the question to present itself. Do I ever really see anything move? May not all my apparently continuous perceptions be ultimately made up of little jumps, which I run together by this same inevitable instinct?

... That is to say, for instance, if I move my hand so in front of me, and apparently see it take up in succession every possible position on its path between the two extreme

positions; do I really see this, or do I only see my hand in a certain very large number of distinct positions, and not at all in the intervening spaces?

I have no doubt whatever myself, that the latter alternative is the true one, and that the wheel of life is really an illustration and type of every moment of our existence. But I am not going to give my reasons for this opinion, because it is quite a different question from the one I am trying to get at. The question, namely, is this. What I see, or fancy I see, is quite consistent with the hypothesis that my hand really does go on moving continuously all the time, and takes up an infinite number of positions between the two extreme ones. But if this hypothesis is not true, what is true? and how are we to imagine any other state of things than that supposed by the hypothesis of continuity?

The problematic concept is infinity and its reciprocal, the infinitesimal. Clifford was an analytic geometer so was not unaware of the problems associated with the infinite. The problem of the infinite is that it relates to mathematical entities, not physical ones. It was seen in the essay 'On Some Conditions of Mental Development' that Clifford was an advocate of abstruse mathematics. The differentiation of abstruse and abstract mathematics is important. A question that arises from consideration of the difference between abstruse and abstract mathematical models is: 'How does an abstruse model become an abstract model?' There is also the question as to how closely any particular model 'models' reality itself. These are fundamental questions. If a model is to be more than an interesting abstruse construct it requires verification. Verification requires that the model is able to better predict events. If something is abstract it is able to predict. If I measure the length of two sides of a right angled triangle I 'know' the third length without the need to measure. This knowledge is not absolute. It is close enough for most purposes. The need for a new model is generated by the inability of the prior model to explain some phenomenon. It was seen above that Clifford's abstract of his 'space theory of matter' concluded with:

(4) That in the physical world nothing else takes place but this variation, subject (possibly) to the law of continuity.

I am endeavouring in a general way to explain the laws of double refraction on this hypothesis, but have not yet arrived at any results sufficiently decisive to be communicated.

If Clifford could have explained the laws of double refraction within the framework of the prevailing model he would have not needed to vary that model. It seems to me that unless we take the position that our present model is absolute then that model is abstruse not abstract. The recognition of this requires that absolute certainty is not attainable within the present model.

Clifford writes:

I have no doubt whatever myself, that the latter alternative is the true one, and that the wheel of life is really an illustration and type of every moment of our existence.

Once Clifford has taken this position speculation becomes unlimited. This will be a source of frustration for some and joy for others. Anyone seeking certainty that any particular mathematical model represents absolutely reality will be disappointed. Reality is inferred from phenomena, but the reality is not the phenomena themselves. Clifford has chosen to reject the Law of Continuity. Leibniz had accepted this Law. An interpretation of the Law is given by Katz and Katz as:

whatever succeeds for the finite, also succeeds for the infinite<sup>45</sup>

In their essay Katz and Katz discuss the infinitesimal. It seems the infinitesimal has been removed from mathematics.<sup>46</sup> The Law of Excluded Middle has been varied or rejected by some mathematicians.<sup>47</sup> There appears to be a desire to ground mathematics on a foundation that is absolute.

## 2.4 Atoms

Clifford presented this lecture to the Sunday Lecture Society 7 January, 1872; presented it again in Manchester 20 November, 1872. The lecture was printed in the series of Manchester Science Lectures. Clifford uses metaphor to explain the current understanding of atomic theory. Clifford makes no use of mathematics to explain how atoms behave. He does tell his audience that mathematics is used to establish the received position. The message of the lecture is ostensibly about atoms, however Clifford also mentions how scientists employ a certain method. The following is how Clifford explains the difference between a theory and a demonstrated fact:

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<sup>45</sup> arXiv:1104.0375v4 [math.HO] accessed 13 December 2012

<sup>46</sup> The infinitesimal was removed by the work of Cauchy and Karl Weierstrass, but reintroduced by Abraham Robinson. In Robinson's theory infinities and infinitesimals are part of a model satisfying the axioms intended for ordinary finite real numbers. This position can be traced back to the thought of Leibniz.

<sup>47</sup> The challenge to the certainty of the Laws of Thought is relevant to Clifford's 'filling in'.

The difference between a theory and a demonstrated fact is something like this: If you supposed a man to have walked from Chorlton Town Hall down here say in ten minutes, the natural conclusion would be that he had walked along the Stretford Road. Now that theory would entirely account for all the facts, but at the same time the facts would not be proved by it. But suppose it happened to be winter time, with snow on the road, and that you could trace the man's footsteps all along the road, then you would know that he had walked along that way. The sort of evidence we have to show that light does consist of waves transmitted through a medium is the sort of evidence that footsteps upon the snow make; it is not a theory merely which simply accounts for the facts, but it is a theory which can be reasoned back to from the facts without any other theory being possible.

The following is of interest in regard to how Clifford understands 'possibility':

There is one other point of very great interest to which I want to call your attention. The word 'atom,' as you know, has a Greek origin; it means that which is not divided. Various people have given it the meaning of that which cannot be divided; but if there is anything which cannot be divided we do not know it, because we know nothing about possibilities or impossibilities, only about what has or has not taken place. Let us then take the word in the sense in which it can be applied to a scientific investigation. An atom means something which is not divided in certain cases that we are considering.

If the lecture is taken to be to inform the audience of received scientific thought it would be no more than that which the audience could gain by borrowing a book from a library. What Clifford gently adds is an appreciation of scientific method. A person that attended the lecture would have a better understanding of deeper questions that underlie the surface 'facts'. This would allow them to apply that understanding in relation to other situations. They would be able to themselves interpret facts in a more scientific way.

Clifford mentions synthesis. He does this by reference to the work of William Thomson:

I must for one or two moments refer to some calculations of Sir William Thomson, which are of exceeding interest as showing us what is the proximity of the molecules in liquids and in solids. By four different modes of argument derived from different parts of science, and pointing mainly to the same conclusion, he has shown that the distance between two molecules in a drop of water is such that there are between five hundred millions and five thousand millions of them in an inch.

Clifford does not express certainty from the different modes of argument, he writes “..pointing mainly to the same conclusion...”<sup>48</sup>

There is also the optimism for further understanding as expressed by the following:

There is another scientific theory analogous to this one which leads us to hope that some time we shall know more about these molecules.

Clifford was not a person to waste his time. His purpose in travelling to Manchester and giving a lecture is not to impart facts but rather to instil in his audience an appreciation of a method of reasoning that questions and seeks answers.

## 2.5 Aims and Instruments of Scientific Thought

This essay was presented to members of the British Association, at Brighton, 19 August, 1872.<sup>49</sup>

Clifford provides an example of what is not scientific thought then gives one that involves scientific thought.

What is not scientific thought is the prediction by use of observed cyclic events. The example is observed astronomical events taken over a lengthy period will reveal cycles. Clifford holds that this requires technical skill but does not involve scientific thought.

What is scientific thought is when the prediction of a particular event fails and a reason for the failure is provided that results in an observation that had never been made before that confirms the reasoning for the failure. The example given is that of the failure of the planet Uranus to be where it should be. The prediction by John Couch Adams and Urbain Le Verrier working separately, of the presence of an as yet unobserved planet that would account for the failure of the initial prediction is held by Clifford to be scientific. It is held to be scientific because the unobserved planet was found in the place it should be. Whether it would still be scientific if the planet had not been found is not discussed.

The synthetic *a priori* of Kant is relevant. Kant argued for synthetic *a priori* knowledge. What constitutes the ‘knowledge’ of the previously unobserved planet prior to its being observed is subject to debate, but is not *a priori* in a Kantian sense. It has already been seen that Clifford was a proponent

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<sup>48</sup> Whewell’s ‘consilience’ provides for a ‘convergence’ of evidence; however if all the evidence is within the same paradigm then that evidence may be irrelevant to evidence that is richer and of a subsequent paradigm.

<sup>49</sup> Printed in *Macmillans Magazine*, October 1872

of abstruse mathematical thinking. The abstruse is valuable because it sometimes leads to discovery of phenomena that result in the abstruse becoming abstract.

Clifford has mentioned scientific and technical. Both are grounded on mathematics. The differences are significant but they are not the only things to be considered. The scientist that suggests the existence of a planet not yet observed in order to correct an observed problem is different to an inventor that creates a mechanism that has never existed. The prediction of there being an unobserved planet that was responsible for the planet Uranus being in the ‘wrong’ position required only that the existence of the planet be assumed and then do the calculations accordingly. This method would not be applicable to creating an escapement for a watch that is more efficient than the one invented by George Daniels.

Clifford writes the following:

Now it seems to me that the difference between scientific and merely technical thought, not only in these but in all other instances which I have considered, is just this: Both of them make use of experience to direct human action; but while technical thought or skill enables a man to deal with the same circumstances that he has met with before, scientific thought enables him to deal with different circumstances that he has never met with before. But how can experience of one thing enable us to deal with another quite different thing? To answer this question we shall have to consider more closely the nature of scientific thought.<sup>50</sup>

It seems to me that Clifford is too narrow in his thought concerning science and technology. He claims that the work of Adams and Le Verrier was scientific, but they only posited an unknown planet to correct the model that was used to predict the motion of Uranus. Both Adams and Le Verrier worked on the assumption that the underlying laws that were involved in the method of predicting the motion of Uranus were applicable. This is different to ‘inventing’ or ‘creating’ a novel model that predicts something that cannot be accounted for in the method employing the existing laws.

Clifford asks this question:

Is the uniformity of Nature absolutely exact, or only more exact than our experiments?<sup>51</sup>

The question asked by Clifford, immediately above, might be unpalatable, but it is a real question. In December 1874 Clifford gave a series of lectures at Shoreditch which were published as *Seeing and Thinking*. Clifford, in these lectures, returns to the problem of the infinite. This problem that is

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<sup>50</sup> *Lectures and Essays*, First Edition, Pg. 128

<sup>51</sup> *Lectures and Essays*, First Edition, Pg. 134

contained in the question has produced a great deal of controversy. If exactness were to invalidate our understanding of the world; how can we ever be confident that we have an exact understanding of the world?

Clifford spends the remainder of the essay addressing the issue of exactness. The issue Clifford raises is:

I want to find out what we mean when we say that the uniformity of Nature is *exact*; and what we mean when we say that it is *reasonable*.<sup>52</sup>

This is a big task. Clifford is giving a presentation concerning scientific thought, and is addressing the Laws of Nature. However the same problem arises in manmade laws. In manmade legislation the term ‘reasonably practicable’ is often used to provide some escape from the need to be exact. In manmade law we are fortunate to have a system that includes courts and judges. We use this system to determine in any specific case what reasonable is. In the end we give the authority to the judge to tell us what is reasonable. Judges are therefore accepted as reasonable people. This might not be satisfactory to critical analysis, but it is difficult to construct anything better. Obviously the two realms of science and the legal system are different. There is no final court of appeal to resolve the problem associated with the nature of the continuum.

Clifford writes the following:

But it happens that about the beginning of the present century the foundations of geometry were criticised independently by two mathematicians, Lobatschewsky and the immortal Gauss; whose results have been extended and generalized more recently by Riemann and Helmholtz. And the conclusion to which these investigations lead is that, although the assumptions which were very properly made by the ancient geometers are *practically exact*—that is to say, more exact than experiment can be—for such finite things as we have to deal with, and such portions of space as we can reach; yet the truth of them for very much larger things, or very much smaller things, or parts of space which are at present beyond our reach, is a matter to be decided by experiment, when its powers are considerably increased. *I want to make as clear as possible the real state of this question at present, because it is often supposed to be a question of words or metaphysics, whereas it is a very distinct and simple question of fact.*<sup>53</sup>

In 2.3 above it was seen that Clifford holds that motion is not continuous but proceeds by very small incremental jumps. This raises the interesting question ‘what is between two consecutive jump

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<sup>52</sup> Ibid, Pg. 132

<sup>53</sup> Ibid, Pgs. 136-137. Emphasis is mine.

states?' If it is not possible to experimentally determine anything about the nature of the jump states or the nature of whatever it is between them, how can they be anything more than abstruse? Clifford champions abstruse mathematical thought; however for the abstruse to be raised to the level of the abstract some form of 'experiment' is required. If that experiment is denied by the nature of the abstruse construct itself can it be claimed to be a scientific speculation or merely a metaphysical daydream?

Clifford writes the following:

This example is exceedingly important as showing the connexion between exactness and universality. It is found that the deviation if it exists must be nearly proportional to the area of the triangle. So that the error in the case of a triangle whose sides are a mile long would be obtained by dividing that in the case I have just been considering by four hundred quadrillions; the result must be a quantity inconceivably small, which no experiment could detect. But between this inconceivably small error and no error at all, there is fixed an enormous gulf; the gulf between practical and theoretical exactness, and, what is even more important, the gulf between what is practically universal and what is theoretically universal. I say that a law is practically universal which is more exact than experiment for all cases that might be got at by such experiments as we can make. We assume this kind of universality, and we find that it pays us to assume it. But a law would be theoretically universal if it were true of all cases whatever; and this is what we do not know of any law at all.<sup>54</sup>

Clifford has recognised the limitations of our present capabilities. Clifford is critical of those that seek to eliminate or avoid this limitation. He writes the following:

As the discoveries of Galileo, Kepler, Newton, Dalton, Cavendish, Gauss, displayed ever new phenomena following mathematical laws, the theoretical exactness of the physical universe was taken for granted. Now, when people are hopelessly ignorant of a thing, they quarrel about the source of their knowledge. Accordingly many maintained that we know these exact laws by intuition. These said always one true thing, that we did not know them from experience. Others said that they were really given in the facts, and adopted ingenious ways of hiding the gulf between the two. Others again deduced from transcendental considerations sometimes the laws themselves, and sometimes what through imperfect information they supposed to be the laws.<sup>55</sup>

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<sup>54</sup> Ibid, Pg. 138

<sup>55</sup> Ibid, Pg.140

Clifford is of the opinion that the things we don't know may be inexplicable by the things we do 'know'. He writes this explicitly as follows:

The attraction may be an ultimate simple fact; or it may be made up of simpler facts utterly unlike anything that we know at present; and in either of these cases there is no explanation. We have no right to conclude, then, that the order of events is always capable of being explained.<sup>56</sup>

The above quote is in relation to gravitational force, which is taken as an example. It seems to me that Clifford is of the opinion that science is held to account by that which we can sense. If this is the case then as our senses are 'improved' by application of ever more accurate instruments we will find events that are beyond the scope of existing models. The certainty we desire is limited by our ability to sense directly or sense by means of instrumentation. If science is judged by these scientific observations then science is limited if the continuum is assumed.

Clifford next considers cause and effect. Clifford holds that motion is a succession of stationary states. This was seen in 2.3 above.

... That is to say, for instance, if I move my hand so in front of me, and apparently see it take up in succession every possible position on its path between the two extreme positions; do I really see this, or do I only see my hand in a certain very large number of distinct positions, and not at all in the intervening spaces?

I have no doubt whatever myself, that the latter alternative is the true one, and that the wheel of life is really an illustration and type of every moment of our existence.

The model that Clifford chooses does not allow for cause and effect to be applicable. The process of causation would be in the gap between two successive states, and as we can only observe the states we can have no knowledge of what occurs within the gap.

Clifford considers this 'unknowable' to be recognised by Kant. He addresses two of Kant's antinomies. The first is the problem of space being infinite or having a boundary. The second is that we cannot conceive of a piece of matter that cannot be divided. Clifford makes the point in a footnote that he believes Kant himself would not hold that the antinomies hold for an empiricist. He holds that the true Kantian position is that both positions of the antinomies are illegitimate. It is difficult to appreciate these comments as a person would that was in the audience listening to Clifford; we have

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<sup>56</sup> Ibid, Pg.149

in our minds things that influence our appreciation of the words of Clifford. I accept that atoms are made up of sub-atomic particles. I accept the model in which the universe is expanding. Even so there is relevance to Clifford's words. Clifford does not inform us of the structure of reality, but he does give arguments that limit our certainty in our pragmatic models of reality.

The conclusions arrived at by Clifford are optimistic. He tells us that:

But we mean that to every reasonable question there is an intelligible answer, which either we or posterity may know by the exercise of scientific thought.<sup>57</sup>

Clifford does mention consciousness in this essay. Consciousness is linked with inference and inference to uniformity in nature. Clifford writes the following:

But the laws of human action in which consciousness is concerned are still so far from being completely analysed and reduced to an exact form that the inferences which you made by their help were felt to have only a provisional force. It is possible that by-and-by, when psychology has made enormous advances and become an exact science, we may be able to give to testimony the sort of weight which we give to the inferences of physical science. It will then be possible to conceive a case which will show how completely the whole process of inference depends on our assumption of uniformity.

This is Clifford's thought in August, 1872. The possibility of psychology becoming an exact science is considered a future possibility. Inference which is formalised in logics assumes uniformity of that to which the particular logic is applicable. At the beginning of the essay Clifford wrote:

It is quite true that a complete setting-forth of my subject would require a comprehensive treatise on logic, with incidental discussion of the main questions of metaphysics; that it would deal with ideas demanding close study for their apprehension, and investigations requiring a peculiar taste to relish them. It is not my intention now to present you with such a treatise.

I find Clifford's thought superficially confused in regard to inference and uniformity. On the one hand he argues for uncertainty in science and holds that future advances will bring us closer to certainty, on

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<sup>57</sup> Ibid, Pg. 156

the other he takes inference to be founded on uniformity. Some uniformity must be assumed if there is to be a process by which the search for greater uniformity is to occur. The thought of Clifford is a project in process. He does not provide a model rather he is searching for one. At the time of this lecture Clifford is twenty seven years old. He is asking questions the answers to which will form his mature metaphysical thought. Within this essay there appears to be confusion, but the confusion is not so much Clifford's as it is the difficulty in creating a uniform model that incorporates the diverse models of reality that Clifford is discussing. Until he establishes a starting point from which he can construct his preferred model the apparent confusion will remain.

This essay was to generate the reaction from C.M. Ingleby that will be considered in the following chapter.

## 2.6 The Philosophy of the Pure Sciences

This series of lectures were delivered at the Royal Institution in March, 1873. The lectures were published in 'The Contemporary Review' June 1874, and December 1874, the third lecture being published in 'The Nineteenth Century' March 1879. The lectures as presented in '*Lectures and Essays*' contains additional material found in Clifford's papers after his death. Clifford is two months short of his twenty eighth birthday. The lectures seem to me to represent the crystallising of Clifford's thought. As was seen above, 3.3, Clifford held that the implied continuity of time is an illusion. This has implications for his world view that puts him in conflict with the thought of others. If, as I hold to be the case, the essays 'On the Nature of Things-in-Themselves' are Clifford's mature metaphysical position, then this series of essays provides an introduction to that position.

### 2.6.1 Statement of the Question

Clifford begins by asking the question:

On entering this room and looking rapidly round, what do I see?

In answering this question Clifford provides the answer that a reasonable man would give of his experience. He does say that when he sees something move he sees it as passing from one position to another by going through an infinite series of intermediate positions. He also says that his view is not made of patches, but is a continuous boundary going all around the void space in which if he so desired he could move. Having presented this answer he tells us that this answer would be acceptable

as a personal experience in a court of law. Clifford then tells us that a little reflection will be enough to convince us that none of the answers have any possibility of being strictly true.<sup>58</sup>

Clifford compares what he sees to a photograph; the photographic plate being the two curved surfaces of the retinas of his eyes. Clifford writes:

Now to see, and to see what is actually there, are two different things. Again, 'I see people with heads more or less round.' —I cannot see your heads; I can only see your faces. I must have imagined the rest.

Clifford leads his audience to the conclusion that “In every sensation there is, besides the actual message, something that we imagine and add to the message.”

He then asks the question ‘Where does this supplement come from?’ This question is the one which Clifford believes to have been present to philosophers for a long time, and is the question that is to be addressed.

In order to better appreciate the question Clifford tells us we need to know better the nature of the supplement. The important point about the supplement is that we usually get it right. It’s quick, and accurate enough to allow us to function. We construct the supplement using a basic set of rules. Clifford then considers what these rules are. Clifford writes the following:

In the first place, out of pictures I have imagined solid things. Out of space of two dimensions, as we call it, I have made space of three dimensions, and I imagine these solid things as existing in it; that is to say, as having certain relations of distance to one another. Now these relations of distance are always so filled in as to fulfil a code of rules, some called common notions, and some called definitions, and some called postulates, and some assumed without warning, but all somehow contained in Euclid's 'Elements of Geometry.' For example, I sometimes imagine that I see two lines in a position which I call parallel. Parallelism is impossible on the curved pictures of my retina; so this is part of the filling in. Now whenever I imagine that I see a quadrilateral figure whose opposite sides are parallel, I always fill them in so that the opposite sides are also equal. This equality is also a part of the filling in, and relates to possible perceptions other than the one immediately present. From this example, then, you can see that the fundamental axioms and definitions of geometry are really certain rules according to which we supplement or fill in our experience.

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<sup>58</sup> ‘Experience of the world in time’, Alva Noe, *Analysis* 66.1, January 2006, pp. 26–32, is a recent essay that explores the question.

I find this quoted passage of great significance. Rather than seeing Euclidean geometry as some giant leap forward for humanity, Clifford sees it as a formalisation of something we do irrespective of whether or not we have any knowledge of geometry or any language abilities either natural or formal. Euclidean geometry is not synthetic a priori, it is empirical pragmatism. If we didn't use the method we do use to supplement the message our survival would be much less probable. It seems to me that the simplest model that allows for a decision to be made will be the one that is quickest. If a decision needs to be made to survive speed is important. Thankfully we have built in systems that provide a rapid response to life threatening situations. These responses can be reflexive or learnt. In the case of non-human life forms they may appear magical. Magical to us as humans that is, but what model of reality is used by other life forms can only be inferred from our perception of their actions. This line of thinking seems to me to be evident in Clifford's mature metaphysics that is presented in the second version of 'On the Nature of Things-in-Themselves'.

Clifford continues his lecture by considering motion of a moving train in which a man is walking along the train, this being observed by Clifford. Clifford writes:

I imagine all motions, therefore, according to the rule of continuity; that is, between the distinct pictures which I see, I insert an infinite number of intermediate pictures. Moreover, both of these motions are imagined in accordance with the laws of geometry; that is to say, they are imagined so that the relations of distance at any instant obey those laws. But now I may, if I like, consider, besides the motion of the train and the motion of the man relative to it, the motion of the man relative to me, as if there were no train; and this like the other motions is part of the filling in. But I always fill this in in such a way that the three motions—of the train by itself, of the man by himself, and of the man relatively to the train—satisfy certain rules, by which one can be found when the other two are given. These rules are called the laws of kinematic, or of the pure science of motion. Then we may say, to begin with, that we supplement our experience in accordance with certain rules; and that some of these rules are the foundations of the pure sciences of Space and Motion. Instead of Space and Motion, many people would like to say Space and Time. But in regard to the special matter that we are considering, it seems to me, for reasons which I do not wish to give at present, to be more correct to say that we imagine time by putting together space and motion, than that we imagine motion by putting together space and time.

Clifford has already told us that time is not continuous. It seems to me that if time is not continuous his concept of motion cannot be continuous.<sup>59</sup> If his concept of motion is not continuous then motion for Clifford is, as he has already written on two occasions, an illusion just as motion perceived while viewing 'The Wheel of Life' is an illusion. By illusion I mean that the reality that provides our percepts is not the same as the percepts. This presents Clifford with, in my opinion, an insurmountable problem if he is to claim his model to be scientific. The question that Clifford must answer is: 'how it is possible for his model to be anything other than abstruse?'

Clifford continues by telling us that there are other rules, besides those of space and motion. One such rule is the continuity of things. The table that he sees, and feels, is an imagination by which he fills in a 'great variety of different experiences'. If he leaves the room and returns later and sees and feels the table, he will 'fill it in in such a way' that he imagines it to be persistent. Clifford chooses to use one rule that applies to things rather than two rules that apply to 'persistence of substance' and 'persistence of qualities'. Clifford sums up this 'rule' as follows:

Things—that is to say, combinations of possible experience—are not persistent, but they change continuously in the imagination by which we fill up that experience. Or we may say that experience at any one time is always so filled in as to aggregate together the possible perceptions implied by the result into groups which we call things; and that experience of a period of time is always so filled in that things change only in a continuous manner.

A further rule that Clifford identifies is that of uniformity. Uniformity is explained by Clifford as follows:

The simplest case of this is when the same experience is repeated, and we fill up the changes subsequent to the second experience so that they shall be the same as those subsequent to the first. It is not necessary that the experience should be actually repeated; it may only be filled up in the same way. The uniformity, however, which is involved in this law is a much more complicated thing than this simple case. I can only say here that experience is filled up always so as to make the imagined history of things exhibit some uniformity; but the definiteness of this varies in different individuals and at different times. Some people prefer to call this the law of causation, and to say that we always supplement our experiences in such a way that every event has a cause or causes which determine it, and effects which flow from it.

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<sup>59</sup> If time is discrete or discrete with gaps the property of continuity would require that the 'time' to which continuity is applied be specified.

Experience is unique to the individual. No two people have the same history so it is not possible that the experiences or filling in of one individual can be identical with another. This is the case for direct experience. There is however another form of ‘experience’ for a species that is capable of communication. The experience of the one individual can be communicated to another without the need for the other to have the direct experience. This is possible in humans by way of natural language. Natural language cannot replace experience but it makes experience more manageable.

Clifford continues his lecture:

Now all this filling up that we have been considering happens directly in the sensations that I get from day to day, just as I get them. (It is convenient to use the word sensation, as meaning the whole phenomenon, not only the immediate experience, but also the supplement.) But if I want to talk to you about them, or if, advancing upon that practice, I talk to myself about them, then I am obliged to use *language* or to represent them by signs; and this requires me to group them in a new manner. I have to make imaginations not of things, but of whole series of things, of relations of these to one another, and combinations of the relations. I have to construct, in fact, what I shall call for shortness the apparatus of thought—the means by which I talk to myself. For there seems reason to think that the conceptions which correspond to general terms—names of a class, or of an abstract relation—are first rendered necessary by the language which expresses them.

This quote contains within it the metaphysic of Clifford. It will be seen later that the ‘thought idea’ distinction becomes relevant in the work of Gottlob Frege, and that representation by signs is the foundation reached by David Hilbert. The quote also presents an initial glimpse of what Clifford will present in ‘On the Nature of Things-in-Themselves’. Clifford did not begin his lecture by discussing language. It is self evident his lecture in its entirety is communicated to others by means of language. What constitutes language and how language achieves this communication is the mystery that needs to be explained. Whatever we decide to define language as being we are constrained in its definition by language. Language is, I would suggest, expressed in forms that are of the world, if that language is being employed to communicate with others. However what is the nature of language when it is used as an ‘apparatus of thought’ which Clifford uses to communicate with himself? When being used to communicate with others the ‘filling in’ by the other becomes part of the process. The communication will be ‘filled in’ by each individual in a unique way. If the line of argument employed by Clifford thus far in his lecture is to be accepted, and if time being non-continuous, and causation effectively an illusion is accepted, there appears to be a difficulty in the concept of argument itself. Logic is the science of inference. Logic is something fundamental to our reasoning.

However Clifford appears to have dissolved logic to something that is not absolute. Perhaps this is the reason that Frege, as will be seen later, attempts to found arithmetic on logic, and takes Euclidean geometry as being *the* geometry.

Clifford continues his lecture as follows:

But however that may be, this new world of conceptions is not made wholly at random, but satisfies certain laws. For example, in order to describe a certain group of things, I introduce the very complicated conception six, and say there are six of them. Now, whenever this is done in the case of two groups, giving rise to the conceptions six and three, it is possible to apply the same process to the group compounded of those two, and it always gives rise to the conception nine. Here, then, is a law of combination to which the world of conceptions has to conform. And another is this: If every individual which belongs to the class A belongs also to the class B, and if every individual which belongs to the class B belongs also to the class C, then always every individual which belongs to the class A belongs also to the class C. Rules like these which regulate the world of conceptions, built out of our sensations, are also said to belong to the pure sciences; and the two examples which I have chosen belong respectively to the sciences of Number and Logic.

Clifford tells us that number and logic derive from conceptions; the world of conceptions is new. It is something we as humans create, conceptions being derived from a combination of sensation and 'filling in'. Gauss held that arithmetic is a priori. In a letter to Olbers dated 28 April, 1817, Gauss wrote the following:

Wachter has printed off a small piece about the first principles of geometry of which you will receive a copy from Lindenau. Although Wachter has penetrated into the matter more than his predecessors, still his proof is no more binding than all the others. I am coming ever more to the conviction that the necessity of our geometry cannot be proved, at least not by human comprehension nor for human comprehension. Perhaps in another life we will come to other views on the nature of space which are currently unobtainable for us. Until then one must *not* put Geometry into the same rank as Arithmetic, which stands a priori, but rather in the same rank as, say, Mechanics.

[emphasis is mine]

It seems to me that Clifford's line of thought goes a step further than Gauss. Clifford has led us to the position where nothing is absolute. Reality is hidden behind our own constructs. Clifford tells us that these rules which we use to fill in our sensations may not be all the rules we use, but he cannot think of any others. He tells us the following:

The rules about Space and Motion constitute the pure sciences of Geometry and Kinematic.

The rules about Things and Uniformity have been said to belong to a pure science of Nature.

The rules about Numbers and Classes constitute the pure sciences of Arithmetic and Formal Logic.

Clifford has presented the world with uncertainty in an explicit manner. Newton had recognised the empirical nature of his work but had not presented it as a human construct. The practical utility of Newton's thought was accepted and used to advance our understanding of the world. The tool available to Clifford to accept 'close enough' as being sufficient for 'progress' is evolution. This is explicitly mentioned by Clifford in his essay. Clifford continues his essay as follows:

But for the present let us confine our attention to the first group of rules, those which relate to space and motion. There is one other property of them which we have to consider, besides the fact that our experience is filled up in accordance with them. I have already mentioned this property, but only in passing. It is that in general this filling in of experience is right: and that, so far as these rules are concerned, it is not only right in general, but always right.

Clifford accepted Darwinian evolutionary theory. If our filling in were not close enough to being right then it is unlikely we would be here to argue whether or not we are right. If we were wrong we would not survive. The 'right' is only 'right enough' for survival. Many individuals get it wrong but those that survive get it right, 'right enough' to continue. Evolution does not require anymore than that our perception of reality be such that it is close enough. When Clifford writes "...it is not only right in general, but always right." he is referring to us as a group.

As a mathematician Clifford uses his understanding of geometry to formulate questions that pertain to his understanding of reality. Clifford continues his lecture by providing his understanding of Euclidean geometry. Clifford writes:

Here, however, I could use the word equal only in its practical sense, in which two things are equal when I cannot perceive their difference; not in its theoretical sense, in which two things are equal when they have no difference at all. But there has been for ages a conviction in the minds of men that these rules about space are true objectively in the exact or theoretical sense, and under all possible circumstances.

This position in respect of geometry is the same as that of Gauss. Clifford goes a step further and considers the nature of arithmetical propositions which Gauss had taken as being a priori. Clifford writes:

Everybody knows that six things and three things make nine things at all possible times and places; you cannot help seeing not only that they do always without exception make nine things, but that they must do so; and that the world could not have been constructed otherwise. For to those ingenious speculations which suppose that in some other planet there may always be a tenth thing inevitably suggested upon the union of the six and the three, so that they cannot be added together without making ten; to these, I say, it may be replied that the words number and thing, if used at all, must have different meanings in that planet. The reply is important, and I shall return to it in a subsequent lecture.

Clifford does consider this important reply as will be seen below. However the question itself is of importance. If our filling in determines our geometry and kinematic, our 'science of nature', and our arithmetic and formal logic, then they are all, in part, our constructs. It is this that removes any certainty in our understanding of *the* reality. If on the other hand it is taken that at least one of the three is certain, and if the other two can be derived from the one that is certain, then certainty is restored.

The lecture continues by Clifford giving his interpretation of the thought of three other philosophers, namely Locke, Hume, and Kant. If it is assumed that each member of the audience is aware of at least some of the thought of each of these philosophers Clifford has a problem and so do the individual members of the audience. The thoughts can be considered separate to the persons that expressed the

thought. However once the thought is considered to be the thought of the person concerned then the matter becomes more complex. My interpretation of the thought of Hume, for example, is incomplete. I have not read everything that was written by Hume; I was not on Hume's shoulder for his entire life so I do not have knowledge of everything he said or a version of everything he experienced. Clifford has argued for a 'filling in' and this filling in takes place in regard to the expressed thought of an individual just as it takes place for any individual's perception of their surroundings. If Clifford's 'filling in' is accepted there is less of a problem, however Clifford is arguing for 'filling in'.

It seems to me that Clifford is closing in on his mature metaphysic that he presents in 'On the Nature of Things-in-Themselves'. I will therefore quote at length Clifford's understanding of Locke and Hume.

Locke and Hume gave explanations of the existence of two of these general rules which I have put into my second group. Locke explained the notion of substance, the notion that a thing means something more than an aggregate of possible perceptions, by the fact that we are accustomed to get these perceptions all together; by this custom they are welded or linked together, and our imagination of the thing is then this connected structure of perceptions, which is called up as a whole whenever one or more of the component perceptions is called up. Having thus by custom formed the complete sensation which we have of the thing, we suppose that this is a message, like the actual perceptions, and comes from something outside. That something is the substance. Locke did not admit that this supposition is right, and that the linking together of messages is really itself a message; but still he thought there was something outside to correspond to this linking. Hume explained in the same way the rule of causation. He said we get it from being accustomed to perceive one event following another; so that these two perceptions got linked together, and when one of them occur alone, we fills it in with the other one. And then, regarding this link, produced only by custom, as if it were a message from somewhere, like the simple perceptions, we give it the name of causation.

These explanations agree in saying that the supplement of experience is made up of past experience, together with links which bind together perceptions that have been accustomed to occur together. This fact, that perceptions and feelings which have frequently occurred together get linked, so that one calls up the other, is called the law of Association, and has been made the basis of scientific Psychology. According to these explanations of Locke and Hume (which extended to the other two groups of rules) all the knowledge we have that the rules are right, or may be objectively verified, is really

derived from experience; only it is past experience, which we have had so often and got so accustomed to that it is now really a part of ourselves.

In this quote Clifford has interpreted the thought of both Locke and Hume in such a way that the thought provides support for his 'filling in'. Clifford writes "This fact, that perceptions and feelings which frequently occurred together get linked together...." The problem is that the perceptions and feelings of two individuals are required to be the same. It is conceivable that the perceptions could be shown to be the same, but I find that highly unlikely. That the 'feelings' be the same I find impossible. If it is accepted that there is required a combination of perceptions and feelings of individuals to allow for the construction of an objective law of Association, then it must be assumed that the similarity of the 'perception feeling construct' is similar enough for the law of Association to have objectivity. How the similarity of the 'perception feeling construct' can be judged is the problem. No two people have the same experience history. Clifford also alludes to memory by writing that our filling in is from past experience. This is why it is reasonable that a person having once been bitten by a snake be at some future time startled by a piece of rope lying in the shadows. If a person has no experience of snakes they will not be startled by lengths of rope, unless they have had some other unpleasant experience with something that resembles a length of rope. The situation in which a person becomes frightened of something that is the construct of someone else with no reference to anything in the world is even more problematic. If a child that has language ability is told that a monster lives in the shed at the bottom of the garden the child may be fearful of going near the shed, even though it has no 'perception' of the monster only a 'feeling' of it. The understanding of 'feeling' in Clifford's metaphysic will be left until 'On the Nature of Things-in-Themselves' is considered. A further point to note is that Clifford's interpretation of Locke and Hume is itself comprised of 'filling in'. It is this that makes the quote difficult in a second degree. Clifford has referred to the thought of two others; someone else is unlikely to have 'filled in' the thought of the two others the same as anyone else, this leads to a 'difference of opinion'.<sup>60</sup>

It was seen above in 2.5 that Clifford challenged the thought of Kant, as Clifford interpreted that thought. Clifford continues this lecture by expanding on that critique of Kant's thought. This is of relevance to the thought of Frege. If it is assumed that Frege wishes to vindicate the thought of Kant then Frege would have to confront the interpretation of Clifford. Whether or not it can be proved beyond doubt that Frege was aware of the thought of Clifford is questionable, however I believe it to be highly probable that he was aware of it.

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<sup>60</sup> The relevance of this will be addressed later in relation to Davidson's 'prior and passing' theory.

Clifford continues his lecture by providing his understanding of Kant. It would be possible to counter Clifford's interpretation of Kant and claim the superiority of a different interpretation. I accept that for some the thought of Clifford will be unacceptable but this is one of personal preference. If Clifford's thought is of relevance it must be considered as his thought as filled in by the individual presented with it. Clifford's thought includes Clifford's interpretation of Kant. Whether or not this is the correct interpretation of Kant is irrelevant, if Clifford's 'filling in' is accepted. A further point to note is that the first attempt to provide a rigorous translation of Kant's *Critique of Pure Reason* was by J.M.D. Meiklejohn in 1890. It is taken as given that Clifford read Kant in the original German so was not only interpreting Kant's thought but was presenting his interpretation of his own 'translation' of that thought into the English language.

Clifford tells us that Kant wrote the following:

It is impossible that all your knowledge can have come from experience. For you know that the axioms of mathematics are absolutely and universally true, and no experience can possibly have told you this. However often you may have found the angles of a triangle amount to two right angles, however accustomed you may have got to this experience, you have no right to know that the angles of every possible triangle are equal to two right angles, nor indeed that those of any one triangle are absolutely and exactly so equal. Now you do know this, and you cannot deny it. You have therefore some knowledge which could not possibly be derived from experience; it must therefore have come in some other way; or there is some other source of knowledge besides experience.

Kant's argument that Euclidean geometry is synthetic a priori is no problem for me. What is a problem is that Kant tells me that I know it and cannot deny it. In short Kant tells me that I know an absolute truth and that it is universal. Peter Suber provides his analysis of this thought of Kant.<sup>61</sup> What Kant means by 'to know' is problematic. Wittgenstein's *On Certainty* is an attempt to understand 'knowing something' and 'being certain that something'. My filling in of his thought is unique. However it may be possible to show that it is reasonable. I write 'reasonable' not 'logical' because I consider Clifford to have arrived at a position that requires 'logics' to be non-essential. See the rules of 'Numbers and Classes' above.

Clifford does not take the position of rejecting Kant's thought, rather he interprets it to fit his own. Note that there are several fillings in here, both Clifford's and my own. Clifford writes:

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<sup>61</sup> 'Geometry and Arithmetic are Synthetic' , Peter Suber, <http://www.earlham.edu/~peters/writing/synth.htm> [ accessed 18 January, 2012 ]

Accordingly, Kant supposes that Space and Time are necessary forms of perception, imposed upon it by the perceiving mind; that things are in space and time as they appear to us, and not in themselves; and that consequently the statement that all things exist in space and time is a statement about the nature of our perception and not about the things perceived. The word corresponding to experience (*Erfahrung*) is used by Kant nearly in the sense in which I have used sensation, to mean the whole phenomenon consisting of the bare message and also of the filling-in, the complete representation which we get of objects. But it is not apparently confined to this; it means not merely the sensations which I get, but the sensations which I talk about. Giving to the word this sense for the present, we may say that in his theory the form, the general character, of experience is imposed upon it by two faculties which we all possess: Intuition and Understanding. Intuition has necessarily the forms of Space and Time; but we are not to say that those properties of space which are expressed in the geometrical axioms are all necessitated by the forms of intuition; for it is the understanding that supplies us with the pure notions of quantity, quality, relation, and modality. It is not always easy to separate the parts played by these two faculties in supplying the general rules to which experience conforms; but it appears, for example, that the three dimensions of space are given by pure intuition itself, while the equality of the opposite sides of a parallelogram is only given by help of the understanding. It is not to our purpose to investigate the difference between these two faculties, or even to remember that Kant made a distinction between them. All that is important for us is the theory that those general statements upon which the pure sciences are founded, although really true of objects, that is of representations made to me, are in fact statements about me and not about the things in themselves: just as my general statement about the colours of things was really a statement about my own eyes and not about the things. And it is just because these statements *are* about me that I know them to be not only universally, but always necessarily true about the objects I perceive; for it is always the same *me* that perceives them—or at any rate it is a *me* possessing always the same faculties of representation.

Clifford, in this lengthy quote, has provided his understanding of Kant. The problems identified, assuming they are problems, are language and the self, intuition and understanding. Kant expressed his thought in the German language. Clifford writes: “The word corresponding to experience (*Erfahrung*) is used by Kant nearly in the sense in which I have used sensation, to mean the whole phenomenon consisting of the bare message and also of the filling-in, the complete representation which we get of objects.” Is this a correct understanding of Kant? It might ‘nearly’ be, but then how

near is necessary for it to be correct? Clifford has argued for filling in, filling in if accepted, applies to my appreciation of what Clifford has written. Clifford writes: “But it is not apparently confined to this; it means not merely the sensations which I get, but the sensations which I talk about.” I have some uncertainty as to what Clifford means by “..which I talk about..” Is Clifford alluding to talking to others or talking to himself? If I sense something it may or may not have any connection to *me*. If I stub my toe I sense that I have stubbed my toe. There was no intention on my part to stub my toe, it came as a surprise. Following the stubbing of my toe many things come to mind. I feel annoyed, I feel pain, I remember previous stubbing of toes. This feeling and remembering takes place subsequent to the sensation of the toe stubbing. In what language does this feeling and remembering take place? Something that is, for me, relevant to this is a minor accident I had nearly forty years ago. I do not understand why my writing of stubbing toes made me think of that particular accident. I did not ‘tell myself’ of the accident, it merely ‘appeared’ in my mind. The accident involved a small fall of ground that required me to remove my body from where it was to somewhere safer. I jumped out of the way of the falling ground over some machinery. In the process of moving I hit my leg on the machinery. This resulted in my having to have medical examinations, and the following day off work. The strange thing was that it was only when I showered after completing the working shift that I was aware that I had damaged my body. Obviously the sense of my leg hitting the piece of machinery would have been there at the time, but the other things occurring at the time rendered my being unaware of it. It would, if I had been aware of it, been a surprise. My body was aware of it, I was not. Earlier in the essay Clifford had written:

Now all this filling up that we have been considering happens directly in the sensations that I get from day to day, just as I get them. (It is convenient to use the word sensation, as meaning the *whole* phenomenon, not only the immediate experience, but also the supplement.)

But if I want to talk to you about them, or if, advancing upon that practice, I talk to myself about them, then I am obliged to use *language* or to represent them by signs; and this requires me to group them in a new manner. I have to make imaginations not of things, but of whole series of things, of relations of these to one another, and combinations of the relations. I have to construct, in fact, what I shall call for shortness the apparatus of thought—the means by which I talk to myself.

There seems to me to be something wrong with this. Clifford writes the word “*language*” not ‘languages’. He also considers it to be ‘advancing upon that practice’ if he talks to himself. It seems to me that this is back to front. I have an apparatus of thought prior to my having acquired a language

whether it be natural or formal. This ‘apparatus of thought’ may or may not have a resemblance to formal or natural language, but there seems to me to be no reason for assuming that it does. Clifford does write that he calls the relations of things to one another and their combinations the ‘apparatus of thought’. If this infers a definition of the ‘apparatus of thought’ then it is not a problem. If it implicitly suggests that this apparatus of thought is how we think then the matter does become problematic.

Returning to the order of Clifford’s lecture; Clifford tells us the following:

Now observe what it is that this theory does with general statements; what is the means by which it gets rid of them—for it does get rid of them. It makes them into particular statements. Instead of being statements about all possible places and times and things, they are made out to be statements about me, and about other men in so far as they have the same faculties that I have. I want you to notice this transformation particularly, because I shall afterwards endeavour to establish a similar transformation, though in rather a different manner.

Clifford accepted non-Euclidean geometries as being possibly abstract as opposed to abstruse, and he accepted Darwinism. Kant ostensibly rejected non-Euclidean<sup>62</sup> geometries and would not have been aware of Darwin’s work, however Kant did provide an evolutionary theory of the universe. The following is taken from ‘Kant’s Philosophical Development’:<sup>63</sup>

Second, in terms of religion, an important new finding is that Kant disliked Christianity—something that his early biographers, all of them Lutheran theologians, did not let on. Kant defended pantheism, naturalism, evolution, and holism when doing so was incompatible with an academic career. Because one’s job was easily lost over such views, he was cautious. In the context of censorship writers tend to become circumspect. To avoid trouble, they may publish something anonymously; or they may make oblique remarks instead of direct statements; or they may have second thoughts and retract earlier “dares”. Kant did all three things, but for later readers of more secular ages, it was easy to miss such subtleties.

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<sup>62</sup> Was there a non-Euclidean geometry for Kant to reject? This would require discussion of what constitutes a non-Euclidean geometry. A reader interested in this will find copious relevant literature on the subject. One place to start would be <http://www.mpiwg-berlin.mpg.de/en/news/features/feature16> . It should be noted that Kant was in communication with Lambert.

<sup>63</sup> Schönfeld, Martin, "Kant's Philosophical Development", *The Stanford Encyclopedia of Philosophy (Winter 2012 Edition)*, Edward N. Zalta (ed.), URL=<<http://plato.stanford.edu/archives/win2012/entries/kant-development/>>. Accessed 20 January, 2013

Thankfully for me Clifford was not cautious. Communication is difficult enough without having the added problem of oblique statements.

Clifford in arguing against Kant's taking the general and applying it to the particular is interpreting Kant in such a way that Kant did take the general and apply it to the particular. This may or may not be a correct interpretation of Kant. If Clifford's 'filling in' is accepted, and if Schönfeld's opinion is taken as being correct, then I fail to see how any interpretation of Kant can be shown to be the correct one. Despite the fact that the task would appear impossible Clifford continues. He writes:

In the next place, observe that the question which was proposed by the Critical Philosophy is a perfectly real and important question. It is this:—'Are there any properties of objects in general which are really due to me and to the way in which I perceive them, and which do not belong to the things themselves?' But it seems to me that the method by which Kant attempted to answer this question was not the right method. It consisted in finding what are those characters of experience which we know to be necessary and universal; and concluding that these are characters of me. It requires, therefore, some infallible way of judging what characters are necessary and universal. Now, unfortunately, as I hope to show you, judgments of this kind may very possibly be mistaken.

If Clifford is correct in his interpretation of Kant there is a problem, the problem being that people are not the same. Not only are people different but each individual changes over time. Our perceptions are modified by our experience and the initial improvement in our bodily capabilities and later the deterioration of these capabilities. Our mental abilities also vary during our lifetimes, as does our feelings regarding our place in the world. There is a further change that occurs, that being the world we live in. With all these changes taking place how would it be possible to ground the characters which we know to be necessary and universal in the 'me'? Further to these considerations is the evolution of humanity.

Clifford has argued that Kant's thought has made the 'me' fundamental. The 'me' is something that should be investigated. Clifford believes the 'me' can be understood better by studying the physical facts that accompany sensation that is the physical properties of the human nervous system. This approach is reasonable; however such an approach will be scientific. Clifford has already argued that the rules of science are not absolute. The results of the scientific investigations into the functioning of the nervous system are beneficial, but because the rules used to arrive at a scientific view of the nervous system are not absolute rather they are 'human constructs' there may well be underlying the scientific 'reality' another 'reality'.

Clifford continues his lecture by considering the influence that Kantian thought had on the philosophy of science. He tells us that Whewell accepted Kant's theory of universal truths largely but not completely. He then tells us that it is the thought of John Stuart Mill, influenced by Whewell, which we should consider.<sup>64</sup>

Clifford quotes Mill at length. He then argues against Mill. I will quote as Clifford did. My reason for doing this is that the position presented by Mill is relevant to certain thoughts of Frege, and Frege is significant later in this thesis. Clifford quotes Mill as follows:

To these arguments (of Dr. Whewell, contending that the axioms could not be known by experience) . . . a satisfactory answer will, I conceive, be found, if we advert to one of the characteristic properties of geometrical forms—their capacity of being painted in the imagination with a distinctness equal to reality: in other words, the exact resemblance of our ideas of form to the sensations which suggest them. This, in the first place, enables us to make (at least with a little practice) mental pictures of all possible combinations of lines and angles, which resemble the realities quite as well as any which we could make on paper; and in the next place, make those pictures just as fit subjects of geometrical experimentation as the realities themselves; inasmuch as pictures, if sufficiently accurate, exhibit of course all the properties which would be manifested by the realities at one given instant, and on simple inspection; and in geometry we are concerned only with such properties, and not with that which pictures could not exhibit, the mutual action of bodies upon one another. The foundations of geometry would therefore be laid in direct experience, even if the experiments (which in this case consist merely in attentive contemplation) were practised solely upon what we call our ideas, that is, upon the diagrams in our minds, and not upon outward objects. For in all systems of experimentation we take some objects to serve as representatives of all which resemble them; and in the present case the conditions which qualify a real object to be the representative of its class, are completely fulfilled by an object existing only in our fancy. Without denying, therefore, the possibility of satisfying ourselves that two straight lines cannot enclose a space, by merely thinking of straight lines without actually looking at them; I contend that we do not believe this truth on the ground of the imaginary intuition simply, but because we know that the imaginary lines exactly resemble real ones, and that we may conclude from them to real ones with quite as much certainty as we could conclude from one real line to another. The conclusion, therefore, is still an induction

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<sup>64</sup> This lecture was given subsequent to the lecture 'Aims and Instruments of Scientific Thought', which resulted in the public exchange of letters, published in *Nature*, between Clifford and Ingleby. Clifford, in my opinion, uses this lecture, in part, to explicate more fully Clifford's position that was argued against by Ingleby.

from observation. And we should not be authorized to substitute observation of the image in our mind for observation of the reality, if we had not learnt by long continued experience that the properties of the reality are faithfully represented in the image; just as we should be scientifically warranted in describing an animal which we had never seen from a picture made of it with a daguerreotype; but not until we had learnt by ample experience that observation of such a picture is precisely equivalent to observation of the original.

These considerations also remove the objection arising from the impossibility of our ocularly following the hues in their prolongation to infinity. For though, in order actually to see that two given lines never meet, it would be necessary to follow them to infinity; yet without doing so we may know that if they ever do meet, or if, after diverging from one another, they begin again to approach, this must take place not at an infinite, but at a finite distance. Supposing, therefore, such to be the case, we can transport ourselves thither in imagination, and can frame a mental image of the appearance which one or both of the hues must present at that point, which we may rely on as being precisely similar to the reality. Now, whether we fix our contemplation upon this imaginary picture, or call to mind the generalizations we have had occasion to make from former ocular observation, we learn by the evidence of experience that a line which, after diverging from another straight line, begins to approach to it, produces the impression on our senses, which we describe by the expression " a bent line," not by the expression " a straight line."

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*Logic* Book ii., chap, v., s. 5.

Clifford's response to this argument of Mill's is, as he says, simple. It is this:

Upon this argument I have one very simple remark to make. That 'characteristic property of geometrical forms' is derived from experience;—we have 'learnt by long-continued experience that the properties of the reality are faithfully represented in the image.' Experience could only tell us this of realities and of images both of which we have experienced. I must know both of two things to know that one faithfully represents the other. Experience then tells me that my mental images of geometrical figures are faithful representations of those realities *which are within the bounds of experience*. But what is to tell me that they are faithful representations of realities that are beyond the bounds of experience? Surely no experience can tell me that.

The two quotes, that of Mill, and that of Clifford, provide a difference of approach that is significant to a person's understanding of their place in the world. If I were to accept the argument of Mill I would know the reality. In the first sentence of his quote it is seen that he takes reality to be known: "...their capacity of being painted in the imagination with a distinctness equal to reality: in other words, the exact resemblance of our ideas of form to the sensations which suggest them." This may be true, but if it is then it is an incredible coincidence. Mill mentions ideas. These ideas are mental pictures. If I have a mental picture, that mental picture can be expressed to others. I think of a triangle and draw it on a piece of paper. If someone were to ask me to draw a triangle I could do it, however the drawing would only be an example of a triangle. When I bring to mind 'triangle' there is not a fixed image. If I express that 'triangle' by drawing it on paper I have not expressed the 'idea of triangle'. The 'idea of triangle' includes every triangle I can imagine. I can express all those 'triangles' but only by expressing rules that construct triangles. Clifford may be alluding to this when he writes:

Again, our notion of *straight* is a combination of several properties, an aggregate of impressions on our senses, which holds together within the limits of experience. But what is to tell us that these impressions hold together beyond the limits of experience?

This differentiation of thought and idea is of significance to the thought of Clifford expressed in his mature metaphysic. It is also explicit in the thought of Frege. How Clifford and Frege come to terms with this problem of 'thought' that is expressible and 'idea' which is not will be considered later.

Clifford continues by considering Mill's position that the inconceivability of the negation is the justification of the necessity of a truth. My problem is now establishing what it is that Mill and Clifford consider 'conceivability' to be. If I can conceive something does it entail that I am able to communicate that conception to someone else? Is it necessary that the communication be in some form of language or can it be by demonstration? The problem is that of thought and idea. I take thought to be something that can be expressed and put into the world. Ideas on the other hand are of a different nature. This is, in my opinion, the underlying problem. It requires an explication of how thought expressed can bring about 'communication', Clifford in his mature metaphysic confronts this. Frege attempts to resolve the problem.

Clifford does mention the thought of Herbert Spencer, and quotes Spencer in regard to evolution and 'experience' being accumulated over generations. I will not endeavour to critique this section of Clifford's lecture.

Clifford concludes the lecture as follows:

It seems to me that the Kantian dilemma about universal propositions is just as valid now, in spite of these explanations, as it was in his time. How am I to know that the angles of a triangle are exactly equal to two right angles under all possible circumstances; not only in those regions of space where the solar system has been, but everywhere else? The accumulated experience of all my ancestors for a hundred and fifty million years is no more competent to tell me *that* than my own experience of the last five minutes. Either I have some source of knowledge other than experience, and I must admit the existence of *a priori* truths, independent of experience; or I cannot know that any universal statement is true. Now, the doctrine of evolution itself forbids me to admit any transcendental source of knowledge; so that I am driven to conclude in regard to every apparently universal statement, either that it is not really universal, but a particular statement about my nervous system, about my apparatus of thought; or that I do not know that it is true. And to this conclusion, by a detailed examination of various apparently universal statements, I shall in subsequent lectures endeavour to lead you.

Russell writes about a five minute old world in his *The Analysis of Mind*, this is discussed in Malcolm Acock's 'The Age of the Universe'.<sup>65</sup>

There are seven 'I's, three 'my's, three 'me's, and one 'you' in this quote. Clifford tells us he will endeavour to lead us to the conclusion in subsequent lectures. Clifford can lead us only by communicating to us that which is in his mind. Unfortunately what is in the mind of Clifford is, in my opinion, incapable of representation by language. If I attended a lecture given by an Italian lecturer that was presented in the Italian language to an Italian audience I would experience the lecture. I have no ability in the Italian language. If I were to have the ability of a video camera I would be able to provide to another my experience to a limited degree. I would be aware that the lecturer was 'communicating' to the audience his thoughts in some natural language. Whatever I would gain in 'knowledge' from the lecture has nothing to do with the meaning of the Italian words used by the lecturer. If I now consider a situation where a lecturer is giving a lecture on brain surgery, in the English language, I will have a similar experience. I have no experience of brain surgery so the words used by the lecturer that are about brain surgery will have no meaning for me. I will not be able to 'fill

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<sup>65</sup>'The Age of the Universe' Malcolm Acock *Philosophy of Science*, Vol. 50, No. 1 (Mar., 1983), pp. 130-145 "In *The Analysis of Mind*, Russell states the hypothesis that the world sprang into being five minutes ago, exactly as it then was, with a population that "remembered" a wholly unreal past (1921, p. 159). The hypothesis is introduced only to illustrate a point in the analysis of memory, and Russell ends his discussion of it by saying that, while it is logically tenable, the hypothesis is uninteresting."

in' the words. Philosophers of language have concerned themselves with this for a long time. I will not expand further on this at this time other than to make the comment that Clifford, for me, has led me in the lecture so far to the position that the 'problem' to be resolved is how language and the self are related.

### 2.6.2 Knowledge and Feeling

This 'fragment' follows the first lecture in *Lectures and Essays*. The following introduces this fragment:

*The following fragment appears to represent what was the conclusion of the series of Lectures as they were delivered in March, 1873. It was found among Professor Clifford's papers without any external indication of its proper context; and as the Lectures now stand after the author's revision, it seems to come in better as an appendix to the first of them. Clifford himself regarded it apparently (note to the Third Lecture in 'Nineteenth Century,' March 1879) as superseded by his article on 'the Nature of Things-in-themselves;' but it contains critical remarks and illustrations which are not there, and it has seemed best to the Editors to let it stand in this place.*

The note to the Third lecture in 'The Nineteenth Century' is a footnote found on the first page. It reads as follows:

This paper completes the publication of the substance of a series of three lectures delivered at the Royal Institution in 1873. The first two were published in the *Contemporary Review* while it was under the guidance of the present Editor of the *Nineteenth Century*. The third lecture contained—besides the substance of what is now here published—a statement of the doctrines afterwards set forth in a paper on the nature of things in themselves published in *Mind*, 1878.

'On the Nature of Things-in-Themselves' published in *Mind*, 1878, was based on a paper presented to the Metaphysical Society 9 June, 1874. Clifford died in Madeira on the 3 March, 1879. He had been in ill health for the two years prior to his death. The publication of the Third lecture in 'The Nineteenth Century' by the then editor J.T. Knowles, may well have been a pragmatic act to assist Clifford. J.T. Knowles was also a member of the Metaphysical Society.

In the opinion of the editors of *Lectures and Essays*, Leslie Stephen and Frederick Pollock, the fragment contains critical remarks and illustrations that are not contained in the final version of 'On the Nature of Things-in-Themselves'. In my opinion the individual essays and lectures require that

they all be taken into account to complete an interpretation of any particular essay or lecture. If Clifford had lived another thirty years he may have been able to produce the book, the outline of which is given at the beginning of this chapter. As he did not, the interpretation of Clifford's work allows for a greater degree of flexibility.

I do not know when the fragment was written. Clifford begins the fragment by reference to Spencer's thought that our evolution carries with it 'experience'. Clifford writes:

A theory came before us—that of Mr. Herbert Spencer—according to which this filling-in was accounted for as the product of past experience, which had taken effect on the brains of our ancestors and produced certain changes in them. These changes have gradually moulded the structure of the nervous system which was handed on to us by hereditary descent.

Herbert Spencer employed evolutionary theory to propound an epistemological position. He was a friend of Huxley and was invited to join the Metaphysical Society but never did.<sup>66</sup>

Herbert Spencer had proposed 'Transfigured Realism' in the second edition his book *The Principles of Psychology* published in 1872. 'Transfigured Realism' was absent from the first edition published in 1855 as a single volume. Spencer ends his chapter on 'Transfigured Realism' as follows:

Finally, then, we resume this originally-provisional assumption but now verified truth. Once more we are brought round to the conclusion repeatedly reached by other routes, that behind all manifestations, inner and outer, there is a Power manifested. Here, as before, it has become clear that while the nature of this Power cannot be known while we lack the faculty of framing even the dimmest conception of it, yet its universal presence is the absolute fact without which there can be no relative facts. Every feeling and thought being but transitory an entire life made up of such feelings and thoughts being also but transitory nay the objects amid which life is passed, though less transitory, being severally in course of losing their individualities, quickly or slowly; we learn that the one thing permanent is the Unknowable Reality hidden under all these changing shapes.

At the beginning of the chapter Spencer had written the following:

And when analyzed, the reasonings of metaphysicians were shown either tacitly to assume that which they set out to disprove or to involve some equally-great absurdity.

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<sup>66</sup> *The Metaphysical Society: Victorian minds in crisis, 1869-1880*, Alan Willard Brown

Spencer should not be judged on two quotations. Rather than comment on Spencer's thought I will take the following sentence as it stands, and consider it remote from any critique of Spencer.

Every feeling and thought being but transitory an entire life made up of such feelings and thoughts being also but transitory nay the objects amid which life is passed, though less transitory, being severally in course of losing their individualities, quickly or slowly; we learn that the one thing permanent is the Unknowable Reality hidden under all these changing shapes.<sup>67</sup>

It seems to me we have learnt something that is unknowable. What then is knowable? Clifford attempts to answer this question by showing that general statements may be divided into two classes. Clifford writes:

There was one obstacle to our acceptance of that theory as a sufficient account of the matter; namely, that we apparently had some knowledge which could not possibly have been got in that way knowledge that certain general statements are absolutely and universally true. This obstacle I shall endeavour to remove, by showing that such general statements may be divided into two classes; of which those in the first class may for all we know be false, while those in the second class are general statements only in form, and really are judgments about the apparatus of thought.

Clifford appears to me to have taken the position that thought is language. The 'apparatus of thought' is language. The problem of analytic and synthetic differentiation is perhaps recognised by Clifford. The problem that this raises is the one already recognised that being how language and the self are related. Within the quotes are two words that lead to confusion for me. The two words are 'feelings', and 'thoughts'. If 'feelings' are taken to be 'ideas' the confusion is lessened somewhat but not completely. This will be considered later in relation to the thought of Frege and others. For present purposes I would suggest that the 'apparatus of thought' is the 'apparatus of language' and that what is being considered is of the world, not of the mind. The 'apparatus of thought' is not about thinking. Clifford writes:

If this be so, we are at liberty to accept the view that all human knowledge is derived from experience; and that of the two factors in sensation, that supplement which we provide of ourselves is a giving out again of what has originally belonged to the other factor, to experience proper.

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<sup>67</sup> I am unsure what Spencer understands 'feelings' to be. Clifford's mature thought presents 'feelings' as a part of his model.

I take it that Clifford assuming that the ‘apparatus of thought’ is ‘language’ then Clifford is correct in saying that both the experience of the outer [the message] and what we add to it [the supplement] are both grounded in experience proper. What ‘experience proper’ is is not the confirmation of the external world as normally understood, but of the message that is in the mind and assumed to be external. This point is important if Clifford’s thought is to be understood. Clifford’s use of ‘external’ and ‘internal’ is explained in ‘On the Nature of Things-in-Themselves’ but as presently expressed it is easy to overlook. Language expressed is of the world and is experienced. The problem is obvious that the interpretation by the individual of the language statement is unique. If it were not then there would be no ‘difference of opinion’. This is recognised by Clifford and he follows the sentence with:

But here a doubt suggests itself which appears exactly to reverse all that we have done. We said there were two factors of experience: that all of it could not be direct message; and we have come to the conclusion that the two factors are really of the same kind. But we did not show that any of it *was* direct message from outside; we only showed that some portions of it were not. Suppose it is all supplement, and there is no message at all!

The position that is reached is that we must consider the possibility that Berkeley’s suggestion that ‘sensible qualities’ are the language of God. However Clifford has already said we know nothing of possibilities or impossibilities. What Clifford can do is reason. He can take facts that we believe and point out problems that arise in common inferences from those facts. This is obviously problematic in that how can he establish any facts at all; having already told us that time is not continuous etc. It is Clifford’s mature metaphysic that provides a speculative answer to this problem. At the moment Clifford is exploring rather than providing his mature metaphysic. Clifford continues his present fragment by telling us that if there is no real message from without then all knowledge will be a priori knowledge.

Clifford writes:

If you and I, then, choose to contemplate another person, we shall say that the world which he directly perceives is really inside his brain, and not outside; but that corresponding to these changes that go on in his brain there are certain changes going on outside of him, and that in many cases there is such a correspondence of the relations of contiguity in one case to the relation of contiguity in the other, that conclusions about the outer world may fairly be drawn from the world in his brain.

It would seem that Clifford is arguing for some form of parallelism. This is refuted by the paragraph that follows the quote:

But now, if instead of considering this other person, I consider myself, the case is rather altered. I shall conclude by analogy that this world which I directly perceive is not really outside of me; that the things which are apparently made known to me by my perceptions are really themselves only groups of my perceptions; that the universe which I perceive is made up of my feelings; that in fact it is really *me*. And—by analogy also—I shall conclude that there *is* something besides this, different from it; the changes in which correspond in a certain way to the changes in my universe. Is it then possible for me to know what that is? or is there nothing at all except my feelings?

Clifford in the two passages just quoted presents the problem. The first passage seems reasonable, but it includes assumptions. The assumptions are 1] you and I exist and have a common perception of the world 2] the world that is common to both of us is real. I do not find the assumptions reasonable. People have different abilities to ‘see’ things. Some people are blind. It is unreasonable to assume that peoples’ perception of the world is uniform. If peoples’ perception of the world were uniform the human race would more than likely atrophy.

(There is something that Clifford needs to provide us with to allow an understanding of his thought. He needs to explain what he means by ‘feelings’. It would be pre-emptive to attend to this at present. Clifford, in my opinion, would have recognised that ‘feelings’ required explication. One point I would make at present is that Pollock and Stephen as editors decided to place ‘The Unseen Universe’ prior to ‘Philosophy of the Pure Sciences’ in *Lectures and Essays*. They did this despite them being more than two years apart, ‘The ‘Unseen Universe’ being published in the *Fortnightly Review* June, 1875. Other essays are taken out of chronological order by Pollock and Stephen. Why they should choose to do this I have no idea.)

Clifford continues the fragment by considering the thought of Berkeley. I will quote at some length. Clifford writes:

If, instead of approaching this question from the physiological side, we adopt another point of view, it is not unlikely that we shall be led to the latter conclusion. If I consider merely my own feelings and ask what evidence they give of anything beyond them, it seems to me that I must answer, no evidence at all. This at least was the answer given by Berkeley in a passage which has been quoted here before by Professor Huxley, but will bear quoting again:—

‘Some truths there are so near and obvious to the mind that a man need only open his eyes to see them. Such I take this important one to be, viz., that all the choir of heaven and furniture of the earth, in a word all those bodies which compose the mighty frame of

the world, have not any subsistence without a mind, that their being is to be perceived or known; that consequently so long as they are not actually perceived by me, or do not exist in my mind or that of any other created spirit, they must either have no existence at all, or else subsist in the mind of some Eternal Spirit.'

Principles of Human Knowledge, § 6.

Clifford was a friend of Huxley. Both Clifford and Huxley seem to me to have respect for the thought of Berkeley. In regard to the quote of Berkeley I would take note of the comments made by Monboddó. Clifford and Huxley's interpretation of Berkeley is relevant to the mature metaphysic of Clifford. In the first version of 'On the Nature of Things-in-Themselves' Clifford commences the essay with reference to a quote of Berkeley by Huxley. Clifford proceeds in this present fragment to give his understanding of Idealism. Clifford tells us that Idealism is characterised by perception. The essence of things consists in the perceiving of them. Clifford then makes the claim that Berkeley's Idealism is not pure. He tells us that Berkeley believed that no material world exists; but only spirits exist, thinking beings whose nature consists of conception and volition. He then diverges from Berkeley by writing the following two sentences:

Now, from this point of view, fairly accepted, you are only phenomena of my consciousness as much as the rest of the world; I cannot allow the existence of any spirits, but only of one spirit, myself. And even this language is hardly suitable; for why should I give myself a class-name like *spirit*, when I am really the sum-total of the universe?

Clifford has come to his question. The question he asks is the one that will be answered by his mature speculative metaphysic.

Clifford wrote:

If, instead of approaching this question from the physiological side, we adopt another point of view, it is not unlikely that we shall be led to the latter conclusion.

It seems to me that if I start from the outer I cannot get to the inner, and if I start from the inner I cannot get to the outer. This is significant to my understanding of Frege and his positing of a *Third Realm* that will be considered later. Clifford seems to recognise the problem as he writes the following:

With Berkeley we get rid of the thing perceived; it is reduced to a bundle of perceptions. With Hume we get rid also of the perceiving self; it is reduced to the whole aggregate of feelings, linked together and succeeding one another in a certain manner.

Clifford ‘fills in’ the thought of Berkeley and Hume to fit his purpose; I admit that I ‘fill in’ to mine. What my purpose is I do not know for certain.

Clifford continues by considering the thought of J.S. Mill. In the opinion of Clifford, Mill provides a more complete definition of the ‘same view’. Clifford quotes Mill at length. I will provide the same quote as it not only relates to Clifford’s thought but also to that of Frege.

The Psychological Theory maintains that there are associations naturally and even necessarily generated by the order of our sensations and of our reminiscences of sensation, which, supposing no intuition of an external world to have existed in consciousness, would inevitably generate the belief, and would cause it to be regarded as an intuition .... The conception I form of the world existing at any moment comprises, along with the sensations I am feeling, a countless variety of possibilities of sensation: namely, the whole of those which past observation tells me that I could, under any supposable circumstances, experience at this moment, together with an indefinite and illimitable multitude of others which though I do not know that I could, yet it is possible that I might, experience in circumstances not known to me. These various possibilities are the important thing to me in the world. My present sensations are generally of little importance, and are moreover fugitive: the possibilities, on the contrary, are permanent, which is the character that mainly distinguishes our idea of Substance or Matter from our notion of sensation .... Matter, then, may be defined, a Permanent Possibility of Sensation.<sup>68</sup>

Mill tells us that objects [matter] can be defined as ‘a Permanent Possibility of Sensation.’ As a definition it is reasonable enough. All definitions are reasonable because they are constructs of thought, and if thought is language, they are of the world even if they have no link to the ‘world’ when perceived by a mind. This is all confusing. Perhaps the confusion is skated over by pretending there is no confusion. Ingleby, it will be seen, argues that if he can’t conceive of something it doesn’t

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<sup>68</sup> J. S. Mill, *Examination of Sir W. Hamilton's Philosophy*, pp. 192, 193, 198, 2nd edit.

exist. I can't imagine a lot of things, mathematical lines, points, and planes, are just three. The quote from Mill is of interest because, in my opinion, it relates to the thought of Frege.<sup>69</sup>

Mill was invited to become a member of the Metaphysical Society by W.G. Ward. He declined in the following letter<sup>70</sup>:

29th March, 1869.

The purpose of those who have projected the Society mentioned in your letter is a laudable one, but it is very doubtful whether it will be realised in practice. Oral discussion on matters dependent on reasoning may be much more thorough than when carried on by written discourse, but only I think if undertaken in the manner of the Socratic dialogue, between one and one. None of the same advantages are obtained when the discussion is shared by a mixed assemblage. Even, however, as a kind of debating society on these great questions the Society may be useful, especially to its younger members. But my time is all pre-engaged to other occupations, and I do not expect any such benefit, either to others or to myself, from my taking part in the proceedings of the Society, as would justify me in putting aside other duties in order to join it.

It is very natural that those who are strongly convinced of the truth of their opinions should think that those who differ from them do not duly weigh their arguments. I can only say that I sincerely endeavour to do the amplest justice to any argument which is urged, and to all I can think of even when not urged, in defence of any opinions which I controvert.

Mill considers oral discussion to be more 'thorough' than written discourse when the matters considered are dependent on reasoning, but only if undertaken in the manner of a Socratic dialogue. A

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<sup>69</sup> Frege writes:

We can include with ideas the direct experiences in which sense-impressions and acts themselves take the place of the traces which they have left in the mind. The distinction is unimportant for our purpose, especially since memories of sense-impressions and acts always go along with such impressions and acts themselves to complete the perceptual image. One may on the other hand understand direct experience as including any object, in so far as it is sensibly perceptible or spatial. [*Translations from the Philosophical Writings of Gottlob Frege* Edited by Peter Geach and Max Black 2<sup>nd</sup> Edition Basil Blackwell Oxford 1960]  
 In the initial translation of this passage from Frege the word 'idea' was presented in English as 'concept'. [*'Sense and Reference'* *The Philosophical Review*, Vol. 57, No. 3 (May, 1948), pp. 209-230 Max Black]

<sup>70</sup> *The Collected Works of John Stuart Mill, Volume XVII - The Later Letters of John Stuart Mill 1849-1873 Part IV*, ed. Francis E. Mineka and Dwight N. Lindley (Toronto: University of Toronto Press, London: Routledge and Kegan Paul, 1972).

dialogue requires that the two interlocutors share a common language. If the dialogue is to be reasoned it must share rules of inference. Clifford by suggesting a ‘filling in’ has taken rigour out of dialogue. One of the things that I have read that comes to mind often is Davidson’s positing of prior and passing theories.<sup>71</sup> If a dogmatic position is taken on inference where does this leave ‘feeling’?

Feelings are not emotions. If I feel that to conflate feelings with emotions is an incorrect conflation what is it that feelings are? Clifford tells us that Hume gets rid of the perceiving self; it is reduced to the whole aggregate of feelings, linked together and succeeding one another in a certain manner. Whether or not I agree with this interpretation of Hume it is secondary to it being the interpretation by Clifford of Hume. I of course interpret Clifford’s interpretation. What is interpreted are words. The word ‘feeling’ is used by Clifford, Mill, Frege, and Wittgenstein. The question that arises, if Clifford’s ‘filling in’ is accepted, is how each of these philosophers fill in the word ‘feelings’. The same problem is seen with the words ‘thought’, ‘idea’, ‘concept’ etc. I agree with Mill that the Socratic dialogue between two interlocutors is more thorough than written discourse. The problem is that the result of the dialogue then needs to be communicated to others. I would suggest the following as a possible way of viewing the productive dialogue between two people. A piece of graph paper is visible to both persons. The one person is focused on a particular square on the paper. Assuming that there are two axes drawn on the paper a way of identifying the square in question is to provide its co-ordinates. Another way is to have the person wishing to bring the focus of the other’s attention to the same square he is focused on say: “Point to any square on the paper with this pointer. Move up. Stop. Down a bit. Stop. Left a bit. Stop. Right a bit. Stop.” By this method the other comes to focus on the same square. This works only if the limited instruction given is understood. The method is similar to that used in automatic control systems. The problem with automatic control systems is that they are not necessarily stable, and even if they are designed to be stable, they don’t ‘know’ where they are when they get there. The analogy also misses the fact that in the case of two interlocutors both are probing for the square. The problem of communication is addressed by Clifford in his essay ‘On the Nature of Things-in-Themselves’.

Clifford takes the thought of Mill to be a defence of Hume’s position and to have established an association theory of mind. Clifford arrives at the following conclusion:

The universe consists of feelings. A certain cable of feelings, linked together in a particular manner, constitutes me. Similar cables constitute you. That is all there is. But in the cable of feelings that make up me there are certain persistent bundles or strands, which occasionally come to the outside; there are similar strands in the cables of which

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<sup>71</sup> See Chapter 4 for a discussion of Davidson’s ‘prior and passing theories’.

you are constituted. These correspond to external objects; we only think them external for the reasons assigned.

It should be remembered that this fragment was taken from Clifford's papers as they were found after his death. Pollock and Stephen tell us that there was no context for the fragment. The fragment was not intended to be a communication to others; rather it is Clifford's notes. The fragment meant something to Clifford but how it is to be interpreted by others is more difficult than a text that was intended to present one's thoughts to others. The passage quoted immediately above should not therefore be criticised as being a conclusion to a well formed argument. It does however present a conclusion that Clifford has arrived at.

Clifford moves on to consider the thought of Herbert Spencer. Clifford tells us that Spencer employs histology in his understanding of the mind body problem. Histology being the 'study of microscopic structure of organ tissue' has made great advances since Clifford was writing in the 1870's. Although the scientific advances in histology have been extensive the metaphysical problem of how mind and body are related is still unresolved. Whether a person takes the position that mind will eventually be explained by body, or body will be explained as a construct founded on mind is one of personal preference. The various parallelistic models, in my opinion, do little other than present the question rather than provide answers to the underlying problem. Clifford recognises the advance provided by Spencer but points out the 'dead end' that is reached by taking mind and body as separate entities that can be analysed and taken to be parallel. Clifford quotes Spencer as follows:

We can think of Matter only in terms of Mind. We can think of Mind only in terms of Matter. When we have pushed our explorations of the first to the uttermost limit, we are referred to the second for a final answer; and when we have got the final answer of the second, we are referred back to the first for an interpretation of it. We find the value of  $x$  in terms of  $y$ ; then we find the value of  $y$  in terms of  $x$ ; and so on we may continue for ever without coming nearer to a solution. The antithesis of subject and object, never to be transcended while consciousness lasts, renders impossible all knowledge of that Ultimate Reality in which subject and object are united. —Principles of Psychology, § 272 (vol. i. p. 627).

Clifford next considers the thought of Shadworth Hodgson. Clifford tells us that Hodgson accepts the analysis of the individual ego or self into a complex of feeling. The world is according to Hodgson 'feelings variously bound together'; which Clifford believes to be in line with the thought of Hume

and Mill. The word 'feeling' is again used as if it were known what 'feeling' is. It is difficult to follow the line of thought being presented by Clifford unless the word 'feeling' is explicated. Clifford writes the following:

Every phenomenon has two aspects; in its subjective aspect it is a feeling, in its objective aspect a quality. But it is not necessarily a feeling of my consciousness or of your consciousness; it may be a feeling of the general or universal consciousness, which is coextensive with all existence. The universal consciousness bears the same relation to the universal Ego of Schelling or Hegel that the stream of feelings does to the soul; it is an analysis of it into elements.

Clifford recognises that phenomena are things to be dealt with; he tells us that within the phenomena there are two distinct parts these being the subjective feeling and the objective quality. It seems to me that Clifford takes the position that the phenomena exist apart from a perceiving mind. If the phenomena exist apart from the perceiving mind, and Clifford holds that phenomena has a part that is 'subjective feeling' then each phenomena has 'feeling'. If the 'self' is a complex of feeling then the human mind is a complex of elements that exist in each phenomenon.

It seems to me that Clifford is alluding to this when he writes the following:

The important thing here is the conclusion that there is only one world, combined with the analysis of mental phenomena. The German Idealists attempted to construct the world out of very abstract ideas, which are the most complex of all forms of mental action. In this way we did get one world, a mental world; but the bricks of which it was built were made by the ingenious piling together of houses. I do not think that that process is likely to produce serviceable bricks. Now, Mr. Hodgson's element, feeling, although it seems to imply something too complicated, is yet at least a step in the way of analysis, an indication that analysis is desired.

The problem of 'feeling' and 'quality' is that what they refer to cannot be pointed at. Even if they could be pointed at Clifford's 'filling in' would result in them being unique for each individual. The use of the word 'refer' is problematic as it can suggest that there is something that is external to mind that is being referred to. 'Objective quantity' seems to be linked to 'emergent properties'. The person that introduced the word 'emergence' to philosophy was George Henry Lewes. Lewes was a friend of

Clifford. Lewes will be considered later. At present the words 'feeling' and 'quality' should be treated with caution.

Clifford continues by asking if we can arrive at real knowledge from external experience, that is the message, and not from imagination. Clifford believes we can, but that the knowledge will be from inference and not of absolute certainty. Inference requires that the uniformity of nature be assumed. The uniformity of nature is not established, but if we do not assume that it is we would never get to the position where we can reflect on its uniformity. Clifford writes:

Now, if you and I had not habitually acted on the assumption of the uniformity of nature from the time when we could act at all, we should not be here to discuss the question. Nature is selecting for survival those individuals and races who act as if she were uniform; and hence the gradual spread of that belief over the civilized world.

The position of the Idealist is rejected by Clifford on the basis that although it is acceptable for him it cannot account for us.

I do believe that you are conscious in the same way as I am; and once that is conceded, the whole idealist theory falls to pieces. For there are feelings which are not my feelings, which are entirely outside my consciousness; so that there is at least an external world. But let us consider now in what way we infer it; why do I believe that there are feelings which are not mine? Because, as I belong to a gregarious race, the greater part of my life consists in acting upon the supposition that it is true.

The fragment concludes with Clifford claiming that "There is thus only one world, of elementary feelings; which is perceived by me as my material world." Clifford has attempted to reason his way from the inside out. He is left with a supposition that others, similar to him, exist outside. This is only a supposition, a belief held without certain knowledge.<sup>72</sup> The conclusion reached is predetermined by the starting point that Clifford chooses. Starting points are important, they are also arbitrary. It will be seen that Frege in his approach to the problem starts from the outside and seeks to arrive at the inner. This results in Frege positing a 'Third Realm'.

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<sup>72</sup> It could be said that this knowledge is a priori. I would suggest that this would present the 'knowledge' as something stronger than a supposition.

### 2.6.3 III.— The Postulates of the Science of Space<sup>73</sup>

Clifford begins his second lecture in the series of three presented to the Royal Institution by restating what he had said at the beginning of the first. He tells us that we imagine a world of solid things, and that these solid things are constructed according to Euclid's axioms, postulates, definitions and demonstrations found in his *Elements of Geometry*.

Humanity had been utilising these construction methods long before Euclid formalised them. The formalisation was in line with man's nature and so humanity's world would fit Euclid's geometry. However this fit does not entail that Euclid's geometry is *the* geometry. The certainty that was associated with Euclid's geometry is not absolute but merely reflects man's nature, not nature as it is of itself.

Clifford provides a brief history of Euclid's geometry and how it was that Lobatchewsky finally came to criticise it. Clifford draws a parallel between the thought of Lobatchewsky and Copernicus. Clifford provides the following:

So, you see, there is a real parallel between the work of Copernicus and his successors on the one hand, and the work of Lobatchewsky and his successors on the other. In both of these the knowledge of Immensity and Eternity is replaced by knowledge of Here and Now. And in virtue of these two revolutions the idea of the Universe, the Macrocosm, the All, as subject of human knowledge, and therefore of human interest, has fallen to pieces.

The certainty of man's understanding of the world has been replaced with possibility. Clifford tells us that the 'geometer of today' [his day] knows nothing about existing space at an infinite distance, and knows nothing about the properties of space in a past or a future eternity. He emphasises the Here and Now.

The explication of Euclidean geometry is done by reference to boundaries. This is in line with the thought of Monboddo. At the beginning of the lecture Clifford has reiterated that we imagine a world of solid things. Just as we imagine points, lines, and surfaces, so we imagine solids. However in the case of solids we imagine a world. A problem that was to arise was the conflation of flatness with two dimensionality.<sup>74</sup> Gauss did not conflate flatness with two dimensionality. Gauss held that

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<sup>73</sup> *Lectures and Essays* First Edition Pg. 295

<sup>74</sup> See <http://www.youtube.com/watch?v=UnURElCzGc0> a clip from Carl Sagan's 'Cosmos', and 'Right, Left, and the Fourth Dimension' Author(s): James van Cleve Source: *The Philosophical Review*, Vol. 96, No. 1 (Jan., 1987), pp. 33-68 Published by: Duke University Press on behalf of Philosophical Review

'flatlanders' were *conscious* of themselves as two dimensional; he did not hold that they are two dimensional. The thought of Gauss:

"We can think of creatures who are conscious of themselves in only two dimensions," he said. "Higher above us in like manner would stand those who look down on us. Certain problems pertaining to this", he continued jestingly, he had "put aside to deal with later through geometry, in a higher state of existence."<sup>75</sup>

Consciousness implies mind. Perhaps Gauss' 'higher state' is a step on an infinite regression to higher states. Maybe this is why Clifford posited mind stuff to avoid the regression.

Clifford continues his lecture by addressing the discrete and the continuous. He points out that Euclid assumed the continuous by positing that every finite line can be dissected. He then addresses 'Elementary Flatness'. 'Elementary flatness is not to be conflated with 'flat worlds''. Clifford writes the following:

If, then, you take a sphere of say a foot diameter, and magnify it more and more, you will find that the more you magnify it the flatter it gets. And you may easily suppose that this process would go on indefinitely; that the curvature would become less and less the more the surface was magnified. Any curved surface which is such that the more you magnify it the flatter it gets, is said to possess the property of elementary flatness. But if every succeeding power of our imaginary microscope disclosed new wrinkles and inequalities without end, then we should say that the surface did not possess the property of elementary flatness.

Clifford now poses the question: "But how am I to explain how solid space can have this property of elementary flatness?" The answer Clifford provides is found on pages 309, 310, 311 and 312 of the first edition *Lectures and Essays Vol. I* first edition. The answer is of relevance to reactions to Clifford's thought and also to his eventual positing of 'mind-stuff'. The importance of the answer is such that I will present it, and then attempt a critique.

If we start to go out from a point on a surface, there is a certain choice of directions in which we may go. These directions make certain angles with one another. We may suppose a certain direction to start with, and then gradually alter that by turning it round

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<sup>75</sup> Pgs. 65-66 *Gauss A Memorial W.* Sartorius von Waltershausen, Leipzig 1856. Translation by Helen Worthington Gauss 1966

the point: we find thus a single series of directions in which we may start from the point. According to our first postulate, it is a continuous series of directions. Now when I speak of a direction from the point, I mean a direction of starting; I say nothing about the subsequent path. Two different paths may have the same direction at starting; in this case they will touch at the point; and there is an obvious difference between two paths which touch and two paths which meet and form an angle. Here, then, is an aggregate of directions, and they can be changed into one another. Moreover, the changes by which they pass into one another have magnitude, they constitute distance-relations; and the amount of change necessary to turn one of them into another is called the angle between them. It is involved in this postulate that we are considering, that angles can be compared in respect of magnitude. But this is not all. If we go on changing a direction of start, it will, after a certain amount of turning, come round into itself again, and be the same direction. On every surface which has the property of elementary flatness, the amount of turning necessary to take a direction all round into its first position is the same for all points of the surface. I will now show you a surface which at one point of it has not this property. I take this circle of paper from which a sector has been cut out, and bend it round so as to join the edges; in this way I form a surface which is called a cone. Now on all points of this surface but one, the law of elementary flatness holds good. At the vertex of the cone, however, notwithstanding that there is an aggregate of directions in which you may start, such that by continuously changing one of them you may get it round into its original position, yet the whole amount of change necessary to effect this is not the same at the vertex as it is at any other point of the surface. And this you can see at once when I unroll it; for only part of the directions in the plane have been included in the cone. At this point of the cone, then, it does not possess the property of elementary flatness; and no amount of magnifying would ever make a cone seem flat at its vertex.

To apply this to solid space, we must notice that here also there is a choice of directions in which you may go out from any point; but it is a much greater choice than a surface gives you. Whereas in a surface the aggregate of directions is only of one dimension, in solid space it is of two dimensions. But here also there are distance-relations, and the aggregate of directions may be divided into parts which have quantity. For example, the directions which start from the vertex of this cone are divided into those which go inside the cone, and those which go outside the cone. The part of the aggregate which is inside the cone is called a solid angle. Now in those spaces of three dimensions which have the property of elementary flatness, the whole amount of solid angle round one point is equal to the whole amount round another point. Although the space need not be exactly similar

to itself in all parts, yet the aggregate of directions round one point is exactly similar to the aggregate of directions round another point, if the space has the property of elementary flatness.

How does Euclid assume this postulate of Elementary Flatness? In his fourth postulate he has expressed it so simply and clearly that you will wonder how anybody could make all this fuss. He says, 'All right angles are equal.'

Why could I not have adopted this at once, and saved a great deal of trouble? Because it assumes the knowledge of a surface possessing the property of elementary flatness in all its points. Unless such a surface is first made out to exist, and the definition of a right angle is restricted to lines drawn upon it—for there is no necessity for the word straight in that definition—the postulate in Euclid's form is obviously not true. I can make two lines cross at the vertex of a cone so that the four adjacent angles shall be equal, and yet not one of them equal to a right angle.

I have problems with Clifford's answer. My problems are that Clifford seems to utilise two definitions of line, he uses the words 'on' and 'of' in relation to points, he assumes that a surface can be 'repositioned' in a three dimensional space.

A line can be drawn between any two points. A line is the boundary of a surface. Monboddo had the insight that geometry was concerned with boundaries. When Hilbert sought to formalise Euclid's geometry he came eventually to present his 'Axiom of Completeness':

To a system of points, straight lines, and planes, it is impossible to add other elements in such a manner that the system thus generalized shall form a new geometry obeying all of the five groups of axioms. In other words, the elements of geometry form a system which is not susceptible of extension, if we regard the five groups of axioms as valid.<sup>76</sup>

Hilbert's system makes no mention of solids, and is a system that includes planes as opposed to surfaces. When Clifford constructs the cone from the segment of the disc he is constructing a surface in a three dimensional space. However in doing so he has created two surfaces if the definition of a surface is that which is bounded by a line. If this is accepted then the line is 'removed' and the two surfaces are one surface that defines the solid contained 'within' the surface. Clifford has not so much

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<sup>76</sup> *The Foundations of Geometry*, David Hilbert, translated by E.J. Townsend, The Open Court Publishing Company, 1950. <http://www.gutenberg.org/files/17384/17384-pdf.pdf> Accessed April 2012.

shown Euclidean geometry to be ‘wrong’ but rather shown it to be limited. The implication is that a geometry must ‘start’ with the element of its system that has the greatest dimensionality.

Clifford has not only shown Euclidean geometry to be limited but has shown that the nature of geometry is limited. The question becomes ‘What is geometry?’, and this question, if it can be answered, cannot take geometry as the basis of its answer.

Clifford next addresses the ‘postulate of Superposition’. Clifford tells us that this postulate is: “According to this postulate a body can be moved about in space without altering its size or shape....When we say that a body can be moved about without altering its size, we mean that it can be so moved as to keep unaltered the length of all the lines in it.” I find it strange that Clifford should allude to ‘body’ when there has up until this point been no mention of ‘body’ in the preceding text. What does Clifford understand ‘body’ to be? Previously the thought of Monboddo was mentioned in regard to Euclid, boundaries, and body. If a body is defined as that which has as its boundary a surface the question arises which side of the surface is body and which side is not. There appears to be some confusion here. If body is that which is ‘inside’ the surface, and space is that which is outside the surface, then both body and space are bounded by the same surface. If the surface can be employed to define body then it seems to me that the surface can be employed to define space. If this is the case then it would seem that body and space are dependent one on the other. Hilbert wrote the following:

We think of these points, straight lines, and planes as having certain mutual relations, which we indicate by means of such words as “are situated,” “between,” “parallel,” “congruent,” “continuous,” etc. The complete and exact description of these relations follows as a consequence of the axioms of geometry.<sup>77</sup>

Clifford is concerned with Euclidean geometry as is Hilbert. Clifford is seeking to show the limits of Euclidean geometry whereas Hilbert is attempting to construct a geometry that is more rigorous than Euclid’s. Hilbert in his *The Foundations of Geometry* makes no mention of ‘body’ or ‘solids’. Clifford does mention body. I mention Hilbert’s thought at this time to show that Clifford is not constructing a ‘geometry’. It seems to me that Clifford is questioning geometry as it is in itself.

Clifford argues that if the nature of space is not consistent over the totality of space then the postulate of superposition does not hold. This follows from the relationship between body and space. However

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<sup>77</sup> *The Foundations of Geometry*, David Hilbert, translated by E.J. Townsend, The Open Court Publishing Company, 1950. <http://www.gutenberg.org/files/17384/17384-pdf.pdf> Accessed April 2012.

if we assume that space is three dimensional, and body is three dimensional, and that to define both we employ a two dimensional surface that is real but dependent on a perceiving mind rather than something that exists, we are led to conclude that body is mind dependent. Clifford began his 'The Postulates of the Science of Space' by telling us we imagine solids. If this is the case then the imagined solids, defined by imagined surfaces, lead us to a model that is mind dependent. This position taken by Clifford requires that he explain how it is possible for different minds to imagine the same thing; assuming that they do.

Clifford continues his lecture by considering a surface of constant curvature on which are drawn figures. He then considers the surface to be flexible. The bending of the surface has no effect on the relationship between the surface and the figures on the surface, providing he does not stretch or tear the surface. Clifford then tells us that:

This property of the surface, then, could be ascertained by people who lived entirely in it, and were absolutely ignorant of a third dimension. As a point-aggregate of two dimensions, it has in itself properties determining the distance-relations of the points upon it, which are absolutely independent of the existence of any points which are not upon it.

Clifford is following the thought of Gauss. To say that the surface has a 'property' leads to consideration of what properties are. This is a problem for surfaces as surfaces are two dimensional mental constructs. If it is accepted that a surface is real but not existent, it is difficult to consider properties of a surface as being anything other than real. As they are real but non-existent they are mind dependent.<sup>78</sup> The problem that follows from this is that of determining existents. I do not suggest that the real being mind dependent implies that which is real is arbitrary; rather I would suggest that the mind cannot be removed from discussion of what is existent. It is perhaps this fundamental problem of explicating the existent that leads Clifford to his mature metaphysic as presented in the final version of 'On the Nature of Things-in-Themselves'.

I would make one further comment on Clifford's discussion of Superposition. I can draw on a piece of paper two shapes that are same other than their property of 'left' and 'right'. In order to superposition these two shapes I must rotate one of the shapes through two right angles in three dimensional space. The axis of rotation is of importance. Clifford makes mention of Leibnitz's definition of a plane:

In so doing it will trace out a surface which is called a geodesic surface. Now in the particular case where a space of three dimensions has the property of superposition, or is

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<sup>78</sup> My understanding of real and existent follow from my interpretation of Forrest's '2. Grounding and an intuition underminer' Pg. 59, *The Necessary Structure of the All-Pervading Aether*, Peter Forrest, ISBN 978-3-86838-166-5, 2012.

all over alike, these geodesic surfaces are planes. That is to say, since the space is all over alike, these surfaces are also of the same shape all over and on both sides; which is Leibnitz's definition of a plane. If you take a piece of space on one side of such a plane, partly bounded by the plane, you may slide it all over the plane, and it will fit; and you may turn it round and apply it to the other side, and it will fit there also. Now it is clear that this definition will have no meaning unless the third postulate be granted. So we may say that when the postulate of Superposition is true, then there are planes and straight lines; and they are defined as being of the same shape throughout and on both sides.

If a left handed glove is to superimpose on a right handed glove it must be rotated in a four dimensional space. The glove has a surface; however that surface is not a plane. Whereas in the case of a two dimensional triangle part of the surface and the axis of rotation can be superimposed, in the case of a left handed glove the axis of rotation is outside of the glove 'in space', and part of space is rotated along with the glove. The case of the triangle is somehow different if the boundary of the triangle is taken to be the three lines bounding the two dimensional shape that is triangular. What does it mean to rotate the glove in four dimensional space? Again I return to Clifford's comment at the start of this section where he tells us we *imagine* a world of solids.

Clifford next considers the postulate of Similarity. This postulate is expressed by Clifford as follows:

According to this postulate, any figure may be magnified or diminished in any degree without altering its shape. If any figure has been constructed in one part of space, it may be reconstructed to any scale whatever in any other part of space, so that no one of the angles shall be altered, though all the lengths of lines will of course be altered.

It should be recalled what a postulate is. A postulate requires language. If I say to a person "Let's assume the world is round and floating around in space. Then....." I am constructing an argument the premises of which I can't point to. Language assumes communication, to assume something intrinsically requires the use of the imagination. When Janos Bolyai developed his non-Euclidean geometry he wrote to his father: "Out of nothing I have created a strange new universe." If *the* geometry is not the geometry of Euclid then the geometry of Euclid models a world that is equally strange as that imagined by Bolyai. However it is that geometry that is close enough and allows for human action that maximizes the probability of survival. Clifford said we imagine a world of solids. The position of Clifford is less startling when considered in light of the 'creation' of non-Euclidean

geometric worlds. Clifford in his metaphysical speculations attempts to resolve the mysteries of creation by use of the imagination, and language.

Clifford goes on to discuss geometries that are self consistent but not Euclidean. This is of interest in itself but if Clifford's position that 'we imagine' solids is taken at face value it becomes a secondary problem to that of how we can appear to be imagining the 'same' thing.

#### 2.6.4 IV.-The Universal Statements of Arithmetic<sup>79</sup>

It was mentioned earlier that Gauss considered the three dimensional world as being a human construct. Gauss wrote the following:

Wachter has printed off a small piece about the first principles of geometry of which you will receive a copy from Lindenau. Although Wachter has penetrated into the matter more than his predecessors, still his proof is no more binding than all the others. I am coming ever more to the conviction that the necessity of our geometry cannot be proved, at least not by human comprehension nor for human comprehension. Perhaps in another life we will come to other views on the nature of space which are currently unobtainable for us. Until then one must not put Geometry into the same rank as Arithmetic, which stands a priori, but rather in the same rank as, say, Mechanics.<sup>80</sup>

Gauss expresses his opinion in this letter that arithmetic is a priori.

Clifford in this lecture is concerned with universal statements. Statements require a language in which they are expressed. To be universal I take it that they are applicable everywhere in both space and time. At the end of the last section I came to hold that Clifford was to address the problem of imagination and language in his mature metaphysic. In this lecture Clifford includes language in his analysis of arithmetic.

Clifford tells us:

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<sup>79</sup> *Lectures and Essays* First Edition Pg. 323

<sup>80</sup> Gauss to Olbers Goettingen, 28 April 1817. Taken from <http://www.math.uwaterloo.ca/~snburris/htdocs/noneucl.pdf> accessed 13 May 2013.

We have now to consider a series of alleged universal statements, the truth of which nobody has ever doubted. They are statements belonging to arithmetic, to the science of quantity, to pure logic, and to a branch of the science of space which is of quite recent origin, which applies to other objects besides space, and is called the analysis of position. I shall endeavour to show that the case of these statements is entirely different from that of the statements about space which I examined in my last lecture.

Clifford has previously argued that our understanding of the statements regarding space may be false. In regard to statements regarding arithmetic he tells us that there may be times and places where they are “...unmeaning and inapplicable.” The term ‘analysis of position’ I take to be analysis situs, now known as topology.

Clifford tells us:

If I am asked what two and two make, I shall not reply that it depends upon circumstances, and that they make sometimes three and sometimes five; but I shall endeavour to show that unless our experience had certain definite characters, there would be no such conception as two, or three, or four, and still less such a conception as the adding together of two numbers; and that we have no warrant for the absolute universality of these definite characters of experience.

Whereas Gauss took the position that arithmetic was a priori, Clifford holds that it is dependent on our ‘characters of experience’. Berkeley provides the following in his essay ‘An Essay Towards a New Theory of Vision (4<sup>th</sup> ed.)’<sup>81</sup>:

147. Upon the whole, I think we may fairly conclude that the proper objects of vision constitute an universal language of the Author of Nature, whereby we are instructed how to regulate our actions in order to attain those things that are necessary to the preservation and well-being of our bodies, as also to avoid whatever may be hurtful and destructive of them. It is by their information that we are principally guided in all the transactions and concerns of life. And the manner wherein they signify and mark unto us the objects which are at a distance is the same with that of languages and signs of human appointment, which do not suggest the things signified by any likeness or identity of nature, but only by an habitual connexion that experience has made us to observe between them.

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<sup>81</sup> <http://psychclassics.yorku.ca/Berkeley/vision.htm> accessed 14 May 2013.

The thought of Berkeley is that of an unchanging world. The Author of Nature has provided its language, and it is by means of this language that we are instructed. If I am correct in my opinion that Berkeley's world is established and unchanging, Berkeley has missed something that is important. Berkeley correctly points out that if we refuse to accept the information provided we will not be acting in such a way as to avoid that which is harmful to our bodies. Berkeley misses the possibility that we have evolved to become what we are because we are the product of the process that those that did not accept the information provided did not survive. Natural selection eliminates that which is not acting on the information provided. This could be taken to be an unfair criticism of Berkeley. I would not see it as a criticism of the man but a criticism of the world Berkeley lived in. If Berkeley had followed the line of thought I suggest he would be most likely be in trouble with the Church, and being a Bishop that would have serious implications for him.

Clifford tells us:

In the first place it is clear that the moment we use language at all, we may make statements which are apparently universal, but which really only assign the meaning of words. Whenever we have called a thing by two names, so that every individual of a certain class bears the name A and also the name B, then we may affirm the apparently universal proposition that every A is B. But it is really only the particular proposition that the name A has been conventionally settled to have the same meaning as the name B.

Clifford has explicitly brought natural language into his discussion of arithmetic. He tells us that it is only the name A that has been conventionally settled to have the same meaning as the name B.

Clifford continues:

I may, for example, enunciate the proposition that all depth is profundity, and all profundity is depth. This statement appears to be of universal generality; and nobody doubts that it is true. But for all that it is not a statement of some fact which is true of nature as a whole; it is only a statement about the use of certain words in the English language.

Clifford makes the point that the use of certain words in English constitute a statement about the English language, not a statement of some fact that is true of nature as a whole

Clifford continues:

In this case the meaning of the two words is co-extensive; one means exactly as much as, and no more than, the other. But if we suppose the word crow to mean a black bird having certain peculiarities of structure, the statement, 'All crows are black,' is in a similar case. For the word black has part of the meaning of the word crow; and the proposition only states this connexion between the two words. Are the propositions of arithmetic, then, mere statements about the meanings of words? No; but these examples will help us to understand them. Language is part of the apparatus of thought; it is that by which I am able to talk to myself. But it is not all of the apparatus of thought; and just as these apparently general propositions, 'All crows are black,' 'All depth is profundity,' are really statements about language, so I shall endeavour to show that the statements of arithmetic are really statements about certain other apparatus of thought.

I find this expressed thought of Clifford to be relevant to my understanding of Frege's thought expressed in his essay 'On Sense and Reference.' It will be seen later that Frege differentiates between 'thought' and 'idea', and that he uses the two names, 'Morning Star' and 'Evening Star', to formulate a question that relates to epistemology.

Having provided his intention of endeavouring to show that the statements of arithmetic are really statements about certain other apparatus of thought, Clifford returns to arithmetic. He tells us:

We know that six and three are nine. Wherever we find six things, if we put three things to them, there are nine things altogether. The terms are so simple and so familiar, that it seems as if there were no more to be said, as if we could not examine into the nature of these statements any further.

No more there is, if we are obliged to take words as they stand, with the complex meanings which at present belong to them. But the real fact is that the meanings of six and three are already complex meanings, and are capable of being resolved into their elements.

In the first paragraph of this quote Clifford writes of 'six things' and 'three things', and also of 'six and three are nine'. The meanings of six and three are complex, made up of elements. Clifford goes on to tell us that our fingers are what first relate to numbers. Things are placed in a one to one relationship with our fingers. The number six is the thumb of the hand that the fingers of are not in

one to one relationship with the other five things. He then tells us that it makes no difference which thing of the six is in a one to one relationship with an individual finger.

It seems to me that Clifford, by taking the fingers to be what first relate to numbers, has started well in advance of the start. I would suggest that two hands are simpler than ten fingers, and one hand simpler than two. Communication is possible by gesture. Gesture allows communication to take place between persons that have no common natural language or a natural language at all. If an open hand is zero and a closed hand is one, is taken as the starting point two 'numbers' are established, zero and one. This line of thought leads to the problem of the origin of 'language'. I do not wish to explore the possible implications to the origin of language, however if the nature of 'language' is to be addressed it seems some consideration of 'language' in its most fundamental form is necessary. Clifford has already brought together the formal language of arithmetic and natural language. Interestingly his explication of counting numbers by reference to fingers being in a one to one relationship with things fails to provide a 'zero'. The notion that 'nothing' should be in a one to one relationship with 'no finger' is problematic. Zero was a relative late comer to numbers. The history of zero as a number is interesting in itself.

There is an underlying problem that relates to Clifford's thought concerning arithmetic. Numbers and things are put into a one to one relationship; this is problematic because it raises the question of the nature of the two entities being placed in a one to one relationship. It seems to me that Clifford takes the position that both entities are of the same nature and are mind dependent. This position is rejected by Frege in his early thought but he does accept the different nature of thought and idea. Frege was to posit in his later work a 'third realm'. My understanding of this problem is expressed by Forrest as follows:

It is undermined by diagnosing it as the misunderstanding of the intuition that all regions exist in virtue of those of maximal dimension. For the term 'real' is equivocal between: (1) existing; (2) existing independently of any ( creature's ) mind; and (3) being fundamental, that is not existing in virtue of any other things.<sup>82</sup>

The position a person takes in regard to the nature of number and things may appear to be one of taste. Clifford starts from his mind and seeks an external 'existing reality'; Frege starts from an existing external reality and seeks to reach the mind.

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<sup>82</sup> *The Necessary Structure of the All-pervading Aether Discrete or Continuous? Simple or Symmetric?* Pg. 59  
Peter Forrest ISBN 978-3-86838-166-5

Clifford tells us that the order in which we take the things that are counted is irrelevant to the end result. However the ‘counting apparatus’ must always be taken in the same order. We cannot count a set of things and leave a gap. We cannot count to six by placing the four fingers of one hand in a one to one relationship with four of the things, and then place the remaining two things in a one to one relationship with fingers on the other hand. This seems to me to be saying that to count we must employ a physical continuum. Clifford expresses this as follows:

Now this is the operation of counting; I take my fingers in a certain definite order—say I begin with the thumb of each hand, and with the right hand. Then I lay my fingers in this order upon the things to be counted; or if they are too far away, I imagine that I lay them. And I observe what finger it is that is laid upon the *last* thing, and call the things by the name of this finger.

Clifford next addresses the problem of how six things and three things are nine. It seems to me that the order of the counting apparatus must be fixed for counting to have any meaning from one instance of counting to the next. The order of the things that are counted are not fixed, they can be taken in any order and provide the same end number. Clifford tells us:

Let us now look in this light at the statement that six and three are nine. I have counted a group of things, and come to the conclusion that there are six of them, I have already said, therefore, that they may be counted in any order whatever and will come to the same number, six. I have counted another distinct group, and come to the conclusion that there are three of them. Then I put them all together and count them. Now, without seeing or knowing any more of the things than is implied in the previous statements, I can already count them *in a certain* order with my fingers.

My understanding of counting is that if I empty a box of matches onto a table and wish to count them I start with a pile of matches. I move a match to start a different pile of matches. During the process of counting I have two piles of matches, before counting and after counting I have one pile of matches. The counting is completed when I have one pile of matches that have been counted. I do this because I have abstracted my fingers to signs. It seems to me that Clifford is alluding to the problem of my first having to recognise my fingers. Most human beings have the same number of fingers. My counting apparatus is the ‘same’ as most other people. If I were so inclined I could chop off the hands of another person and use them as my counting apparatus. What I cannot do is replace my abstracted sign that is of my mental apparatus and replace it with someone else’s.

Clifford continues:

But this is an operation performed on my fingers; and the statement that we have founded on it must therefore be, at least in part, a statement about my counting apparatus. We may easily understand what is meant by saying that six and three are nine on my fingers, independently of any other things than those; this is a particular statement only. The statement we want to examine is that this is equally true of any two distinct groups whatever of six things and three things, which appears to be a universal statement. Now I say that this latter statement can be resolved into two as follows:—

1. The particular statement aforesaid: six and three are nine on *my fingers*.
2. If there is a group of things which can be attached to certain of my fingers, one to each, and another group of things which can be attached to certain other of my fingers, one to each, then the compound group can be attached to the whole set of my fingers that have been used, one to each.

Now this latter, it seems to me, is a tautology or identical proposition, depending merely upon the properties of language. The arithmetical proposition, then, is resolved or analysed in this way into two parts—a particular statement about my counting apparatus, and a particular statement about language; and it is not really general at all.

Clifford has split the arithmetical proposition into two parts (1) a particular statement about his counting apparatus, and (2) a particular statement about language. I take Clifford's use of 'language' to be use of 'natural language'.

Clifford was not the only person contemplating 'number'. Georg Cantor and Richard Dedekind became friends in 1872. Cantor had been working on the relationship between rational and irrational numbers since 1870. Cantor invoked the notion of a one to one relationship in 1874. Dedekind produced his paper 'Continuity and Irrational Numbers' in 1872. The historical aspect of the timelines of the thought of Cantor, Dedekind, Clifford, and others in respect to numbers is interesting in and of itself. However I would make note of the following by Dedekind with regard to Clifford's 'filling in':

This analogy between rational numbers and the points of a straight line, as is well known, becomes a real correspondence when we select upon the straight line a definite origin or zero-point  $o$  and a definite unit of length for the measurement of segments. With the aid of the latter to every rational number  $a$  a corresponding length can be constructed and if we lay this off upon the straight line to the right or left of  $o$  according as  $a$  is positive or

negative, we obtain a definite end-point  $p$ , which may be regarded as the point corresponding to the number  $a$ ; to the rational number zero corresponds the point  $o$ . In this way to every rational number  $a$ , i.e., to every individual in  $R$ , corresponds one and only one point  $p$ , i.e., an individual in  $L$ . To the two numbers  $a, b$  respectively correspond the two points  $p, q$ , and if  $a > b$ , then  $p$  lies to the right of  $q$ .....

“If all points of the straight line fall into two classes such that every point of the first class lies to the left of every point of the second class, then there exists one and only one point which produces this division of all points into two classes, this severing of the straight line into two portions.”

As already said I think I shall not err in assuming that everyone will at once grant the truth of this statement; the majority of my readers will be very much disappointed in learning that by this commonplace remark the secret of continuity is to be revealed. To this I may say that I am glad if every one finds the above principle so obvious and so in harmony with his own ideas of a line; for I am unable to adduce any proof of its correctness, nor has any one the power. The assumption of this property of the line is nothing else than an axiom by which we attribute to the line its continuity, by which we find continuity in the line. If space has at all a real existence it is *not* necessary for it to be continuous; many of its properties would remain the same even were it discontinuous. And if we knew for certain that space was discontinuous there would be nothing to prevent us, in case we so desired, from filling up its gaps, in thought, and thus making it continuous; this filling up would consist in a creation of new point-individuals and would have to be effected in accordance with the above principle.<sup>83</sup>

Dedekind wrote in 1872, a year prior to Clifford’s series of lectures that are presently being considered. Clifford seems to have extended the notion of ‘filling up its gaps’. Clifford has already explicitly told us that he holds time to be discontinuous, and applies his notion of ‘filling in’ to more than the ‘points on a line’.

I assume that Clifford was aware of Dedekind’s paper.

Dedekind tells us that “The assumption of this property of the line is nothing else than an axiom by which we attribute to the line its continuity, by which we find continuity in the line.”; perhaps it would be better to say that it is a postulate rather than an axiom. A postulate requires language.

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<sup>83</sup> *God Created the Integers*, Edited, with commentary, by Stephen Hawking, Running Press 2005. Pgs 915-918. ‘Continuity of Numbers’ R. Dedekind.

Clifford has mentioned ‘counting apparatus’ which he holds to have been initially the fingers on hands. Dedekind has extended number to ‘points on a line’. His ‘counting apparatus’ is the concept of zero dimensional points on a one dimensional line. If we attribute to line its continuity then we find continuity in the line. He does make the observation that “If space has at all a real existence it is *not* necessary for it to be continuous; many of its properties would remain the same even were it discontinuous.” What Dedekind understands these ‘properties’ to be is problematic. Are the properties human constructs or are they independent of any mind?

Dedekind writes the following: “To this I may say that I am glad if every one finds the above principle so obvious and so in harmony with his own ideas of a line; for I am unable to adduce any proof of its correctness, nor has any one the power.” It seems to me that Dedekind is treating ‘line’ as something that we have ‘ideas’ of. I do not accept that a line is something other than a mind dependent real that has a shared reality but no existence. If different people have different ideas of what a line is then there is no unique shared reality that is a ‘line’. This brings me to Clifford’s ‘social object’ that will be addressed later. I accept that Dedekind is correct in claiming that no one has the power to adduce a proof of the statement he presents, if that statement is about a continuum. However to relate the continuum to points on a line is to define the line and the points in such a way that there is a continuum.

The continuum is problematic because it entails the infinite. Clifford provides his understanding of infinite in his series of lectures given at the Town Hall, Shoreditch, for a University Extension Course, in December 1874.<sup>84</sup> The following is taken from those lectures:

It is only this: I cannot move this thing from one position to another, without making it go through an infinite number of intermediate positions. Infinite; it is a dreadful word, I know, until you find out that you are familiar with the thing which it expresses. In this place it means that between any two positions there is some intermediate position; between that and either of the others, again, there is some other intermediate; and so on without any end. Infinite means without any end. If you went on with that work of counting for ever, you would never get any further than the beginning of it. At last you would only have two positions very close together, but not the same; and the whole process might be gone over again, beginning with those as many times as you like.<sup>85</sup>

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<sup>84</sup> *Seeing and Thinking*, Macmillan and Co. 1879.

<sup>85</sup> *Ibid* Pg. 134

In this present lecture on arithmetic Clifford has separated geometry from arithmetic. What would constitute an infinite in terms only of number as opposed to number relating to geometrical entities? It seems to me that the obvious answer is that to any natural number a natural number can be added that produces a natural number that is greater than that number. The 'discovery' of other numbers than the natural numbers does not entail that natural number cannot be infinite. The recognition of irrational numbers by the Pythagoreans was important. The work of Cantor that demonstrated the incommensurability of natural and real numbers is also important. Once a physical continuum has been accepted the reasoning to the mathematical continuum is possible. The possibility of counting forever does not entail that there are an infinite number of things to be counted. It is only when we recognise the distinction of real from existent, that is mind dependent entities from entities that require no mind for their existence can we ask the question 'What exists?'

The discovery of irrational numbers was achieved by way of geometry and the Pythagorean Theorem. The relationship between length and area was shown to provide in certain circumstances an irrational number. Rather than discard the geometry it was pragmatic to accept the irrational numbers as an extension of the counting numbers, and rational numbers. The reals are represented by the points on a line segment. The number of points on a line segment is the same for all line segments. This can be shown with nothing more than a pen, a ruler, and a piece of paper.

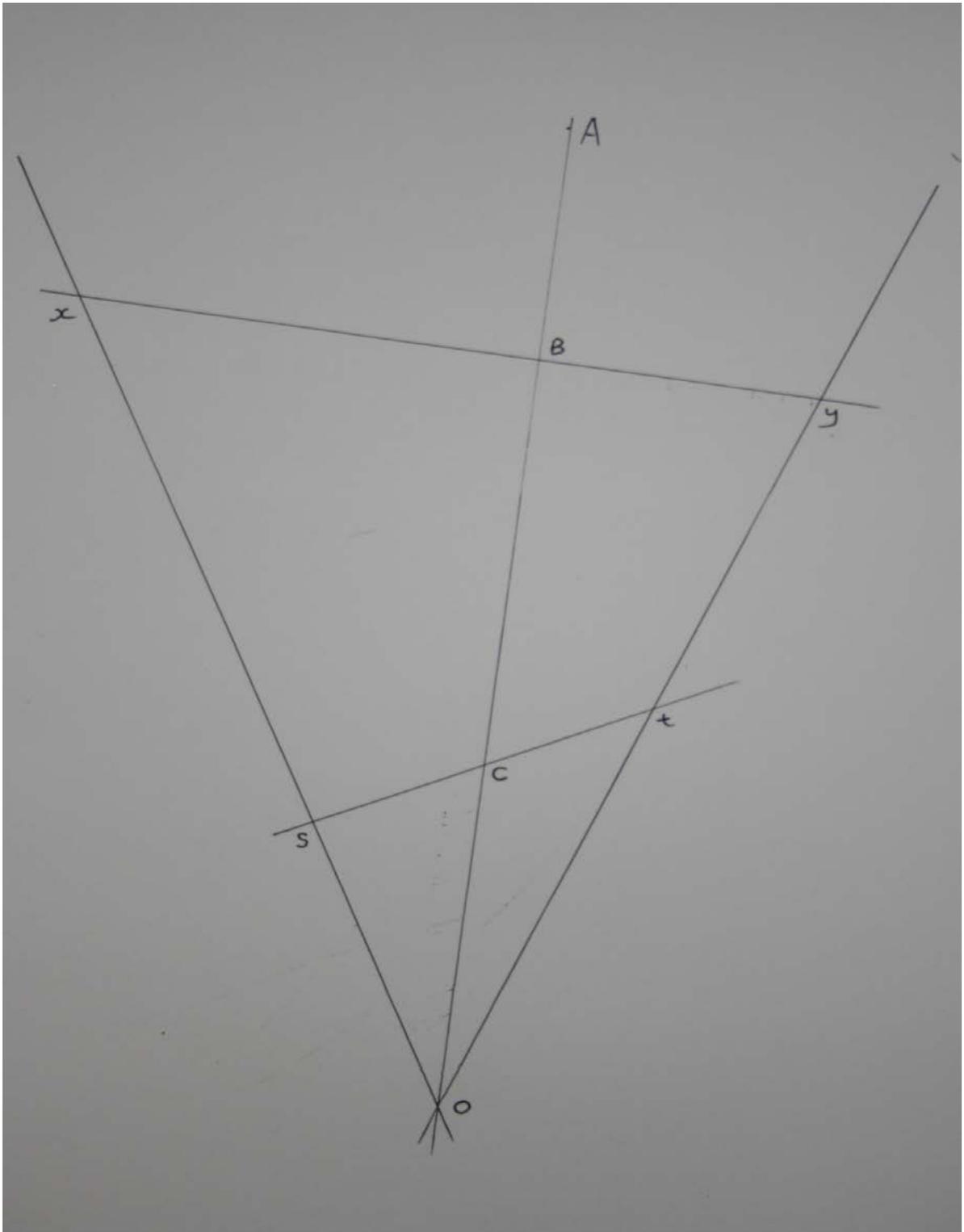


Fig.1

In Fig. 1 it can be seen that the line AO crosses the two line segments xy and st at unique points B and C. This will be the same for all straight lines originating at O and lying between the two lines Ox and

Oy extended. A similar construct can be used to show that planes have the same number of points upon them. In both cases the construct is a dimension above that which is being shown to have the same number of points on it. In order to show that all solids have the same number of points would require, presumably, a four dimensional construct.

Cantor went further than suggesting that all lines have the same number of points on them, as do all planes. Cantor showed that all lines, planes, solids, and higher dimensional entities had the same number of points. It seems to me that two different ‘languages’ are being used; the first employs an abstracted representation, the second an abstruse construct. The abstract construct has within it the presupposition that the external exists and can be abstracted. Perhaps it was Clifford’s insight that the external, as commonly taken, is itself an abstraction; maybe the thought of Plato is relevant.<sup>86</sup>

Clifford continues his lecture by considering the ‘counting order’.

And I only arrive at the result that if the aggregate group of things has any number at all, that number is nine. It is not yet proved that they may be counted in any order whatever, and will always come to that number. Here, then, we are driven back to consider the nature of that fundamental assumption that the number of any finite group of distinct things is independent of the order of counting. Here is a proposition apparently still more general than any statement about the sum of two numbers. Do I or do I not know that this is true of very large numbers?<sup>87</sup>

Clifford is asking if experience is necessary for knowledge. In Clifford’s words:

Can I know anything about the equivalence of two impossible operations, neither of which can be conceived except in a symbolic way? And if I do, how is it possible for this knowledge to come from experience?

This problem was addressed by Saul Kripke in his 1982 book *Wittgenstein on Rules and Private Language*. Clifford continues:

I reply that I do know it; that such knowledge of things as there is in it has come from experience; and that, in fact, it is made up of a particular statement and a conventional use of words. These views will appear paradoxical; but the justification of them is to be found

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<sup>86</sup> See *The Walls of Plato’s Cave* Smythies, John R. Avebury 1994 for thought that explores this.

<sup>87</sup> The Rule Following Paradox is considered by Wittgenstein in §201 of *Philosophical Investigations*.

in the analysis of that fundamental assumption which lies at the basis of the idea of number.

Clifford tells us he will prove the ‘fundamental assumption’ in the case of the number six. Clifford believes that the proposition to be proved is: “...if a group of distinct things comes to six when counted in a certain order, it will come to six when counted in any other order.” Clifford tells us that the proposition to be proved involves the meaning of the phrase ‘distinct things’.<sup>88</sup> Clifford asks the question “What, then, is meant by ‘a group of distinct things’? Clifford’s answer to this question is as follows: “That they are all distinct from one another, or that any one and any other of them make two.” Clifford is addressing counting numbers. Distinctness of things is defined by one and any other distinct things make two. This is problematic in that two [ the counting number two ] is defined by two distinct things. Prior to having a concept of a counting number it is necessary to have distinct things. For Clifford the ‘distinct things’ are his fingers, his ‘counting apparatus’. Clifford puts it this way: “That is, if they are attached to two of my fingers in a certain order, they can also be attached to the same two fingers in the other order.”

Clifford next considers counting the letters in the word ‘spring’. Each individual letter is distinct. He tells us that “merely on the supposition that they are distinct from one another, I can change one order into the other while I use the same fingers to attach them to.” He then provides the following:

1	2	3	4	5	6
S	P	R	I	N	G
G	P	R	I	N	S
G	I	R	P	N	S
G	I	N	P	R	S

Clifford has used letters to be the things that are counted. The things that are counted can be placed in any order and still be six. I know that six is one more than five. It would appear strange but why can I not place in any order the six numbers and say that the number of letters is six because six is the largest number? This may be Clifford’s thought, in that he argues that once counted the letters can be

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<sup>88</sup> A point is identical to any other point. Its distinctness lies in its position.

rearranged in a different order. He tells us: “Here I have two distinct statements: the first is that the things are distinct, and have been once counted as six; the second is that in another order they come to the same.” If I were to be asked how many letters there are in the word ‘spring’ I would answer six. I would not answer one, two, three, four, five, six. My answer ‘six’ is not in an order with anything else, it is a single word. Clifford continues: “When I examine into the meaning of these, I find that they are not statements of different facts, but different statements of the same facts. That one statement is true, or that the other statement is true,—that is a matter of experience; but that if one is true the other is true, that is a matter of language.” At the beginning of the lecture Clifford had said “...but I shall endeavour to show that unless our experience had certain definite characters, there would be no such conception as two, or three, or four, and still less such a conception as the adding together of two numbers...”. Language [natural language] is a human construct, and Clifford tells us that our experience has ‘certain definite characters’. It seems to me that Clifford considers our human nature to be a determining factor in our appreciation of the external world.

Clifford continues by addressing how we can extend the system to that which cannot be counted on account that the number is too large. When Clifford says ‘cannot be counted’ I take it he means it would take a person too long to count it, not that it is uncountable. Clifford tells us:

I have only spoken, however, of the particular number six; how am I to extend these remarks to numbers which cannot be counted, like the number of molecules in this glass of water? In the first place we all know that cultivated races do not count directly with their fingers, but with the names of them—with the words one, two, three, four. Next, this system of names has been extended indefinitely, by a process to which no end can be conceived. But the remarks that we have made about finger-counting will hold good in every case in which the actual counting can be performed.

The ability to count indefinitely is achieved by replacing the counting apparatus of fingers by a language based construct that employs a rule by which counting can take place. The thought of Saul Kripke expressed in his book *Wittgenstein On Rules and Private Language*<sup>89</sup> discusses Wittgenstein’s ‘paradox of rule following’ which is concerned with other minds rather than rules as and of themselves. The problem of other minds is addressed by Clifford in his essay ‘On the Nature of Things-in-Themselves’.

Clifford uses the example of pure water and *aqua pura* to elucidate his understanding of the nature of large numbers that cannot be ‘visualized’. He writes:

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<sup>89</sup> *Wittgenstein On Rules and Private Language*, Saul A. Kripke, 1982, Basil Blackwell Publisher.

Pure water is the same thing as aqua pura; and wherever there are seventy thousand million tons of pure water there are seventy thousand million tons of aqua pura. I know that to be true, but it is not a statement of fact: it is a statement about language, notwithstanding that the language is used to symbolize that which cannot be actually represented in thought. So when I say of these molecules of water, 'If they are distinct things, the number of them counted in one order is equal to the number of them counted in any other order,' I make a supposition which I cannot realize in thought. I cannot possibly call up those molecules two and two to observe their distinctness. The supposition is only represented symbolically by language; but the statement that follows it is the same supposition represented symbolically by other language; and the equivalence of the two is, after all, a statement about language and not about facts.

Clifford tells us that he makes a supposition 'which he cannot realize in thought'. The problem of the equivocal nature of words such as 'thought', 'idea', 'impression', 'concept', 'feeling', 'notion', and 'concept', leads to confusion. Frege was to distinguish between 'thought' and 'idea'. My own interpretation of Clifford's 'cannot realize in thought' is that the idea does not present itself to the mind as a clear 'feeling'. Clifford's use of 'feeling' will be considered later, but is not to be confused with 'emotion'.

Clifford continues the lecture by digressing to a more metaphysical line of thought. He tells us that distinct things are distinct only by inference, on the assumption of the uniformity of nature. The distinctness of things, which is that one thing and one thing make two things, belongs to our experience. Clifford uses 'our' rather than 'my' so is assuming a common experience of persons. Clifford continues:

It is a fact that impressions hang together in groups which persist as groups, and in virtue of this persistence we call them things. So long as our experience consists of things, we may build out of it the conceptions of number; and the nature and connexion of these conceptions are determined by the primary sensation of things as individuals.

The counting numbers are dependent on our experience; our sensation of things as individuals. Clifford uses the words 'impressions', 'conceptions', and 'primary sensation'; what he understands by these words is to be established.

Clifford continues by introducing evolutionary considerations. He tells us that the experience of millions of years has modified our nervous systems, and that without total disruption of them we cannot cease to aggregate our perceptions into more or less persistent groups. He holds that the continuity of things has become a form of sense.

The lecture continues:

If we were placed in circumstances where these aggregations of feeling were not naturally produced, where perceptible things were not continuous in their changes, we should go on perceiving chaos as made of individual things for at least some time. But the perception would be a false one, and in acting upon it we should come to grief. Meanwhile, however, the science of number would be perfectly true of our perceptions, though practically inapplicable to the world.

Clifford has introduced ‘feeling’. In a future presentation Clifford explains what he means by ‘feeling’. It seems to me that Clifford is ‘thinking aloud’ and it would be impossible for his audience to appreciate his expressed thought because they are not aware of his understanding of ‘feeling’. What he means by ‘naturally produced’ is uncertain. Perhaps he considers that which is natural as that which is external to mind. It seems to me that as his understanding that number is in effect a human construct he can hold that the science of number remains true but is inapplicable to the external world. Clifford is faced with a dilemma that requires he either rejects the commonly held notion of an external world, or he needs to re-think his understanding of number, logic, and geometry. Clifford has already given his ‘filling in’ and so he is more likely to choose a radical view of the external.

Clifford concludes his exposition of the counting numbers as follows:

To sum up, then, we carry about with us a certain apparatus of counting, which was primarily our fingers, but is now extended into a series of signs which we can remember in a certain order—the names of numbers. Our language is so formed as to make us able to talk to ourselves about the results of counting. The propositions of arithmetic are compounded in general of two parts; a statement about the counting apparatus, and a statement about the different ways of describing its results.

Approximately fifty years after Clifford expressed this view of number David Hilbert was to arrive at a similar understanding in regard to number. It seems to me that Clifford has arrived at a position that holds that the counting numbers are mind dependent. The counting apparatus is one of choice; to

describe its results requires a natural as opposed to a purely formal language. Clifford continues by treating the counting of things as establishing a correspondence between two groups. He tells us that there is a one-to-one correspondence of two aggregates, the one being a standard. The final two sentences of Clifford's lecture that relate to the counting numbers are:

Now this establishment of correspondence between two aggregates and investigation of the properties that are carried over by the correspondence may be called the central idea of modern mathematics: it runs through the whole of the pure science and of its applications. It may be conceived, therefore, that propositions which are apparently as general and certain as those we have discussed to-day may be analysed in the same manner, and shown to be really statements about the apparatus of thought.

The first sentence seems to bear some resemblance to the thought of Dedekind in regard to the continuum. Dedekind wrote: “. If space has at all a real existence it is *not* necessary for it to be continuous; many of its properties would remain the same even were it discontinuous.” What is understood by properties seems to be mind dependent. If the propositions may be analysed in a manner that shows them to be really statements about the apparatus of thought then the statements may or may not be absolute in nature.

Clifford next addresses the nature of continuous quantity. A continuous quantity is different to a discrete quantity. It seems to me that counting in relation to a continuous quantity can only occur once an element of the continuous quantity has been chosen as that which will be counted. Counting numbers can only be employed in regard to a continuous quantity once that continuous quantity has been transformed to a discrete quantity by an arbitrary choice of an element of the continuous quantity. If every line has the same ‘number’ of points lying on it then counting them would serve no purpose. The implication drawn from Fig.1 above is that in one sense every line does have the same number of points lying on it. Points are human creations that are real but do not exist. In his exposition of the counting numbers Clifford mapped the counting numbers to things. It was necessary that the things be distinct. In measuring we employ a standard element of a supposed continuum to measure the extent of that continuum. The smaller the element is in comparison to the extent of the continuum the more accurate will be the measurement. The utility of a ‘standard element’ is only attained on the assumption that nature is uniform; the repositioning of the standard element in space does not alter its properties.<sup>90</sup> The uniformity of nature may appear to be, yet that appearance may be false.

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<sup>90</sup> In *Science and Hypothesis* Pgs. 75-78, Henri Poincaré writes of a world in which nature is not uniform.

Having provided my initial thoughts concerning continuous quantity I will now consider the thought of Clifford on the subject.

Clifford begins with the difference between discrete and continuous that he explained in the previous lecture. Clifford tells us:

In a row of marbles, which is a discrete aggregate, we can find between any two marbles only a finite number of others, and sometimes none at all. But if two points are taken on a line, the hypothesis of continuity supposes that there is no end to the number of intermediate points that we can find. Precisely the same difference holds good between number and continuous quantity. The several marbles, beginning at any one of them, may be numbered one, two, three, &c.; and the number attached to each marble will be the number of marbles from the starting-point to that marble inclusive. If the points on a line are regarded as forming a continuous aggregate, then lengths measured along the line from an arbitrary point on it are called continuous quantities.

Clifford has introduced the term ‘length’. If the uniformity of nature is accepted then a bar of length  $L$  will be of length  $L$  wherever it is positioned in the world. How this uniformity could be proved to be the case I do not know. I take it that lengths are measured by use of a standard element of line. Points by definition do not have the property of ‘lineness’ or extension in one dimension. Points are boundaries of line segments.<sup>91</sup> It seems reasonable to assume that Clifford would have recognised the distinction between the density of the rationals and the continuum of the reals. The question is which of these two is a better abstraction of our notions of space and time.

Clifford continues:

So also, if the instants of time are regarded as forming a continuous aggregate—that is, if we suppose that between any two instants there is no end to the number of intermediate ones that might be found—then intervals or lengths of time will be continuous quantities.

Clifford has already stated that he holds time to be discrete. When employing the metaphor of marbles to describe discreteness it is usually explained that the discrete entities ‘touch each other’, that is there is no gap between two adjacent discrete entities. It seems to me that this requirement is one of taste. If time is discrete there appears no obvious reason to assert that there are no ‘gaps’ between adjacent

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<sup>91</sup> If the world were one dimensional the ‘straightness’ of the line would be meaningless to inhabitants of that world.

discrete 'atoms of time'. Once Clifford has taken time to be discrete then the nature of space would be subject to revision.

Clifford continues:

And just as we may attach our numbers one by one to the marbles which form a discrete aggregate, so we may attach continuous quantities (or shortly quantities) one by one to the points which form a continuous aggregate. Thus to the point P will be attached the quantity or length A P.



And we see thus that between any two quantities there may be found an infinite number of intermediate quantities, while between two numbers there can only be found a finite number of intermediate numbers, and sometimes none at all. That is to say, continuous quantities form a continuous aggregate, while numbers form a discrete aggregate. Thus the science of quantity is a totally different thing from the science of number.

Clifford has avoided 'counting points'. A and P are points that are the boundary of a continuous quantity (length), and he tells us between any two quantities there may be found an infinite number of intermediate *quantities*. I take it that Clifford is referring to the counting numbers. Clifford was a gifted mathematician and it would be reasonable to suggest that he would be aware of the difference between the density of the rationals and the continuum of the reals. As a mathematician yes, but as a metaphysician it seems not. I have no problem accepting that the reals present a continuum, but whether or not this has relevance to the nature of space and time is a different matter.

Clifford continues:

Notwithstanding that this difference was clearly perceived by the ancients, attempts have constantly been made by the moderns to treat the two sciences as one, and to found the science of quantity upon the science of number. The method is to treat rational fractions as a necessary extension of numerical division, and then to deal with incommensurable quantities by way of continual approximation. In the science of number, while five-sevenths of fourteen has a meaning, namely, ten, five-sevenths of twelve is nonsense. Let us then treat it as if it were sense, and see what comes of it. A repetition of this process

with every impossible operation that occurs is supposed to lead in time to continuous quantities. The results of such attempts are the substitution of algebra for the fifth book of Euclid or some equivalent doctrine of continuous ratios, and the substitution of the differential calculus for the method of fluxions.

Clifford mentions the differential calculus and the method of fluxions. The difference in thought concerning the calculus of Newton and Leibnitz was discussed by J.J. O'Conner and E.F. Robertson.<sup>92</sup> The following is taken from their article:

For Newton integration consisted of finding fluents for a given fluxion so the fact that integration and differentiation were inverses was implied. Leibniz used integration as a sum, in a rather similar way to Cavalieri. He was also happy to use 'infinitesimals'  $dx$  and  $dy$  where Newton used  $x'$  and  $y'$  which were finite velocities. Of course neither Leibniz nor Newton thought in terms of functions, however, but both always thought in terms of graphs. For Newton the calculus was geometrical while Leibniz took it towards analysis.

Clifford seems to be questioning the possibility that continual approximation will lead to a continuous quantity. This may be in line with the thought of Berkeley and the thought of Sir William Rowan Hamilton as mentioned by J.O. Wisdom in his essay 'Berkeley's Criticism of the Infinitesimal'.<sup>93</sup> Clifford was not averse to abstruse mathematical thought; however he seems to reject abstruse thought when it appears to override his preferred metaphysic. A quote from John von Neumann is pertinent:

I think that it is a relatively good approximation to truth — which is much too complicated to allow anything but approximations — that mathematical ideas originate in empirics. But, once they are conceived, the subject begins to live a peculiar life of its own and is ... governed by almost entirely aesthetical motivations. In other words, at a great distance from its empirical source, or after much "abstract" inbreeding, a mathematical subject is in danger of degeneration. Whenever this stage is reached the only remedy

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<sup>92</sup> [http://www-groups.dcs.st-and.ac.uk/~history/HistTopics/The\\_rise\\_of\\_calculus.html](http://www-groups.dcs.st-and.ac.uk/~history/HistTopics/The_rise_of_calculus.html) accessed 07/11/2012

<sup>93</sup> 'Berkeley's Criticism of the Infinitesimal', J.O. Wisdom, *The British Journal for the Philosophy of Science*, Vol. 4, No. 13, George Berkeley Bicentenary (May, 1953)

seems to me to be the rejuvenating return to the source: the reinjection of more or less directly empirical ideas.<sup>94</sup>

Clifford continues:

For my own part, I believe this method to be logically false and educationally mischievous. For reasons too long to give here, I do not believe that the provisional use of unmeaning arithmetical symbols can ever lead to the science of quantity; and I feel sure that the attempt to found it on such abstractions obscures its true physical nature.

It seems to me that Clifford is in line with the later thought of von Neumann. I have limited mathematical ability but did make use of the square root of minus one when an engineering student. Although  $i$  was used to get from a question to an answer it was never, as far as I recall, a component of the answer. Clifford has referred to 'unmeaning arithmetical symbols'. What Clifford understands 'meaning' to be is uncertain. Clifford's explication of meaning is given in his 'On the Nature of Things-in-Themselves' which will be considered later.

Clifford continues by telling us that although the science of number and the science of quantity are founded on totally different hypotheses, the first being distinctness of things, the second continuity, the two sciences are very closely related. Clifford continues:

The scale of numbers is used, as we shall see, in forming the mental apparatus of the scale of quantities, and the fundamental conception of equality of ratios is so defined that it can be reasoned about in the terms of arithmetic. The operations of addition and subtraction of quantities are closely analogous to the operations of the same name performed on numbers and follow the same laws. The composition of ratios includes numerical multiplication as a particular case, and combines in the same way with addition and subtraction. So close and far-reaching is this analogy that the processes and results of the two sciences are expressed in the same language, verbal and symbolical, while no confusion is produced by this ambiguity of meaning, except in the minds of those who try to make familiarity with language do duty for knowledge of things.

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<sup>94</sup> "The Mathematician", in *The Works of the Mind* (1947) edited by R. B. Heywood, University of Chicago Press, Chicago

Clifford introduces the term 'scale'. What is meant by the 'scale of numbers' I fail to grasp. When scale is applied to quantity the number of elements that determine the quantity provides an accuracy of measure as the element decreases in size relative to the quantity measured. This may be in line with the thought of von Neumann above: "I think that it is a relatively good approximation to truth — which is much too complicated to allow anything but approximations — that mathematical ideas originate in empirics." Clifford as a geometer would have been aware of the recognition of the irrationality of the square root of two as derived by a Pythagorean, possibly Hippasus of Metapontum, in the fifth century BC. The failure to find a unit of measure that circumvents the irrationality of the square root of two entails a problem for the discrete as opposed to the continuous. The paradoxes of Zeno are a result of this problem. It was Eudoxus of Cnidus who recognised the distinction between magnitude (quantity) and number. Clifford's thought that "to try to make familiarity with language do duty for knowledge of things." is echoed in the thought of Poincaré. Poincaré wrote in the 'Author's Preface to Translation' of his book *Science and Hypothesis*:

Moreover, to analyze this concept is not to sacrifice reality to I know not what phantom. The geometric language is after all only a language. Space is only a word that we have believed a thing. What is the origin of this word and of other words also? What things do they hide? To ask this is permissible; to forbid it would be, on the contrary, to be a dupe of words; it would be to adore a metaphysical idol, like savage peoples who prostrate themselves before a statue of wood without daring to take a look at what is within.<sup>95</sup>

Clifford tells that in operations of measuring, real or ideal, there is comparison of some piece of continuous thing with a scale of quantities. Clifford uses the example of measuring time by the length of the arc on a clock face traversed by the hour hand. Another example would be the verification of the required amount of oil in a car engine by the position of the surface of the oil measured on the engine dipstick. Clifford presents the following:

With the help of the scale of numbers, then, any assigned continuous quantity will serve as a standard by which the whole scale of quantities may be represented. And when we assert that any theorem, e.g., the binomial theorem, is true of all quantities whatever, whether of length, of time, of weight, or of intensity, we really assert two things: first, this theorem is true on the standard; secondly, relations of the measures of quantities on the standard are relations of the quantities themselves. The first is (in regard to the kind of

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<sup>95</sup> *The Foundations of Science, Science and Hypothesis*, H. Poincaré, The Science Press, New York and Garrison, N.Y. 1921 Pg. 5

quantity) a particular statement; the second is involved in the meaning of the words 'quantity' and 'measurement.'

A problem that arises when length is used as a measure of volume is that of limit of measurement. This arises from the relationship of volume to length. If the lengths of the sides of a cube are doubled the volume is eight times as great. When the limit of accuracy is reached for the linear the cubic may still be capable of 'accurate' measurement. This is of practical importance in experimentation. Again Clifford in the quote immediately above has made reference to 'meaning'.

Clifford next addresses the scale of quantities that is supposed to be marked off on a straight line, starting from an arbitrarily assumed point named the origin. By accepting the four assumptions of Euclidean or parabolic geometry, continuity, elementary flatness, superposition, and similarity, the position of every point in space can be specified by three quantities marked off on the three straight lines at right angles to each other, their common point of intersection being taken as origin, and the direction in which each of the quantities is measured being also assigned. Any geometry will provide the possibility of elementary flatness. The elementary flatness will be related to scale. Maybe this was the intent of Clifford but I had difficulty with the last portion of his lecture. The following is what Clifford presented:

If we make the four assumptions of Euclidean or parabolic geometry, the position of every point in space may be specified by three quantities marked off on three straight lines at right angles to each other, their common point of intersection being taken as origin, and the direction in which each of the quantities is measured being also assigned. Namely, these three quantities are the distances from the origin to the feet of perpendiculars let fall from the point to be specified on the three straight lines respectively. In all space of three dimensions the position of a point may be specified in general by a set of three quantities; but two or more points may belong to the same set of quantities, or two or more sets may specify the same point; and there may be exceptional sets specifying not one point, but all the points on a curve or surface, and exceptional points belonging to an infinite number of sets of quantities subject to some condition. There are three kinds of space of three dimensions in which this specification is unique, one point for one set of quantities, one set of quantities for every point, and without any exceptional cases. These three are the hypothetical space of Euclid, with no curvature; the space of Lobatchewsky, with constant negative curvature; and the space I described at the end of my second lecture, with constant positive curvature. In only one of these, the space of Euclid, are the three quantities specifying a point actual distances of the point from

three planes. In this alone we have a simple and direct representation of the scale of quantities. Now, if we remember that the scale of quantities is a mental apparatus depending only on the first of our four assumptions about space, we may see in this distinctive property of Euclidean space a probable origin for the curious opinion that it has some a priori probability or even certainty, as the true character of the universe we inhabit, over and above the observation that within the limits of experience that universe does approximately conform to its rules. It has even been maintained that if our space has curvature, it must be contained in a space of more dimensions and no curvature. I can think of no grounds for such an opinion except the property of flat spaces which I have just mentioned.

My problem grasping this section of Clifford's lecture was perhaps due to my taking Clifford to be saying that 'elementary flatness' is an assumption of Euclidean geometry. I accept the final two sentences. Clifford holds that our 'scale of quantities' is a mental apparatus. He then tells us that Euclidean space has (in my interpretation) elementary flatness, when in fact the flatness of Euclidean space is not elementary flat, it is flat. A different geometry that is not flat may exhibit elementary flatness if the scale is such that the perceiving entity is aware of only a part that is so small that it appears flat.

Clifford presented this lecture 'on his feet' to a live audience. One of the problems of interpreting the thought of Clifford is that he never lived long enough to present his thought as a coherent whole in book form. It is necessary to attempt to construct the coherent whole from diverse lectures and essays. This construction may or may not be the construction Clifford himself would have made given the opportunity.

## 2.7 'On the Nature of Things-in-Themselves'<sup>96</sup>

The final version of the essay 'On the Nature of Things-in-Themselves' was published in *Mind* January 1878. This version of the essay was built on the foundation of a presentation to the Metaphysical Society 9 June 1874 of the same title. Prior to the presentation to the Metaphysical

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<sup>96</sup> I have omitted the lecture 'The First and Last Catastrophe' Sunday Lecture Society, 12 April 1874, because it deals in large part with scientific thought that has been superseded.

Society in June 1874 Clifford had written a review of *Problems of Life and Mind* in *The Academy*.<sup>97</sup> The review was published in the 7 February 1874 issue of the journal.

The author of *Problems of Life and Mind* was George Henry Lewes. Lewes was a personal friend of Clifford. The review contains thoughts that were to appear in the presentation of 'On the Nature of Things-in-Themselves' to the Metaphysical Society four months following the review. How long Clifford had been forming his thoughts in regard to the paper I do not know. Clifford was a gregarious and open person by nature so it is likely that he both influenced and was influenced by those he associated with. The review is interesting in that it initiated a response from Shadworth Hodgson<sup>98</sup> who was mentioned by Clifford in the review. The response from Hodgson was replied to by Clifford.<sup>99</sup> Shadworth Hodgson was a member of the Metaphysical Society. The 'debate' that takes place in the exchange of letters published by *The Academy* therefore gives some insight into what may have occurred during the discussions that followed papers presented to the Society.

The review is likely to have been discussed by the members of the Metaphysical Society. The review provides some insights into the arguments that Clifford uses in the paper presented to the Metaphysical Society. Clifford writes:

...Mr.Lewes says:

"They differ primarily in this: he [Comte] holds that Humanity develops no attribute, intellectual or moral, which is not also to be found in Animality, whereas I hold that the attributes of Intellect and Conscience are special products of the Social Organism, and that although animals possess in common with man the Logic of Feeling, they are wholly deficient in the Logic of Signs, which is a social not an animal function."

(The logic of feeling means those laws of grouping whereby elementary simple sensations are knit together into the perception of objects or things; the logic of signs, those laws of grouping whereby such perceptions are knit together into the general conceptions expressed by language.)

I find this quote difficult because my appreciation of it is influenced by my understanding of the word 'feelings'. Clifford explicates 'feeling' in his later essay 'The Unseen Universe'. Clifford tells us that

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<sup>97</sup> *Problems of Life and Mind*. Clifford, W. K. *The Academy*, 1869-1902, 0269-333X; Feb 7, 1874; *British Periodicals* pg. 148.

<sup>98</sup> *"Revolution in Psychology."* Hodgson, Shadworth H. *The Academy*, 1869-1902, 0269-333X; Feb 14, 1874; *British Periodicals* pg. 173

<sup>99</sup> *A Revolution in Psychology*. Clifford, W. K. *The Academy*, 1869-1902, 0269-333X; Feb 28, 1874; *British Periodicals* pg. 232

elementary simple sensations are knit together into the perception of objects or things. It is possible to assume that the objects or things have an existence in and of themselves apart from the perception. As will be seen, Clifford does not hold that this is the case. Clifford tells us that the logic of signs are laws of grouping whereby such perceptions are knit together into general conceptions expressed by language. It is possible that feelings and sensations are of the same nature.

In the review Clifford also writes the following:

In the first place, it may be maintained that the judgement of feeling which asserts an external reality, a not self, is derived from the social medium. This table is an object in my consciousness; but I have reason to infer the existence of your consciousness, and of a similar object in that. Your consciousness can never be an object to me, nor can any part of it. Now this inference of a consciousness in other men, similar to my own, lies at the base of the social relations. Herein is a distinction between Self and Not-self, which is far deeper than that between Subject and Object; the distinction between *You* and *Me*.

Clifford mentions Thomas Young. It seems to me that the paragraph in which Young is mentioned is relevant to both scientific and philosophical method. The following is the paragraph:

“Rules of philosophising” are admirable things if two conditions are satisfied: first, you must philosophise before you make your rules; secondly, you should publish them with a fond and fervent hope that no philosopher will attend to them. It is quite true that a man who can make a new and successful application of the methods of science must have passed through a training which organizes in him the experience of preceding scientific work into an instinct of right generalisation; and that if he has the power of self-observation, he may state some of the main features of this instinct in the form of rules. But these rules are the *product*, not the *regulators*, of his habits of thought; they are *laws* in the empirical sense admirably expounded by Mr. Lewes in a later portion of the volume. And a subsequent investigator cannot be safely guided by these rules, but only by instinctive habits formed in the course of a similar scientific training. Young would have created the theory of Interference if no *Regulae Philosophandi* had existed; but every simpleton who explains the universe appeals to the canons of Bacon and Newton in support of the chimaeras that buzz in his brain. It is hardly necessary to say that these remarks are addressed to the world, and not to Mr. Lewes; who says distinctly that what his Rules profess “is no more than certain general results of philosophic reflection on the conduct of Research, which are offered to the attentive meditation of the student.”

The work of Young in regard to the nature of light was empirical. The results demonstrated an inconsistency with classical thought as regards Newton's corpuscular theory of light and showed light to be a wave. This problem was resolved in the 20thC by quantum physics. It is normally taken to be the case that there were two conflicting theories both being classical. There is a possibility that Clifford recognised that light could be both wave and particle. This may be the reason that he held a discrete theory of time, and a space theory of matter. In the previous section Clifford applied himself to the problem of scale in regard to the real numbers. Dedekind was seen to hold that if space were to be found to be discrete many of its properties would remain the same even were it discontinuous. It seems to me that Clifford recognised the significance of three lines of thought that required attention of both the philosopher and the scientist, these being non-Euclidean geometries, Darwinism, and the wave particle problem. Perhaps his comment "...but every simpleton who explains the universe appeals to the canons of Bacon and Newton in support of the chimaeras that buzz in his brain." is one of frustration. Newton himself had expressed the empirical rather than the absolute nature of his 'Laws' in his fourth Rule of Reason.

Newton's approach to science is summed up in his fourth Rule of Reason, this rule being explicitly stated in the third edition of the *Principia* (1726).<sup>100</sup> The Rule, adopted by Newton as early as his Optical Lectures of the 1670's is as follows:

*In experimental philosophy, propositions gathered from phenomena by induction should be taken to be either exactly or very nearly true notwithstanding any contrary hypotheses, until yet other phenomena make such propositions either more exact or liable to exceptions.*

I am sure that Clifford's review would have caused considerable discussion, not only the reply from Shadworth Hodgson. It is possible that the interest this review created resulted in Clifford presenting his paper 'On the Nature of Things-in-Themselves' to the Metaphysical Society 9 June of the same year.

### 2.7.1 'On the Nature of Things-in-Themselves'<sup>101</sup> as presented to the Metaphysical Society

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<sup>100</sup> Isaac Newton's *Philosophiae Naturalis Principia Mathematica: the Third edition (1726) with variant readings*, assembled and ed. by Alexandre Koyré and I Bernard Cohen with the assistance of Anne Whitman (Cambridge, MA, 1972, Harvard UP)

<sup>101</sup> This version of 'On the Nature of Things-in-Themselves' was provided by Professor Bernard Lightman, York University, Toronto, to whom I owe a debt of gratitude.

Clifford begins his presentation with the following:

Professor Huxley quotes a simile of Berkeley's wherein the water of a fountain, rising to a great height, and then falling back into the basin, is made to represent a mind which rises out of a crude idealism into materialism, only to fall back inevitably to its true idealistic home. The application of this simile depends very largely on the starting-point; and it will serve quite as well to illustrate the course of one who begins at the simple objective facts of science, soars for awhile into the clouds of idealism, and then, bringing only so much air as may freshen the sparkle of the pool, returns to a materialist faith which is rank enough for all practical purposes. To indicate this course of thought, and to justify its conclusion, is the end of the following remarks.

The quote of Berkeley are the final words of Philonous found in the Third Dialogue.<sup>102</sup> Clifford considers the 'starting point' of the application of the simile. Starting points are of importance.<sup>103</sup> It seems to me that Clifford is taking the idealist position and rather than placing it in counterpoint with a materialist position he is taking a position that gives 'idealism' an ontological foundation that is of the world. This has the result that Clifford can construct a model that Clifford [or others] may feel more comfortable with. I think it would be wrong to suggest that Clifford is suggesting that this particular model is absolute.

Clifford begins the presentation with 'Meaning of the Individual Object'. The first sentence is:

My feelings arrange and order themselves in two distinct ways.

Feelings were discussed by Clifford in his review of Lewes' book. Feelings are not to be confused with emotions.

Clifford continues:

There is the internal or subjective order, in which sorrow succeeds the hearing of bad news, or the abstraction "dog" symbolises the perception of many different dogs. And there is the external or objective order, in which the sensation of letting go is followed by the sight of a falling object and the sound of its fall. The objective order, *quâ* order, is

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<sup>102</sup> Three Dialogues between Hylas and Philonous in opposition to Sceptics and Atheists, George Berkeley.

<sup>103</sup> <http://legacy.earlham.edu/~peters/writing/begin.htm> Accessed 17/07/2013

treated by physical science, which investigates the uniform relations of *objects* in time and space. Here the word *object* (or *phenomenon*) is taken merely to mean a group of my feelings, which persists as a group in a certain manner; for I am at present considering only the objective order of my feelings.

'Feelings' is a technical term that relates to the structure of consciousness. Clifford has provided for a differentiation of internal and external but both are 'internal' in that they are constructed by his feelings. Clifford is starting from consciousness, as he understands consciousness to be.

What immediately follows involves meaning. Clifford tells us:

The object, then, is a set of changes *in* my consciousness, and not anything out of it. Here is as yet no metaphysical doctrine, but only a fixing of the meaning of a word. We may subsequently find reason to infer that there is something which is not object, but which corresponds in a certain way with the object; this will be a metaphysical doctrine, and neither it nor its denial is involved in the present determination of meaning.

It would be possible to analyse this in terms of later work on the meaning of meaning but I don't believe that would be productive. If it is accepted that analysis 'must start somewhere' then Clifford's starting point seems reasonable to me.

Clifford continues:

We may subsequently find reason to infer that there is something which is not object, but which corresponds in a certain way with the object; this will be a metaphysical doctrine, and neither it nor its denial is involved in the present determination of meaning. But the determination must be taken as extending to all those inferences which are made by science in the objective order. If I hold that there is hydrogen in the sun, I mean that if I could get some of it in a bottle and explode it with half its volume of oxygen, I should get that group of possible sensations which we call "water." The inferences of physical science are all inferences of my real or possible feelings; inferences of something actually or potentially in my consciousness, not of anything outside it.

This thought of Clifford was to prove problematic for Ernst Mach, however in later writing Mach was to embrace the thought of Clifford. As yet Clifford has neither denied nor affirmed the common sense

notion of an external world. Clifford has merely started with his understanding of feelings and explicated a certain model that pertains to feelings irrespective of the question whether or not those feelings are substantiated in an external existence of things.

Clifford titles the next part of his address as *Distinction of Object and Eject*.

He tells us that there are some inferences that are profoundly different to those of physical science. He says:

When I come to the conclusion that *you* are conscious, and that there are objects in your consciousness similar to those in mine, I am not inferring any actual or possible feelings of my own, but *your* feelings, which are not, and cannot by any possibility become, objects in my consciousness.

This comment seems to me to be so obvious as to be a triviality. Although ostensibly trivial it is the basis upon which we derive confirmation of our understanding of the world from others. That confirmation is not gained by knowledge of the other's conscious content, but rather by way of their expressing that which is available to me and which can be feelings of my own.

Clifford coins the word 'ejects' to refer to that which cannot be his feelings. He tells:

The complicated processes of your body and the motions of your brain and nervous system, inferred from evidence of anatomical researches, are all inferred as things possibly visible to me. However remote the inference of physical science, the thing inferred is always a part of me, a possible set of changes in my consciousness bound up in the objective order with other known changes. But the inferred existence of your feelings, of objective groupings among them similar to those among my feelings, and of a subjective order in many respects analogous to my own; these inferred existences are in the very act of inference *thrown out* of my consciousness, recognised as outside of it, as *not* being a part of me. I propose, accordingly, to call these inferred existences *ejects*, things thrown out of my consciousness, to distinguish them from *objects*, things presented in my consciousness, phenomena.

Clifford's position regarding the existence of external things is not compromised by imaginary things. A unicorn can be assumed not to exist, but it is real in that it can be part of my consciousness. I can imagine a unicorn but I do not 'throw it out' and assume its existence external to my mind. I look at

my body and see a certain structure. When I look at other humans I see a similar structure. Others react to other things in much the same way I do. I recognise myself as a human and am recognised by others as being human. In recognising my own body and other humans I have not recognised anything that is outside my own mind. It is only when I infer that other humans have a mind similar to my own am I inferring the existence of something outside of my own mind. Clifford has already suggested solipsism in regard to his metaphysic.

Clifford continues:

The existence of the object, whether perceived or inferred, carries with it a group of beliefs; these are always beliefs in the future sequence of certain of my feelings. The existence of this table, for example, as an object in my consciousness, carries with it the belief that if I climb up on it, I shall be able to walk about on it as if it were the ground. But the existence of my conception of you in my consciousness carries with it a belief in the existence of you outside of my consciousness, a belief which can never be expressed in terms of the future sequence of my feelings. How this inference is justified, how consciousness can testify to the existence of anything outside of itself, I do not pretend to say; I need not untie a knot which the world has cut for me long ago. It may very well be that I myself am the only existence, but it is simply ridiculous to suppose that anybody else is. The position of absolute idealism may, therefore, be left out of count, although each individual may be unable to justify his dissent from it.

Clifford tells us that he can believe in certain future sequences of events. Assuming the past to be indicative of the future he can predict certain events. However because the other's mind is an object he cannot believe in a future sequence of his feelings as regards the mind of another.

The untying of a knot that the world has cut for Clifford long ago is difficult to interpret. Perhaps Clifford is alluding to his birth and separation from his mother, or perhaps Clifford is alluding to the Gordian Knot. The Gordian Knot was suggested to me and it makes sense. It is a nice example of the inability to know what is in the mind of another even if their expressed thought is available.

Clifford escapes solipsism by a leap of faith. Clifford has so far not found anything external to his own mind other than the minds of others which he cannot justify. I do not consider it charitable to Clifford to interpret his thought as inferring that there is nothing external to his own mind. The argument is that what is the commonly held position regarding external things may in fact be false. The things may be of a different nature to that which is commonly accepted.

The next part of the address is titled *Formation of the Social Object*.

So far Clifford has presented *objects*, *ejects*, and now *social objects*. There is nothing as yet external to his mind other than the inferred consciousness of others.

Clifford tells us:

The belief, however, in the existence of other men's consciousness, in the existence of ejects, dominates every thought and every action of our lives. In the first place, it profoundly modifies the object.

At what point in our development this domination of our thoughts and actions occurs is not explicitly given. Our 'objects' are altered by the inferred 'ejects' which we assume are in the minds of others and external to our own mind. Language is an extension of the inference already taken; we acquire language from others, but that is only possible if we first infer they have minds similar to our own. This inference that others have minds is not limited to other humans. If a dog approaches me in an excited state wagging its tail, I infer I am not about to be bitten. If another dog bares its teeth, growls and has the hair standing up on its back, I expect the dog to attack. I assume that there is some structure to mind that is given prior to 'experience'; that is prior to objects. The structure is passed from parents to offspring. The structure is unique for each individual; if it were not then the possibility of evolution would be less likely. The structure of my mind is different to the structure of any other persons' mind, but it is similar. The difference in structure between my mind and the mind of a bat is less similar.

Clifford continues:

This room, the table, the chairs, your bodies, are all objects in my consciousness; as simple objects, they are parts of me. But I, somehow, infer the existence of similar objects in your consciousness, and these are not objects to me, nor can they ever be made so; they are ejects. This being so, I bind up with each object as it exists in my mind the thought of similar objects existing in other men's minds; and I thus form the complex conception, "this table, as an object in the minds of men,"—or, as Mr. Shadworth Hodgson puts it, an object of consciousness in general.

Clifford is still within the confines of 'his own mind'. Shadworth Hodgson and Clifford had exchanged letters to 'The Academy' following Clifford's review of Lewes' book. Hodgson wrote in his letter of the 14<sup>th</sup> February 1874:

There is a change in the individual organism *intermediate* between the social organism and the change in the psychical phenomenon of the individual. The question for the future is – what specifically this intermediate change consists in; how the physical component in social phenomena becomes clothed, so to speak, with the mental; and how, in consequence, the organism bears its part in sustaining and developing that general world of ideas in which civilisation consists.

Hodgson has assumed a physical and a psychical. Clifford did reply to Hodgson's question in his letter to 'The Academy' dated 28 February 1874. It seems to me that Clifford's address to 'The Metaphysical Society' of 9 June 1874 is an extension of the response to Hodgson. Rather than start with a physical and a psychical Clifford has started from his own mind and is attempting to reach an external reality that exists.

Clifford continues his address:

This conception symbolises an indefinite number of ejects, together with one object which the conception of each eject more or less resembles. Its character is therefore mainly ejective in respect of what it symbolises, but mainly objective in respect of its nature. I shall call this complex conception the *social object*; it is a symbol of one thing (the *individual object*, it may be called for distinction's sake,) which is in my consciousness, and of an indefinite number of other things which are ejects and out of my consciousness. Now, it is probable that the individual object, as such, never exists in the mind of man. For there is every reason to believe that we were gregarious animals before we became men properly so called. And a belief in the eject—some sort of recognition of a kindred consciousness in one's fellow-beings—is clearly a condition of gregarious action among animals so highly developed as to be called conscious at all.

Clifford has not yet found his way to the external other than his belief in ejects; that is a belief in the minds of others. When Clifford says "is clearly a condition of gregarious action among animals so highly developed as to be called conscious at all.", he is suggesting a development of mind. If it is

taken that 'development', as used by Clifford in this context, is synonymous with evolution, then consciousness [mind] evolves.

Clifford continues:

Language, even in its first beginnings, is impossible without that belief; and any sound which, becoming a sign to my neighbour, becomes thereby a mark to myself, must by the nature of the case be a mark of the social object, and not of the individual object. But if not only this conception of the particular social object, but all those that have been built up out of it, have been formed at the same time with, and under the influence of, language; it seems to follow that the belief in the existence of other men's minds like our own, but not part of us, must be inseparably associated with every process whereby discrete impressions are built together into an object. I do not, of course, mean that it presents itself in consciousness as distinct; but I mean that as an object is formed in my mind, a fixed habit causes it to be formed as social object, and insensibly embodies in it a reference to the minds of other men. And this sub-conscious reference to supposed objects is what constitutes the impression of *externality* in the object, whereby it is described as *not-me*. At any rate, the formation of the social object supplies an account of this impression of outness, without requiring me to assume any objects or things outside my consciousness except the minds of other men. Consequently, it cannot be argued from the impression of outness that there is anything outside of my consciousness except the minds of other men.

Clifford has brought 'language' into his argument. What constitutes 'language' is not explicitly stated. It seems to me that 'language' should be taken in a wide sense not be confined to what is usually discussed under the head of 'natural language'. Clifford tells us that 'discrete impressions are built together into an object'. I find Clifford's use of the word 'impressions' problematic. Perhaps 'feelings' would be a better word to use in this context, however the subtlety of such splitting of words suggests my own interpretation to fit my own model rather than faithfully following Clifford's model. Perhaps a quote from von Neumann is relevant to this:

Young man, in mathematics you don't understand things. You just get used to them. <sup>104</sup>

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<sup>104</sup> Reply to Dr. Felix T. Smith at Stanford Research Institute who had said "I'm afraid I don't understand the method of characteristics." —as quoted in footnote of pg 208, in *The Dancing Wu Li Masters: An Overview of*

Once we have become used to a certain model it is difficult to accept a model that is so different that it removes foundations from the model already held. The difficulty, in my opinion, lies in the desire that the model held is representative of a reality that exists. This desire is, again in my opinion, impossible to satisfy. This will be considered in more detail later, for now I consider it important to recognise that Clifford is arguing for a model. If the model is rejected out of hand because of its implications perhaps something of importance will be missed.

It is the last two sentences of the quote from ‘On the Nature of Things-in-Themselves’ immediately above that is difficult to accept. If I require another to confirm my world then my world is not my own but only shared. This has the implication that the world is a social construct as opposed to an existing reality there to be discovered.

Clifford continues:

And this sub-conscious reference to supposed ejects is what constitutes the impression of *externality* in the object, whereby it is described as *not-me*. At any rate, the formation of the social object supplies an account of this impression of outness, without requiring me to assume any ejects or things outside my consciousness except the minds of other men. Consequently, it cannot be argued from the impression of outness that there is anything outside of my consciousness except the minds of other men. I shall argue presently that we have grounds for believing in non-personal ejects, but these grounds are not in any way dependent on the impression of outness, and they are not included in the ordinary or common-sense view of things. It seems to me that the prevailing belief of uninstructed people is merely a belief in the social object, and not in a non-personal eject, somehow corresponding to it; and that the question “Whether the latter exists or not?” is one which cannot be put to them so as to convey any meaning without considerable preliminary training. On this point I agree entirely with Berkeley, and not with Herbert Spencer.

Herbert Spencer employed evolutionary theory to propound an epistemological position. He was a friend of Huxley and was invited to join the Metaphysical Society but never did. It seems a strange move by Clifford that he should reject Spencer and agree with Berkeley. Clifford was a confirmed

believer in Darwinism and rejected religious dogma. However Clifford's thought, in my opinion, follows closely that of Berkeley, but provides a different answer to the question raised by Berkeley. Whereas Berkeley argues for our perceived reality to be 'the language of God', Clifford suggests something different.

Herbert Spencer had proposed 'Transfigured Realism' in the second edition his book '*The Principles of Psychology*' published in 1872. 'Transfigured Realism' was absent from the first edition published in 1855 as a single volume. Spencer's philosophy has a different starting point to that of Clifford and Berkeley. Spencer ends his chapter on 'Transfigured Realism' as follows:

Finally, then, we resume this originally-provisional assumption but now verified truth. Once more we are brought round to the conclusion repeatedly reached by other routes, that behind all manifestations, inner and outer, there is a Power manifested. Here, as before, it has become clear that while the nature of this Power cannot be known while we lack the faculty of framing even the dimmest conception of it, yet its universal presence is the absolute fact without which there can be no relative facts. Every feeling and thought being but transitory an entire life made up of such feelings and thoughts being also but transitory nay the objects amid which life is passed, though less transitory, being severally in course of losing their individualities, quickly or slowly ; we learn that the one thing permanent is the Unknowable Reality hidden under all these changing shapes.

At the beginning of the chapter Spencer had written the following:

And when analyzed, the reasonings of metaphysicians were shown either tacitly to assume that which they set out to disprove or to involve some equally-great absurdity.

Clifford continues his address under the heading *Difference between Mind and Body*.

This section of the address can be difficult to accept because Clifford uses words that are associated with an external existing world, but Clifford uses them in relation to his posited understanding of *objects*. Clifford tells us:

I do not pause to show how belief in the Eject underlies the whole of natural Ethic, whose first great commandment, evolved in the light of day by healthy processes wherever men have lived together, is, "Put yourself in his place." It is more to my present purpose to

point out what is the true difference between body and mind. Your body is an object in my consciousness; your mind is not, and never can be. Being an object, your body follows the laws of physical science, which deals with the objective order of my feelings. That its chemistry is ordinary chemistry, its physics ordinary physics, its mechanics ordinary mechanics, may or may not be true; the circumstances are exceptional, and it is conceivable (to persons ignorant of the facts) that allowance may have to be made for them, even in the expression of the most general laws of nature. But in any case, every question about your body is a question about the physical laws of matter, and about nothing else.

This is a difficult passage. My difficulty lies in grasping the sentence “That its chemistry is ordinary chemistry, its physics ordinary physics, its mechanics ordinary mechanics, may or may not be true; the circumstances are exceptional, and it is conceivable (to persons ignorant of the facts) that allowance may have to be made for them, even in the expression of the most general laws of nature.” It has been suggested to me that Clifford may be referring to ‘emergence’; as mentioned above it was Lewes that coined the term ‘emergence’. It seems to me that emergence is a recognition of limits of a particular model to model absolutely. This is perhaps the problem identified by C.D. Broad that I quoted in the Abstract above. A detailed analysis of emergence is given by Broad in his *The Mind and its Place in Nature*. Broad’s analysis commences on page 59 of his book. Clifford’s speculative model removes the need for ‘emergent properties’ by having taken his starting point back to mind stuff. I am confident that Clifford would still have considered his model to be ‘emergent’ from something even deeper. His holding that time is discrete [ with gaps in my opinion ] suggests to me that even were Clifford’s model to be ‘proved’ in some distant future, the model that ‘proves’ the model of Clifford would have done so by explicating the ‘whatever’ that is contained in the gaps.

Clifford has not yet found his way to an external realm and yet tells us that persons can be ignorant of the facts. What are these facts? Who, if anyone, is aware of the facts? Clifford seems to be unable to explicate the ‘facts’ himself as he tells his audience: “But in any case, every question about your body is a question about the physical laws of matter, and about nothing else.” Are we to take words such as ‘matter’ in their ordinary usage, or as would be their usage in the model that Clifford is in the process of building? Clifford seems to me to resolve this problem by presenting the following immediately following the quote above:

To say, “Up to this point science can explain; here the soul steps in,” is not to say what is untrue, but to talk nonsense. If evidence were found that the matter constituting the brain behaved otherwise than ordinary matter, or if it were impossible to describe vital actions

as particular examples of general physical rules, this would be a fact in physics, a fact relating to the motion of matter; and it must either be explained by further elaboration of physical science, or else our conception of the objective order of our feelings would have to be changed. The question, “Is the mind a force?” is condemned by similar considerations. A certain variable quality of matter (the rate of change of its motion) is found to be invariably connected with the position relatively to it of other matter; considered as expressed in terms of this position, the quality is called Force. Force is thus an abstraction relating to *objective* facts; it is a mode of grouping of my feelings, and cannot possibly be the same thing as an eject, another man’s consciousness.

Clifford has mentioned the word ‘soul’. Souls are ordinarily considered in the domain of theological discourse. Clifford has said that it is nonsense to say that “here the soul steps in”. Does this entail that Clifford considers souls nonsense, or the early arrival of the soul into the analysis of his model, to be nonsense? I do not believe that Clifford is offering a model that he or anyone else should consider as absolute. The world *is* and an absolute model would be that world. If the model is identical to that which is modelled then the model is not a model but rather a duplicate. The differentiation of ‘real’ and ‘exists’ is perhaps relevant. It was seen above that Dedekind considered the possibility of space being discrete, but that does not reduce the usefulness of considering the real numbers to be points on a line. The final sentence hints to what Clifford considers to be ‘feelings’. Clifford’s understanding of force is that force is an abstraction relating to position and matter. Force is an abstraction but position and matter are not, or at least less of an abstraction. Clifford has not yet found his way to an externality so the use of the word abstract is somewhat redundant. Force is an abstraction relating to objective facts that are within the mind of Clifford. I find this line of thought interesting because it raises questions relating to how we function. I could catch a ball long before I had any understanding of kinematics. I can play table tennis yet am incapable of providing the equations that would describe the motion of the ball. Clifford tells us that in order to understand ejects in terms of the objective order our conception of the objective order of our feelings would have to be changed. This is problematic if our conceptions themselves are founded on feelings. It seems to me that evolution as an ongoing process may come to make the process less mysterious; however this is beside the point at present because Clifford has not yet found his way to the external.

[ This quote has within it the explanation of why Clifford reacted so strongly to *The Unseen Universe* of Tait and Stewart. ]

Clifford continues:

But the question, “Do the changes in a man’s consciousness *run parallel* with the changes of motion, and therefore with the forces in his brain?” is a real question, and not *primâ facie* nonsense. Objections of like character may be raised against the language of some writers, who speak of changes in consciousness as *caused* by actions on the organism. The word *Cause*, *πολλαχῶς λεγόμενον*<sup>105</sup> and misleading as it is, may yet be of some use, if it is kept to denote a relation between objective facts, to describe certain parts of the phenomenal order. But only confusion can arise if it is used to express the relation between certain objective facts in my consciousness, and the ejective facts which are inferred as corresponding in some way to them and running parallel with them. For all that we know at present, this relation does not in any way resemble that expressed by the word *Cause*.

This section could suggest to some that Clifford is advocating some version of parallelism but this would be, in my opinion, wrong. Clifford has not yet placed anything in the external other than the minds of others. Clifford does not suggest his thought is complete leaving open the possibility that future advances in man’s understanding may answer questions that are presently incapable of being answered. As a person that has accepted evolutionary theory, and its continuation, Clifford may be suggesting that not only scientific advance is necessary but also an evolutionary advance is necessary to come closer to an understanding of the nature of mind.

Clifford concludes the section as follows:

To sum up, the distinction between eject and object, properly grasped, forbids us to regard the eject, another man’s mind, as coming into the world of objects in any way, or as standing in the relation of cause or effect to any changes in that world. I need hardly add that the facts do very strongly lead us to regard our bodies as merely complicated examples of practically universal physical rules, and their motions as determined in the same way as those of the sun and the sea. There is no evidence which amounts to a *primâ facie* case against the dynamical uniformity of Nature; and I make no exception in favour of that slykick force which fills existing lunatic asylums, and makes private houses into new ones.

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<sup>105</sup> *πολλαχῶς λεγόμενον*: “said in many ways” Aristotle §2 of Book of Gamma of the Metaphysics.  
<http://semantics.univ-paris1.fr/pdf/Handout%20no.%201.pdf> 1 May 2012

Clifford talks of 'the world of objects'. That world is an internal world. He talks of 'universal physical rules' which are again applicable only to the objects within his mind. Clifford has not denied an external existing reality, he has merely not as yet been able to arrive at it by starting from his own mind.

The last sentence is difficult to interpret. One possible explanation of the sentence may be that Clifford is referring to the kick of Dr. J. H. Stirling. In order to explain my understanding of 'slykick' as used by Clifford it will be necessary to bring into the thesis at this point persons other than Clifford.

C.M. Ingleby wrote a letter on 6 September 1870 to the journal *Nature*.<sup>106</sup> It was published in the journal 8 September 1870. Ingleby's letter is titled 'Kant's Transcendental Distinction'. For my purpose the following section of the letter is relevant:

Accordingly, we are not called upon to give a more recondite meaning to the distinction in question in order to explain the use of *transcendental* as applied to it. Rather let us bear in mind what Dr. J. H. Stirling pointed out to me some months ago, that Kant somewhat loosely applies that adjective to other matters besides the *a priori* elements of experience. In fact, he applies it to the said *distinction* and *reflection*, and also to the thing in itself, an object exercising an unknown function, feigned to account for a known state. The unknown function indeed might be called transcendental, but the object is in itself a mere nullity. If Sensation be referred to the *kick* (as Dr. Stirling calls it) received by us from the feigned object, that *kick* is transcendental; but "das Object bleibt uns unbekannt *und transscendente*." We say, then, that the two forms of sense and the four forms of thought (in apperception) are *transcendental and constitutive of experience*: but the object in itself is *transcendent and regulative of thought*. If Kant departs from his own nomenclature in the case of the noumenon, we need not be surprised if he does so in the case of the distinction between sense and understanding.

James Hutchinson Stirling wrote *The Secret of Hegel* in 1865. On page 275 of Volume 1 he writes the following:

It is to be borne in mind, too, that when Hegel was exhibiting the most fervid zeal for Schelling, and demonstrating with an air of perfect conviction the advance which Schelling's position constituted, as compared not only with that of Fichte, but with that of Kant also—at that very moment he had in his desk the first sketch of his own system, a

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<sup>106</sup> *Nature*, Volume 2, Pg. 375

system that lay directly in that of Kant, a system that proved the contempt entertained by Schelling for the execution and details of Kant, and for Logic in general to have been, as we have seen, 'not unrevenged.' It lay in the nature of the Hegelian iron, then, to kick out of sight the ladders of his rise, to provide for self, to take measures afar off, and to set deep plans for the realisation and particularisation of Self.

If my understanding of Clifford's use of the word 'slykick' is correct, then Clifford is critiquing the philosophies of Hegel and Kant, and Stirling's interpretation of them. I will not pursue this line of thought as it would be beyond the scope of this thesis. I will return to Ingleby later, but that will concern the interaction between Ingleby and Clifford, not Kant and Hegel's philosophy as it is given in recorded thought. A simpler interpretation of 'slykick' would be that it is a play on the word psychic. The interpretation of Fiske's essay presented in his *Excursions of an Evolutionist* may be relevant. In this essay Fiske provides a limited interpretation of Clifford's essay 'On the Nature of Things-in-Themselves' in his essay 'A Universe of Mind-Stuff' and brings into his essay the thought of others. I will not provide an analysis of this essay, but a reader of this thesis may wish to read the essay.

Clifford continues his address under the heading *Correspondence of Elements of Mind and Brain-Action*.

Clifford begins:

I have already spoken of certain ejective facts—the changes in your consciousness—as running parallel with the changes in your brain, which are objective facts.

This is misleading in that it may suggest that 'your brain' and 'your consciousness' are both real and existent. Clifford has so far in his address not accepted the externality of anything other than inferred minds which are not his own. The certain ejective facts and changes in the other's brain are both as yet only in the mind of Clifford. If Clifford's word usage is adhered to then both 'ejective facts' and 'objective facts' are both within the mind of Clifford. The 'ejective facts' are given an externality because not to would condemn Clifford to solipsism.

Clifford continues:

The parallelism here meant is a parallelism of complexity, and analogy of structure. A spoken sentence and the same sentence written are two utterly unlike things, but each of

them consists of elements; the spoken sentence of the elementary sounds of the language, the written sentence of its alphabet. Now the relation between the spoken sentence and its elements is very nearly the same as the relation between the written sentence and its elements. There is a correspondence of element to element; although an elementary sound is quite a different thing from a letter of the alphabet, yet each elementary sound belongs to a certain letter or letters. And the sounds being built up together to form a spoken sentence, the letters are built up together, *in nearly the same way*, to form the written sentence. The two complex products are as wholly unlike as the elements are, but the manner of their complication is the same. Or, as we should say in the mathematics, a sentence spoken is the same function of the elementary sounds as the same sentence written is of the corresponding letters.

Clifford writes “There is a correspondence of element to element:..” This is similar to Cantor’s one to one mapping of different numbers. It seems to me that Clifford is making obvious his purpose. He is not denying or affirming an external existing reality, rather he is showing that his argument from the starting point he has chosen does not provide him with an exit from the inner to the outer. Unless he accepts on faith the minds of others. The methodology of Clifford is relevant. The following was mentioned above:

The word 'atom,' as you know, has a Greek origin; it means that which is not divided. Various people have given it the meaning of that which cannot be divided; but if there is anything which cannot be divided we do not know it, because we know nothing about possibilities or impossibilities, only about what has or has not taken place. Let us then take the word in the sense in which it can be applied to a scientific investigation. An atom means something which is not divided in certain cases that we are considering.

Clifford tells us that the two complex products are unlike but that their complication is the same. Their complication may or may not be the same, but their complication may be taken as being the same by Clifford for his purpose, providing that their similarity is such that it satisfies the properties being considered.

Clifford continues his address:

Of such a nature is the correspondence or parallelism between mind and body. The fundamental “deliverance” of consciousness affirms its own complexity. It seems to me

impossible, as I am at present constituted, to have only one absolutely simple feeling at a time. Not only are my objective perceptions, as of a man's head or a candlestick, formed of a great number of parts ordered in a definite manner, but they are invariably accompanied by an endless string of memories, all equally complex. And those massive organic feelings with which, from their apparent want of connection with the objective order, the notion of consciousness has been chiefly associated,—those also turn out, when attention is directed to them, to be complex things.

Clifford seems to me to have reached the point of attempting to maintain a speculative metaphysical position while providing that position with a potential of 'scientific justification'. If it is accepted that we are all conscious, that we each have a mind of similar enough structure to allow us to discuss the nature of the structure of our minds, then there is a desire to explicate that structure. It seems to me that one of two starting points can be taken. The first is to accept one's own consciousness and from that attempt to justify the belief in similar consciousnesses of others. This is Clifford's preferred method. The other is to accept the existence of the external world; its structure being taken as the best explanation that scientific method can give, and from thence build consciousness. The first method, as will be seen shortly, requires that there be posited more fundamental building blocks than the science of the time provided to Clifford. The second, which I suggest was attempted by Frege, results in a similar need to posit something not provided for by the science of Frege's time. Newton's understanding of science has already been mentioned. Science does not provide absolute understanding of the world. I assume that no one would hold that science is complete; rather it is an ongoing enterprise. It seems to me that Clifford would agree that his model is not complete. It is a speculation that is forced on him by his reasoning applied to gain access to the external world from a starting point of his own consciousness.

Clifford continues his presentation by telling us that while writing he has been 'thinking' of other things. He then tells us:

This being so, it will be said that there is a unity in all this complexity, that in all these varied feelings it is I who am conscious, and that this sense of personality, the self-perception of the Ego, is one and indivisible. It seems to me (here agreeing with Hume) that the "unity of apperception" does not exist in the instantaneous consciousness which it unites, but only in subsequent reflection upon it; and that it consists in the power of establishing a certain connection between the memories of any two feelings which we had at the same instant.

My problem with this is that to reflect on the instantaneous consciousness requires that I remember it; however it is possible that I do not remember all of it and so cannot reflect on it in its entirety. Without this acknowledgement of the incompleteness of my ‘memory’ then any possibility of intuition has been ruled out. If the incompleteness is accepted then the problem remains as to the nature of that which is not ‘remembered’ and how it influences the conscious mind.

Clifford continues:

A feeling, at the instant when it exists, exists *an und für sich*, and not as *my* feeling; but when on reflection I remember it as my feeling, there comes up not merely a faint repetition of the feeling, but inextricably connected with it a whole set of connections with the general stream of my consciousness. This memory, again, *quâ* memory, is relative to the past feeling which it partially recalls; but in so far as it is itself a feeling, it is absolute, *Ding an sich*.<sup>107</sup>

It seems to me that this section of the address shows the purpose that Clifford has in giving the address. Despite taking a very radical view of things Clifford is still required to posit a Leibnizian entelechy in the form of his ‘I’. The refusal by Clifford to invoke the deity in the argument at this point suggests to me that Clifford is offering an extended ontology that may explain the world more fully, rather than arguing for the fallaciousness of the notion of a deity. Clifford’s use of the word absolute is problematic. He tells us “but in so far as it is itself a feeling, it is absolute [thing-in-itself]”. In the model that Clifford is constructing ‘feelings’ are taken to be fundamental. The absolute nature of elements within a speculative model should not be taken as implying that the model maker holds that the absoluteness applies to that which is modelled. Clifford has already told us we know nothing of possibilities or impossibilities.

Clifford continues:

The feeling of personality, then, is a certain feeling of connection between faint images of past feelings; and personality itself is the fact that such connections are set up, the property of the stream of feelings that part of it consists of links binding together faint reproductions of previous parts. It is thus a relative thing, a mode of complication of

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<sup>107</sup> cf. “We can include with ideas the direct experiences in which sense-impressions and acts themselves take the place of the traces which they have left in the mind. The distinction is unimportant for our purpose, especially since memories of sense-impressions and acts always go along with such impressions and acts themselves to complete the perceptual image. One may on the other hand understand direct experience as including any object, in so far as it is sensibly perceptible or spatial.” Taken from Frege. This will be considered in the following chapter.

certain elements, and a property of the complex so produced. This complex is consciousness; when a stream of feelings is so compacted together that at each instant it consists of (1) new feelings, (2) fainter repetitions of previous ones, and (3) links connecting these repetitions, the stream is called a consciousness.

Clifford confuses the issue by using 'feeling' as 'feeling of connection' and 'feeling' as the *Ding an sich*. If the complex is made up of 'feelings' what would constitute faint images of past feelings? How do 'feelings' as 'things in themselves' form structures that are complex? It seems to me that Clifford's speculation does not require that the speculation itself be speculated about. If I were to take his speculation as being absolute my position would be different, but he is constructing a model, not giving us anything more.

Clifford continues:

A far more complicated grouping than is necessarily implied here is established when discrete impressions are run together into the perception of an object. The *conception* of a particular object, as object, is a group of feelings symbolic of many different perceptions, and of links between them and other feelings. The distinction between Subject and Object is twofold; first, the distinction with which we started between the subjective and objective *orders* which simultaneously exist in my feelings; and secondly, the distinction between me and the social object, which involves the distinction between me and you. Either of these distinctions is exceedingly complex and abstract, involving a highly organised experience. It is not, I think, possible to separate one from the other; for it is just the objective order which I do suppose to be common to me and to other minds.

Clifford reminds us that his model is limited to that which is in his own mind and that which he believes is in the minds of others, the minds of others being the only things external to his mind. What is of interest in this part of his address is "and of links between them and other feelings." It will be seen later in his essay 'The Unseen Universe', when Clifford gives a 'definition' of 'feelings', that it is position that is the 'link'. What 'experience' is in the usage made by Clifford in the quote is uncertain. Clifford has not yet found his way to the external so 'experience' cannot be experience of the external other than experience of 'other minds', assuming the acceptance of the externality of other minds is warranted. The distinction between Clifford and the social object suffers the same problem. The social object is because ejects are taken as external and both real and existent. If ejects are only real then Clifford is left with a solipsistic position. The distinction of real and existent is an

important one; however it seems to me that Clifford is in a realm that is both. Whether or not this realm is the 'Third Realm' posited by Frege is yet to be addressed. Clifford's distinction of 'me' [ Clifford ] and the social object again raises the question of an entelechy.

Clifford continues:

I need not set down here the evidence which shows that the complexity of consciousness is paralleled by complexity of action in the brain. It is only necessary to point out what appears to me to be a consequence of the discoveries of Müller and Helmholtz in regard to sensation; that at least those distinct feelings which can be remembered and examined by reflection are paralleled by changes in a portion of the brain only. In the case of sight, for example, there is a message taken from things outside to the retina, and therefrom sent in some whither by the optic nerve; now we can tap this telegraph at any point and produce the sensation of sight, without any impression on the retina. It seems to follow that what is known *directly* is what takes place at the inner end of this nerve, or that the consciousness of sight is simultaneous and parallel in complexity with the changes in the grey matter at the internal extremity, and not with the changes in the nerve itself, or in the retina. So also a pain in a particular part of the body may be mimicked by neuralgia due to lesion of another part.

Clifford makes reference to the recent developments in science of his day. Great advances have been made in the understanding of the brain in the last 150 years.

Clifford concludes his *Correspondence of Elements of Mind and Brain-Action* as follows:

We come, finally, to say, then, that as your consciousness is made up of elementary feelings grouped together in various ways (ejective facts), so a part of the action in your brain is made up of more elementary actions in parts of it, grouped together *in the same ways* (objective facts). The knowledge of this correspondence is a help to the analysis of both sets of facts, but it teaches us in particular that any feeling, however apparently simple, which can be retained and examined by reflection, is already itself a most complex structure. We may, however, conclude that this correspondence extends to the elements, and that each simple feeling corresponds to a special comparatively simple change of nerve-matter.

Clifford has not given a version of epiphenomenalism because he has not yet found a physical, all he has is his own mind and the belief that others have minds similar to his own. Huxley was an

epiphenomenalist. What Huxley understood epiphenomenalism to be is of interest when his conflict with Lilly, brought about by Lilly's position that Huxley and Clifford were materialists is considered. I find it difficult to accept that there are no minds and that 'minds' are complications of physical entities. The word 'physical' can be differentiated from the word 'material' but this does not remove the problem as I understand it. Abstruse mathematics is not concerned with abstractions, and as such must, in my opinion, belong to the realm of minds. The process by which abstruse becomes abstract in certain cases confirms the real, which are mind dependent entities that have no existence. Perhaps it is this problem that led Frege to posit a 'Third Realm'. Labelling of things can often cloud an appreciation of the thing itself; maybe Clifford is a subjective idealist [ empirical idealist ] but I fail to see how the novelty of his thought can so easily be placed within the confines of a pre-labelled '-ism'.

Clifford concludes his presentation to The Metaphysical Society under the heading *The Elementary Feeling is a Thing-in-Itself*.

Clifford tells us:

The conclusion that elementary feeling co-exists with elementary brain-motion in the same way as consciousness co-exists with complex brain-motion, involves more important consequences than might at first sight appear. We have regarded consciousness as a complex of feelings, and explained the fact that the complex is conscious, as depending on the mode of complication. But does not the elementary feeling itself imply a consciousness in which alone it can exist, and of which it is a modification? Can a feeling exist by itself, without forming part of a consciousness? I shall say *no* to the first question, and *yes* to the second, and it seems to me that these answers are required by the doctrine of evolution.

Again I would point out that at no point has Clifford been able to provide a path from his mind to anything external, other than the minds of others. Consciousness, or mind, co-exists with complex brain motion. The brain is real but does not exist. Clifford takes as his fundamental building block feelings. I would return to Forrest's explication of the words 'exist' and 'real':

For the term 'real' is equivocal between: (1) existing; (2) existing independently of any (creature's ) mind; and (3) being fundamental, that is not existing in virtue of any other things.

My understanding of Clifford's position is that he takes consciousness as (1), he denies (2), and would not hold (3). My reason for claiming that Clifford would not hold (3) is that he has already told

us that we know nothing of possibilities and impossibilities. Clifford himself seems to me to have recognised that he has presented a model rather than a complete ontological explication. Clifford's holding of (1), which is consciousness exists, does not entail that consciousness is not 'existing in virtue of the 'mind' of some other thing'. Clifford's model takes matters further back than had previously been the case, but does not provide us with an absolute.

Clifford regards consciousness as a complex of feelings. Feelings are the parts that come together to construct consciousness. Clifford denies (2) because the mind is a complex of feelings, and feelings cannot of themselves have a feeling of self awareness. Clifford tells us that his position is a necessary result of the doctrine of evolution. Clifford must consider the mind to have evolved.

Clifford continues:

For if that doctrine be true, we shall have along the line of the human pedigree a series of imperceptible steps connecting inorganic matter with ourselves. To the later members of that series we must undoubtedly ascribe consciousness, although it must, of course, have been simpler than our own. But where are we to stop? In the case of organisms of a certain complexity, consciousness is inferred. As we go back along the line, the complexity of the organism and of its nerve-action insensibly diminishes; and for the first part of our course, we see reason to think that the complexity of consciousness insensibly diminishes also. But if we make a jump, say to the tunicate molluscs, we see no reason there to infer the existence of consciousness at all. Yet not only is it impossible to point out a place where any sudden break takes place, but it is contrary to all the natural training of our minds to suppose a breach of continuity so great. All this imagined line of organisms is a series of objects in my consciousness; they form an insensible gradation, and yet there is a certain unknown point at which I am at liberty to infer facts *out* of my consciousness corresponding to them!

It seems to me that Clifford is taking such things as atoms, sub-atomic particles, and all the things that are held to be in space and time to be complex structures of fundamental bits [ feelings ]. Clifford has already told us that he holds that time is discrete, and I would hold that in addition time is discrete with gaps. This is all speculative; however the speculation arrives at a model that accounts for the world. The model may or may not be found to be 'true' but if it is false then we are left with duality of mind and body. Unless it is argued that body can be considered to provide mind by complication of its parts. I find it reasonable to take my own consciousness as a starting point and see where that leads. The alternative is to take something perceived by me, the external 'existing reality', and

attempt from that starting point arrive at consciousness. I will attempt to show in the next chapter that this was the project of Frege in his essay 'The Thought'.

Clifford continues his address:

There is only one way out of the difficulty, and to that we are driven. Consciousness is a complex of ejective facts,—of elementary feelings, or rather of those remoter elements which cannot even be felt, but of which the simplest feeling is built up. Such elementary ejective facts go along with the action of every organism, however simple; but it is only when the material organism has reached a certain complexity of nervous structure (not now to be specified) that the complex of ejective facts reaches that mode of complication which is called Consciousness. But as the line of ascent is unbroken, and must end at last in inorganic matter, we have no choice but to admit that every motion of matter is simultaneous with some ejective fact or event which might be part of a consciousness.

This may appear to some to be confused and meaningless. It suggests to me that Clifford has reached a point where he has to fall back on 'emergence'. If he is forced to emergentism then he will have to accept some *kind* of parallelism. The relationship between emergence and parallelism will be discussed later.

Clifford continues:

From this follow two important corollaries.

1. A feeling can exist by itself, without forming part of a consciousness. It does not depend for its existence on the consciousness of which it may form a part. Hence a feeling (or an eject-element) is *Ding an sich*, an absolute, whose existence is not relative to anything else. *Sentitur* is all that can be said.
2. These eject-elements, which correspond to motions of matter, are connected together in their sequence and co-existence by counterparts of the physical laws of matter. For otherwise the correspondence could not be kept up.

Yet again it must be remembered that when Clifford talks of 'physical laws' he is discussing the 'objective order' as presented within the confines of his own mind. When Clifford says of a feeling that it is absolute he is treating it as absolute within the confines of his model, to do otherwise would be contra his position on possibilities and impossibilities.

Clifford continues:

We are thus led to a doctrine which agrees with the *transfigured realism* of Spencer and Helmholtz, so far as that goes. Every object which I perceive is in my mind, a part of me. A similar object may exist in the mind of every other man. But besides all these objects in our minds, there is something else, different from them, of which, however, each object is a picture; this is the thing in itself, not an object in our consciousness nor in any consciousness (except when the corresponding object is part of the action of a brain); and yet made of the stuff that minds are made of. In thus assigning the *nature* of things in themselves, our theory goes beyond the transfigured realism afore-mentioned, in that it makes the substratum a known thing, instead of an unknowable.

Clifford's model allows him go beyond transfigured realism because he has conflated real and existent in the form of object-elements or feelings. The substratum is then a 'known thing', but not yet isolated other than by way of reasoning. In this sense it is abstruse with a possibility of becoming abstract, subject to further advances in human understanding, or an evolution of the complexity of the human mind that will allow greater insight into the functioning of minds.

Clifford concludes his address as follows:

In the case of mind, we say there is no substratum; consciousness is the whole fact, and the elements out of which it is built up are things in themselves. In the case of matter, the substratum is compounded of the elements of consciousness, and bears the same relation to my consciousness that the material object does to my brain. Your brain is object to me; your consciousness is the thing in itself that underlies it. The universe is made up of elementary mental facts, proceeding according to certain laws; when certain of these attain a particular kind of complexity, they become a consciousness, and subsequent development may form in this consciousness a point-for-point representation or transfigured picture of the external universe. Such a picture is then a material world, like that which exists in my brain or yours. We have thus one substance, and *no* unknowable, but only vast unknown complication of elements to investigate.

Clifford begins the quoted portion of his address with "In the case of mind,...." The model that he presents of mind is a model and not the absolute that it models. Clifford tells us that in the case of matter, the substratum is constituted of elements of consciousness.

Rather than continue with an analysis of the published version of 'On the Nature of Things-in-Themselves' that was published in *Mind* January 1878, I will deal with the essays and lectures in chronological order. This is done, in part, because some positions held by Clifford relevant to the second version are found in the essays and lectures that are provided between 9 June 1874 and January 1878.

## 2.8 'Body and Mind'

The essay '*Body and Mind*' was presented to the Sunday Lecture Society on November 1, 1874; published in the 'Fortnightly Review' December, 1874. It follows the presentation of '*On the Nature of Things-in-Themselves*' to the Metaphysical Society by five months. The persons addressed are not the 'elite' of Britain but the general public. The address is not held in camera but is public, and presented to a wider public by its publication in a widely read journal.

Huxley had given an address to the Metaphysical Society titled 'Has the Frog a Soul' on 8 November 1870. Huxley presented a paper titled 'The Hypothesis that Animals are Automata, and Its History' to the British Association for the Advancement of Science, in Belfast in August of 1874.

Clifford's lecture is to an audience that would be unaware of his address to the Metaphysical Society earlier in the year. The question that presents itself to me is how I would appreciate the lecture if I was unaware of Clifford's prior thought as presented. This is problematic in that there is a vast amount of Clifford's expressed thought that is lost to history. I can take bits that have been recorded and draw certain opinions from those bits but nothing more. This seems to me to be the insight of Davidson's 'prior and passing theories' as presented in his essay 'A Nice Derangement of Epitaphs'. In a situation in which a person presents a lecture there is no opportunity for the passing theory to form.

Clifford begins his lecture:

THE subject of this Lecture is one in regard to which a great change has recently taken place in the public mind. Some time ago it was the custom to look with suspicion upon all questions of a metaphysical nature as being questions that could not be discussed with any good result, and which, leading inquirers round and round in the same circle, never came to an end. But quite of late years there is an indication that a large number of people are waking up to the fact that Science has something to say upon these subjects; and the

English people have always been very ready to hear what Science can say understanding by Science what we shall now understand by it, that is, organized common sense.

Clifford tells us that ‘science’ is to be understood as ‘organized common sense’.<sup>108</sup> What is meant by ‘common sense’? Is Clifford alluding to his posited ‘social objects’? Maybe he is referring to the ‘general sense of mankind’ mentioned by the Dean of Westminster (Stanley) in his address to the Metaphysical Society titled ‘Do we Form our Opinions on External Authority’. Does Clifford accept the reply to the question ‘What is Common Sense?’ that was the title of the paper given to the Metaphysical Society by Dr. Carpenter?

These thoughts are fundamental to the nature of models. Assuming the model is not that which it models requires the assumption that ‘common sense’ will provide us with a firm foundation on which to construct our preferred model.

W. B. Carpenter in his presentation to the Metaphysical Society ‘What is Common Sense?’ 17 January 1872 makes the following comment:

...the *philosopher* means by Common Sense, when he attributes to it the formation of those original convictions or ultimate beliefs, which cannot be resolved into simpler elements, and which are accepted by every normally-constituted Human being as *direct cognitions* of his own mental states.

This is an interesting quote because it qualifies the type of human being that is normally-constituted as being the one that accepts ultimate-beliefs that are held by normally-constituted human beings. The problem I have is that I have never come across a human being that is constituted the same as myself and would fear ever doing so. Perhaps a quote from Salvador Dali will explain my reluctance to accept normally-constituted humans:

There is only one difference between a madman and me. The madman thinks he is sane. I know I am mad.

Clifford continues:

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<sup>108</sup> This is taken from Huxley.

When I say Science, I do not mean what some people are pleased to call Philosophy. The word 'philosopher,' which meant originally 'lover of wisdom,' has come in some strange way to mean a man who thinks it his business to explain everything in a certain number of large books. It will be found, I think, that in proportion to his colossal ignorance is the perfection and symmetry of the system which he sets up ; because it is so much easier to put an empty room tidy than a full one. A man of science, on the other hand, explains as much as ever he can, and then he says, 'This is all I can do; for the rest you must ask the next man.' And with regard to such explanations as he has given, whether the next man comes at all, whether there is any next man or any further explanation or no (and we may have to wait hundreds or even thousands of years before another step is made), yet if the original step was a scientific step, was made by true scientific methods, and was an organization of the normal experience of healthy men, that step will remain good for ever, no matter how much is left unexplained by it.

It seems that I should follow the scientific method rather than indulge in philosophy. However it seems not for Clifford continues:

The whole field of human knowledge may be divided roughly, for the sake of convenience, into three great regions. There are first of all what we call par excellence the Physical Sciences those which deal with inanimate matter. Next, there are those sciences which deal with organic bodies the bodies of living things, whether plants or animals, and the rules according to which those things move. And lastly, there *are those sciences which make a further supposition which suppose that besides this physical world, including both organic and inorganic bodies, there are also certain other facts, namely, that other men besides me, and most likely other animals besides men, are conscious.*<sup>109</sup>

Clifford has a purpose in presenting this lecture. It is aimed at the audience and those that will read it in the 'Fortnightly Review'. I have taken the essays of Clifford in their chronological order, interestingly in *Lectures and Essays* 'Body and Mind' is placed immediately prior to the second version of 'On the Nature of Things-in-Themselves'. In the 'Biographical' of the first volume of the 1879 edition of *Lectures and Essays* Pollock does write the following:

Students of Spinoza will easily trace the connexion between his theory of mind and matter and the doctrine set forth in Clifford's Essays on ' Body and Mind,' and ' The

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<sup>109</sup> Italics added.

Nature of Things-in-themselves.' This was arrived at, to the best of my recollection, in 1871 or 1872; certainly before 1874, in which year the last-mentioned paper was read at a meeting of the Metaphysical Society.<sup>110</sup>

Pollock also writes the following that is a continuation of the quote immediately above:

Briefly put, the conception is that mind is the one ultimate reality; not mind as we know it in the complex forms of conscious feeling and thought, but the simpler elements out of which thought and feeling are built up. The hypothetical ultimate element of mind, or atom of mind-stuff; precisely corresponds to the hypothetical atom of matter, being the ultimate fact of which the material atom is the phenomenon. Matter and the sensible universe are the relations between particular organisms, that is, mind organized into consciousness, and the rest of the world. This leads to results which would in a loose and popular sense be called materialist. But the theory must, as a metaphysical theory, be reckoned on the idealist side. To speak technically, it is an idealist monism.<sup>111</sup>

Pollock considers the metaphysic of Clifford to be idealist monistic. If the model that Clifford presents removes the 'material' then in terms of that model 'idealism' ceases to be in contrast to the material. Rather than idealist monism perhaps monism is more appropriate. How the monism of Clifford relates to the epiphenomenalism of Huxley is problematic. Huxley's defence against being labelled a 'materialist' is perhaps not to be dismissed as a mere attempt to avoid criticism for being 'politically incorrect'.

Clifford continues:

The sciences which make that supposition are the sciences of Ethics and Politics, which are still in the practical stage, and especially the more advanced science which is now to be considered Psychology, the Science of Mind itself; that is to say, the science of the laws which regulate the succession of feelings in any one consciousness. Each of these three great divisions began in the form of a number of perfectly disconnected subjects, between which nobody knew of any relation; but in the history of science each of them has been woven together, in consequence of connexions being found between the different subjects included in it, into a complete whole; and the further progress of the

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<sup>110</sup> *Lectures and Essays* Vol 1, 1879 Pg.39

<sup>111</sup> *Ibid.*

history of science requires that each of these great threads, into which all the little threads have been twined, should themselves be twined together into a single string.

This quote shows Clifford's understanding of what science is. I find it of particular interest because it pre-empted the thought of C. D. Broad mentioned above. Clifford's thought that Psychology is the Science of Mind is interesting in that this has been in some ways usurped by Science of the Brain. If psychology and cognitive science are separate disciplines it is because the 'materialist' paradigm has pushed aside the broader understanding of the world.

Clifford continues his lecture with reference to the presentation made by Huxley in Belfast. He also brings in the work of experimental psychologists Donders and Helmholtz. Clifford provides an explanation of the workings of the nervous system as science of the time understood it. The science has long since advanced so I will not consider it further.

Clifford tells his audience the following:

We have now observed two classes of facts and the parallelism between them. Let us next observe what an enormous gulf there is between these two classes of facts.

The state of a man's brain and the actions which go along with it are things which every other man can perceive, observe, measure, and tabulate; but the state of a man's own consciousness is known to him only, and not to any other person. Things which appear to us and which we can observe are called objects or phenomena. Facts in a man's consciousness are not objects or phenomena to any other man; they are capable of being observed only by him. We have no possible ground, therefore, for speaking of another man's consciousness as in any sense a part of the physical world of objects or phenomena. It is a thing entirely separate from it; and all the evidence that we have goes to show that the physical world gets along entirely by itself, according to practically universal rules. That is to say, the laws which hold good in the physical world hold good everywhere in it they hold good with practical universality, and there is no reason to suppose anything else but those laws in order to account for any physical fact; there is no reason to suppose anything but the universal laws of mechanics in order to account for the motion of organic bodies.

This is all well and good if it serves to compliment Huxley, however how does it fit with Clifford's views expressed in his essay presented to the Metaphysical Society a few months prior?

Huxley held the position of epiphenomenalism. My understanding of epiphenomenalism is taken from the article in the Stanford Encyclopedia of Philosophy.<sup>112</sup>

Epiphenomenalism is the view that mental events are caused by physical events in the brain, but have no effects upon any physical events. Behavior is caused by muscles that contract upon receiving neural impulses, and neural impulses are generated by input from other neurons or from sense organs. On the epiphenomenalist view, mental events play no causal role in this process. Huxley (1874), who held the view, compared mental events to a steam whistle that contributes nothing to the work of a locomotive.

Clifford tells his audience:

But I may very well say that among the physical facts which go along at the same time with mental facts there are forces at work. That is perfectly true, but the two things are on two utterly different platforms the physical facts go along by themselves, and the mental facts go along by themselves. There is a parallelism between them, *but there is no interference of one with the other*. Again, if anybody says that the will influences matter, the statement is not untrue, but it is nonsense. The will is not a material thing, it is not a mode of material motion.<sup>113</sup>

Clifford cannot be an epiphenomenalist because he denies that the physical has an effect on the mental.<sup>114</sup> The problem is brought into focus when Clifford tells his audience:

Excepting the fact that other men are conscious, there is no reason why we should not regard the human body as merely an exceedingly complicated machine which is wound up by putting food into the mouth. But it is not merely a machine, because consciousness goes with it. The mind, then, is to be regarded as a stream of feelings which runs parallel to, and simultaneous with, a certain part of the action of the body, that is to say, that

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<sup>112</sup> Robinson, William, "Epiphenomenalism", *The Stanford Encyclopedia of Philosophy* (Summer 2012 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/sum2012/entries/epiphenomenalism/>>. Accessed 19/08/2013

<sup>113</sup> Italics added.

<sup>114</sup> "Huxley was not alone among 19th century figures who gave vigorous and clear expositions of an epiphenomenalistic view. S. Hodgson (1870), W. K. Clifford (1874) and H. Maudsley (1886) were exponents of the view." Taken from Robinson William, "Epiphenomenalism", *The Stanford Encyclopedia of Philosophy* (Summer 2012 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/sum2012/entries/epiphenomenalism/>>. Accessed 19/08/2013

particular part of the action of the brain in which the cerebrum and the sensory tract are excited.

This quote says to me that there is a dualism between the mind and the body. It is not an idealist monism.

Clifford continues his presentation and arrives at the following:

Though every small part of the reality which is outside corresponds to a small part of my picture, though every connexion between two parts of that reality outside corresponds to a connexion between two parts of my picture, yet the two things are not alike. They correspond to one another, just as a map may be said in a certain sense to correspond with the country of which it is a map, or as a written sentence may be said to correspond to a spoken sentence.

Interestingly it is Alfred Korzybski, born 3 July 1879, that is remembered as the author of the dictum: “The map is not the territory”. Korzybski did acknowledge that Eric Temple Bell’s “the map is not the thing mapped” had appeared in Bell’s *Numerology: The Magic of Numbers*, published in 1933.

Clifford tells us the following:

There is a parallelism between them, but there is no interference of one with the other. Again, if anybody says that the will influences matter, the statement is not untrue, but it is nonsense. The will is not a material thing, it is not a mode of material motion. Such an assertion belongs to the crude materialism of the savage. The only thing which influences matter is the position of surrounding matter or the motion of surrounding matter. It may be conceived that at the same time with every exercise of volition there is a disturbance of the physical laws; but this disturbance, being perceptible to me, would be a physical fact accompanying the volition, and could not be the volition itself, which is not perceptible to me.

On my understanding this quote shows that Clifford does not hold an epiphenomenalist position. It would seem there is a problem that goes far beyond the ‘interpretation’ of a particular philosophical text. G.E. Berrios wrote the following<sup>115</sup>:

The above claims, particularly the one stating that the doctrine of concomitance was common to a number of nineteenth-century writers, incensed Morton Prince, the American neurologist who in an article in the journal *Brain* (rightly) commented:

I cannot help suspecting that Hughlings-Jackson has not completely grasped the full meaning of this problem. To group together Hamilton, Clifford, Spencer, Bain, Huxley, and Tyndall, to say nothing of the others, as holding essentially the same doctrine, is to my mind much the same thing as putting Salisbury, Gladstone, Chamberlain and Labouchere into one political boat, and saying that they hold essentially the same opinions. If one does not see the essential difference between the opinions of Clifford and Huxley, one can scarcely have a clear idea of the matter.

Berrios writes the following:

The latter (*Lectures and Essays*) constitute the main source for Clifford’s non-mathematical work. Their popular lecture format precludes any deeper textual exegesis and the most one can say is that his ideas were often bold, imaginative but alas inchoate.

The direction that Clifford’s mature thought might have followed will always remain a mystery, and we shall never know if he would have abandoned a position as confusing as parallelism.

I fail to see how Clifford could abandon the position when he never held it. ‘Body and Mind’ is not an easy lecture to grasp, as it requires an awareness of ‘On the Nature of Things-in-Themselves’ to appreciate it. That having been said Clifford does give a version of his thought found in the earlier address ‘On the Nature of Things-in-Themselves’ in ‘Body and Mind’. If the structure of Clifford’s thought is taken in its entirety, and allowance is made for his particular audiences, then there is something worth considering.

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<sup>115</sup> *History of Psychiatry*, xi (2000), Body and Mind, G.E. Berrios, Classic Text No.43 Downloaded from hpy.sagepub.com at University of New England on November 20, 2012

Parallelism arises when adherence to two positions is held and lack of a fuller understanding does not allow the two positions to be brought together. What Clifford has presented in this public lecture provides no alternative than to point out the parallelism of the thoughts presented in the lecture. However prior to this lecture he has presented the initial version of ‘On the Nature of Things-in-Themselves’ where the ‘parallelism’ has been taken much further back.

Clifford tells us:

But then I may conclude from what I said before that, although the two corresponding things are not alike, yet they are made of the same stuff. Now what is my picture made of? My picture is made of exceedingly simple mental facts, so simple that I only feel them in groups. My picture is made up of these elements; and I am therefore to conclude that the real thing which is outside me, and which corresponds to my picture, is made up of similar things; that is to say, the reality which underlies matter, the reality which we perceive as matter, is that same stuff which, being compounded together in a particular way, produces mind. What I perceive as your brain is really in itself your consciousness, is You; but then that which I call your brain, the material fact, is merely my perception. Suppose we put a certain man in the middle of the hall, and we all looked at him. We should all have perceptions of his brain; those would be facts in our consciousness, but they would be all different facts. My perception would be different from the picture produced upon you, and it would be another picture, although it might be very like it.....

To use the words of the old disputants, we may say that matter is not of the same substance as mind, not *homoousion*, but it is of like substance, it is made of similar stuff differently compacted together, *homoiousion*.

Clifford tells us:

The mere fact that all the consciousness we know of is associated with certain complex forms of matter need only make us exceedingly cautious not to imagine any consciousness apart from matter without very good reason indeed; just as the fact of all swans having turned out white up to a certain time made us quite rightly careful about accepting stories that involved black swans.

Clifford is trying very hard to say what he said in ‘On the Nature of Things-in-Themselves’ without saying it.

I find it very difficult to interpret 'Body and Mind' in terms of the lecture in isolation. I will not speculate as to the intent of Clifford in giving the lecture; however the nature of the questions that it raises are profound, and of implication to the 'stability of society' itself. If, as I believe, the Metaphysical Society was more than a place for pleasant academic meetings, rather being a place to consider the impact of scientific discovery on the foundations of society, then Clifford's dissemination of his thought to the public must be circumspect and well considered. The fact that Clifford addresses ethical issues in his address 'Body and Mind' may lend support to this view.

One further point I would make is that Clifford was not the only person to comment on Huxley's thought as expressed in his Belfast address. In 1879 William James wrote an essay titled 'Are We Automata?'.<sup>116</sup> James writes the following:

EVERYONE is now acquainted with the Conscious-Automaton- theory to which Prof. Huxley gave such publicity in his Belfast address; which the late Mr. D. A. Spalding punctiliously made the pivot of all his book-notices in *Nature*; which Prof. Clifford fulminated as a dogma essential to salvation in a lecture on "Body and Mind"; but which found its earliest and ablest exposition in Mr. Hodgson's magnificent work, *The Theory of Practice*. The theory maintains that in everything outward we are pure material machines.

This quote opens James' essay. The following closes it:

When a philosophy comes which, by new facts or conceptions, shall show how particular feelings may be destitute of causal efficacy without the genus Feeling as a whole becoming the sort of ignis fatuus and outcast which it seems to be to-day to so many "scientists" (loathly word!), we may hail Professors Huxley and Clifford as true prophets. Until then, I hold that we are incurring the slighter error by still regarding our conscious selves as actively combating each for his interests in the arena and not as impotently paralytic spectators of the game.

It seems James is of the opinion that Clifford agrees with Huxley in regard to epiphenomenalism. Unfortunately by the time James' essay is published Clifford is dead. Again the response of Huxley to W. S. Lilly's assertions that Huxley and Clifford were materialists is pertinent.

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<sup>116</sup> 'Are We Automata', Wm. James, *Mind*, Vol.4, No.13 (Jan., 1879) Pgs. 1-22

## 2.9 The Unseen Universe

This essay appears in *Lectures and Essays* on page 228 of the first volume<sup>117</sup>, and is a review of the book by the same name written by Tait and Stewart.<sup>118</sup>

In the Bibliographical of this volume on page 70 Pollock writes the following:

In reprinting the Lectures and Essays which now appear no alterations have been made beyond such little matters of verbal and literary correction as the author would have naturally attended to if he had himself undertaken a revision with a view to collected publication; but certain passages have been omitted which we believe that Clifford himself would have willingly cancelled, if he had known the impression they would make on many sincere and liberal-minded persons whose feelings he had no thought of offending.

It seems the editors of *Lectures and Essays* are capable of great things. They can know the ‘feelings’ not only of Clifford but also all of those that are sincere and liberal minded persons. Whatever a person makes of this is up to them, I for one find it arrogant in the extreme. To fail to interpret correctly, to miss-understand, to say ‘this is not my cup of tea’, is reasonable, but to claim that which is claimed by the editors is not reasonable.

The essay ‘The Unseen Universe’ as printed in *Lectures and Essays* omits the first section that was published in the ‘Fortnightly Review,’ June, 1875. Anyone that was likely to be offended already has been if they had read the original essay. Clifford lived another two years and ten months after publication of the original essay; those that were offended had time to voice their disapproval. It seems to me that the persons most likely to be ‘offended’ by the section of the essay that the editors chose to remove would be the authors of the book *The Unseen Universe*, namely Balfour Stewart and Peter Guthrie Tait.

It will be seen that the authors of the book did respond to Clifford in the second edition of their book. Clifford and Tait were known to each other. The following is reported:

This passage at arms excited a great deal of interest among the students of the Physical Laboratory. One of our number was R. B. Haldane, second to none in knowledge of

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<sup>117</sup> First Edition, 1879.

<sup>118</sup> *The Unseen Universe*, Balfour Stewart, Peter Guthrie Tait, Published by Macmillan, 1875.

philosophy and in power of debate. We fought the Spencer-Tait controversy over and over again. I remember that W. K. Clifford visited Edinburgh about that time, and in the Tea Room at one of the April Meetings of the Royal Society of Edinburgh much lively talk went on regarding the controversy. Tait was in great spirits and said to Clifford, "There is not a man in England I suppose, other than Herbert Spencer, who does not see the point of my story." Clifford responded with a hearty laugh, "No doubt, it is a very good story."<sup>119</sup>

This meeting took place in 1874, the year prior to the events presently being considered.

In light of the fact that Tait and Stewart did respond to Clifford in the second edition of their book I find it difficult to comprehend whose 'feelings' the editors of *Lectures and Essays* are concerned with.

The significance of the attitude of the editors is, in my opinion, of importance. Perhaps both Pollock and Stephens thought it politically expedient to distance themselves from Clifford's position on 'life after death' at a time when Queen Victoria is still mourning Prince Albert.

Clifford wrote the essay 'The Unseen Universe' in one sitting between a quarter to ten at night and nine the next morning.<sup>120</sup> Clifford begins his essay by providing his understanding of the main points of the book. Clifford's interpretation may or may not be correct; he may have misunderstood. However his critique is founded on his interpretation right or wrong. To remove this Cliffordian abstract and publish in *Lectures and Essays* the critique that follows is strange to say the least. Clifford's abstract of Tait and Stewart's book is not polite or circumspect. Obviously something has caused Clifford to attack with all the force he can muster. What is there in Tait and Stewart's book that could be so important to Clifford?

Clifford's essay 'The Ethics of Belief' was presented in the *Contemporary Review*, January 1877. Clifford had presented a paper to the Metaphysical Society on April 11 1876 titled 'The Ethics of Belief'. I have not obtained a copy of the Metaphysical Society paper to compare the two essays of the same title. However both are subsequent to the essay 'The Unseen Universe'. As previously mentioned I find ethics difficult, this being the case I will not proceed further with this.

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<sup>119</sup> *Life and Scientific Work of Peter Guthrie Tait*, Cargill Gilston Knott, Cambridge University Press, 1911 Pg. 19

<sup>120</sup> *Dictionary of National Biography* Vol. XI, Macmillan and Co. NY, 1887. The entry was written by Leslie Stephen, drawing on Pollock's comments in the preface of *Lectures and Essays*, information from Clifford's wife, and his own personal knowledge.

It seems to me that Tait and Stewart, both distinguished scientists, have done something that is unscientific. They have taken a hypothetical position that they hold to be true and then endeavoured to employ scientific knowledge of their day to prove the hypothetical position. This is all well and good; however the nature of their hypothetical is of the nature of an absolute. Science is not, in my opinion, concerned with absolutes. It is concerned with models that provide the best explanation available at a particular time in the development of science. Clifford does not deal with the possible or the impossible. Tait and Stewart published a second edition of their book in 1875; in the preface they reply to Clifford's criticisms.

Clifford wrote his review of Tait and Stewart's book in 1875. In 1875 William James reviews the book.<sup>121</sup> Brian J. Mahan writes:

In this, James expresses his agreement with Tait's contention that acquisition of religious truth "implies a prior act of trust." To this, however, James adds a controversial amendment: "[A]nyone to whom [an act of trust in a possible better world] makes a practical difference . . . is duty-bound to make it." James, in this early review as in his later work, including *Varieties*, wishes to help free the believer or potential believer from "scientific scruples" (or philosophical scruples) that threaten to paralyze their capacity for faith.<sup>122</sup>

I have difficulty with what James would consider a 'possible better world'. This is an ethical question and I find ethics difficult.

There is something in Clifford's essay 'The Unseen Universe' that I find of particular relevance to my understanding of not only his metaphysic but also that of others that have followed. The section of the essay I find interesting is this:

So the fact that matter, as a phenomenon, is not to be increased or diminished in quantity, has nothing to say to the question about the existence of something which is not matter, not phenomenon at all, but of which matter is the symbol or representative. The answer to this question is only to be found in the theory of sensation; which tells us not merely that there is a non-phenomenal counterpart of the material or phenomenal world, but also in some measure what it is made of. Namely, the reality corresponding to our perception of

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<sup>121</sup> William James on Chauncey Wright in *The Nation* (1875), quoted in Gay Wilson Allen, *William James* (New York: Viking Press, 1967), 164. [Taken from William James: The Problem of the Ethics of Belief and the Three Criteria of Spiritual Judgment, Brian J. Mahan.]

<http://theo.kuleuven.be/uploads/file/lest/ppseniors/mahan.pdf> Accessed 25/08/2013

<sup>122</sup> Ibid.

the motion of matter is an element or the complex thing we call feeling. What we might perceive as a plexus of nerve-disturbances in itself a feeling; and the succession of feelings which constitutes a man's consciousness is the reality which produces in our minds the perception of the motions of his brain. These elements of feeling have relations of *nextness* or contiguity in space, which are exemplified by the sight-perceptions or contiguous points; and relations of succession in time, which are exemplified by all perceptions. Out of these two relations the future theorist has to build up the world as best he may. Two things may perhaps help him. There are many lines of mathematical thought which indicate that distance or quantity may come to be expressed in terms of *position* in the wide sense of the *analysis situs*. And the theory of space-curvature hints at a possibility of describing matter and motion in terms of extension only.

Clifford has explicated his understanding of 'feeling'. It will be remembered that Clifford stated the following at the commencement of his address to the Metaphysical Society following the initial reference to Huxley's comments in his 'On the Nature of Things-in-Themselves':

My feelings arrange and order themselves in two distinct ways. There is the internal or subjective order, in which sorrow succeeds the hearing of bad news, or the abstraction "dog" symbolises the perception of many different dogs.

It is necessary to understand the starting point of a person's line of reasoning in order to follow their argument. If feelings are the starting point for Clifford then that is where it is necessary to start. It is not necessary to accept that starting point as being self evident, but if an analysis is to be done then that is where it must commence.

Clifford includes in this essay the following:

Now, whatever may turn out to be the ultimate nature of the ether and of molecules, we know that to some extent at least they obey the same dynamic laws, and that they act upon one another in accordance with these laws. Until, therefore, it is absolutely disproved, it must remain the simplest and most probable assumption that they are finally made of the same stuff—that the material molecule is some kind of knot or coagulation of ether.

Clifford is still holding his speculation of a 'space theory of matter'.

I do not accept that Clifford considered his metaphysical model as absolute. He presumably did consider it to be coherent.

## 2.10 Ethics and Religion

Much has been written on Clifford's essay 'Ethics of Belief'. Rather than write more I will avoid Clifford's essays that address ethics and religion. I do not consider them irrelevant, but rather beyond the scope of the thesis.

## 2.11 'On the Nature of Things-in-Themselves' as published in *Mind*, January 1878

The January 1878 edition of *Mind* contained six articles. The person responsible for the edition was George Croom Robertson, the editor of *Mind* from its foundation. Robertson was a member of the Metaphysical Society from 1872. Born 10 March 1842 he graduated in 1861 from Marischal College Aberdeen. Having gained a Fergusson scholarship he travelled to University College, London; the University of Heidelberg; the Humbolt University in Berlin; and the University of Gottingen. From Gottingen Robertson went to Paris in June 1873 and returned to Aberdeen the same year. In 1866 he was appointed professor of philosophy of mind and logic at University College, London. As a member of the Metaphysical Society he would have been aware of Clifford's presentation of the first version of 'On the Nature of Things-in-Themselves' and would have known the effect it had on the members of the society.

Clifford's health was in decline by January 1878. Clifford chooses to publish a second version of 'On the Nature of Things-in-Themselves'. Presumably Clifford considers this essay to be representative of his metaphysical position in regard to mind.

The six articles that appear in the January Edition 1878 of *Mind* are as follows:

'The Question of Visual Perception in Germany' Author: James Sully

'The Physical Basis of Mind' Review of Lewes' Second Series of *Problems of Life and Mind* by the Editor (G.C. Robertson)

'The Use of Hypotheses' Author: John Venn

‘On the Nature of Things-in-Themselves’ Author: W.K. Clifford

‘The Philosophy of Ethics’ Author: Arthur James Balfour

‘Philosophy in the Dutch Universities’ Author: J.P.N. Land

The first five, in my opinion, have relevance to each other. The sixth seems to me to be extraneous to my purpose.

Of the first five authors two are members of the Metaphysical Society, and another two will become members.<sup>123</sup>

In his essay, James Sully provides an appraisal of the current state of research in Germany of the perception of space. Sully contrasts the German approach with that of the English, who tend to follow a Berkeleyan approach. Sully writes:

The field in which the space-question has been most warmly discussed, is that of visual perception. This domain is clearly not one of pure psychology (in its narrow sense as a subjective science), but to some extent comes under the control of physiology.

The essay is of interest in itself, however for my purposes it is how it relates to Clifford that is of importance. Clifford made use of visual perception repeatedly in his lectures. What I find of particular interest in Sully’s essay is his use of the word ‘feelings’. Sully uses the word thirty eight times in his essay. Examples are as follows:

The second mode of sensibility which, as is now generally admitted, is involved in these perceptions is that which is variously known under the name of the muscular sense, feeling of innervation, and so on.

Yet though this sensibility must be supposed to enter into our judgments of relative position and magnitude, it by no means follows that it is superior in delicacy to the motor feelings.

These he seeks systematically to refer to peculiarities in the process of innervation involved, and its attendant feeling.

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<sup>123</sup> A.J. Balfour and James Sully became members of the Metaphysical society in 1880.

What is feeling? Sully does not provide an answer to this question. This is not a problem if he is concerned with the Cliffordian objective order as he understands it.

Robertson's review is of Lewes' latest work. Clifford's presentation of 'On the Nature of Things-in-Themselves' to the Metaphysical Society followed his review of the earlier work of Lewes.

Robertson tells us the following:

In this country at least, Mr. Lewes holds an almost unique position. He is a philosophical thinker and psychological inquirer who is also a practical worker in physiology; or he is a physiologist whose positive investigations of the innermost phenomena of organic life are guided by trained psychological insight and an ever-present regard to philosophical principles.

Robertson makes the following comment:

It is by an over-simplification of the system that these elements are singled out from the whole mass of it, and the proper scientific task of analysis is again overdone when division is arbitrarily made of the system into sides and parts, which are credited with such diverse characters in separation that it becomes impossible to understand how they should form together a system the most coherent and uniform that is.

It seems to me that Robertson has pointed out the problem of starting points and inference. His opinion that 'a system the most coherent and uniform that is.' is coherent and uniform belies the problem of the foundation of science itself. Science is not absolute. Science is not complete. This is not a criticism of science merely a statement as to its nature.

Robertson tells us the following:

That it must not be asserted in any absolute sense, so as to imply fixity or invariability of nervous conduction, he is quite sure: " fluctuation," he (Lewes) is never tired of repeating, is the characteristic at least of central combinations, and this, he more than suggests, may be dependent on the presence of a structural element for which no allowance has been made in the current physiological theories, namely, the so- called Neuroglia.

It is possible that the world is 'coherent and uniform' but how this could ever be established is problematic. The possibility that there are structural elements for which no allowance has been made would be difficult to deny with certainty.

The thought of Lewes as interpreted by Robertson shows a close relationship with that of Clifford. The following two extracts from Robertson's review are, I believe, sufficient to show this close relationship:

While the current theory seems to him to assert dogmatically that the nervous processes in lower centres may and do pass as purely physical (or, as they are called, mechanical) changes without having any psychical aspect whatever, he contends that every central nervous process, to the very lowest and simplest, in any organism, intact or truncated, that is not dead, has in and for itself its proper psychical phase or aspect, as much as the highest and most complex cerebral process accompanying or accompanied by that which all understand as a conscious experience. He does not say that the psychical state concomitant with the action of a lower centre is a conscious state-either that the centre is itself endowed with consciousness or that the man or animal is conscious in the case; as indeed, for that matter, he denies that the centres immediately concerned in the higher cerebral process are in themselves the seat of consciousness, or that the man or animal need always be conscious in *this* case. But he does assert that in the one case as well as the other there is, besides the physical, a real psychical occurrence which is to be understood in terms of "Feeling" or subjective experience. He commits himself, for example, to the general statement that "Feeling is necessary for reflex action" -(p. 435), meaning this at all events, that whenever and wherever a central nervous process goes forward in a living organism there always is present something that may be called Feeling.....

With Pflüger, he urges that it is only by inference from objective signs, that we ascribe subjective life to any other man or animal, and where the signs, though in the absence of the brain, remain precisely what they were, the inference is not to be evaded....

He contests the ground inch by inch with Professor Huxley who some years ago gave an impressive exposition of the doctrine of Automatism, and, what is more, he enters upon a line of consideration which not only, as it seems to him, affords the deepest reason for asserting Feeling to be an agent in the vital procedure of man or animal, but also yields a strictly psychological solution of the general question of the relation between Body and Mind.

As a metaphysician, Mr. Lewes is a monist who declares that objective Motion and subjective Feeling are but two aspects of one and the same real, but he confesses that he did not always clearly see *how* a physical process could also be a psychical process. Even now, in a chapter (on Body and Mind) that is otherwise marked by great insight and subtlety of expression, there is some want of clearness or consistency in the explanation that is offered; but his general drift is unmistakeable and is to the effect that what we call Matter and Mind, Object and Subject, are symbols of different modes of feeling or sentience, which may both represent the same real, just as one tuning-fork may appear moving to the eye and sounding to the ear.

The first two articles of *Mind*, January 1878, have 'feeling' as a foundational element. The second has 'feeling' and sentience conflated, but this does little to explicate what 'feeling' is.

The third article by John Venn will now be considered.

John Venn was a logician. Venn titles his essay 'The Use of Hypotheses'. In the opening paragraph of his essay Venn writes the following:

THE thorough working out of that general view of the nature and province of Logic which, for the sake of brevity, may be termed the Material or Objective view, throws a new light upon, and therefore demands a reconsideration of, a good many detached points. Amongst these, as it seems to me, is the question of the nature and functions of Hypotheses.

Venn has told us he is considering the Material or Objective view. This is reasonable, but unless his view is to be that of an individual it must be assumed that there is an objective view that is common to all.

Venn then goes on to fix what he understands the term 'hypothesis' to be in regard to his present enquiry. Venn's understanding of 'hypothesis' is as follows:

What will here be understood by the term, then, is, briefly speaking, nothing else than a mental representation, or conception of our own, which is either known or suspected not to be in accordance with actual facts.

What an 'actual fact' is is problematic. Many facts require temporal fixing to be facts. If I were asked the question 'Have you been to Tibet?' I would answer 'No'. In Indonesian culture the same question

is likely to be answered by 'Belum.' which can be glossed as 'Not yet.' Cultural appreciation of time is interesting in itself. The western world in 'everyday' communication takes a past, present, future, view of facts, whereas some cultures take a different view. Venn tells us the following:

Often they are so, or are fully believed to be so, and they then go by various names according to conditions of time or mode of acquirement. If they refer to future events we might term them predictions or confident anticipations; if to the past, and within our own experience, recollections, and so on. Often, however, we have occasion to picture to ourselves a state of things which we deliberately contemplate as not-actual; it may be merely that the things are considered as uncertain, it may be that they are utterly and even whimsically false. With regard to their nature they may be either concrete facts, or groups of facts, or properties of bodies, or laws of connection or succession, which we thus picture to ourselves as other than they are. Such suppositions as these, in so far as they are seriously made for scientific or practical purposes, and not with any prominently aesthetic or humorous aim, may be roughly taken to correspond to 'hypotheses' as we are here concerned with them.

Venn continues:

The remarks just made imply the existence or assumption of a tolerably sharp distinction between the objective and the subjective, between the complex of external facts and our conceptions of them. This is, of course, distinctive of the Material view of Logic. We cannot pause to enter into any justification of such a view here, but shall postulate it for the present as being, if not philosophically unassailable, at any rate a perfectly tenable and consistent view for all purposes of science and therefore of logical inference.

Venn is presenting a Material view of Logic. This is fair enough if it is accepted that the material view changes with advances in science and therefore Material Logic must change to keep pace. Once scientific models are recognised as not being absolute then it follows that a material logic is not absolute. The Sun will rise tomorrow; unfortunately science tells us that at some future time this will not be the case.<sup>124</sup>

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<sup>124</sup> Cf. 'On Truth and Lies in a Nonmoral Sense', 1873, F. Nietzsche.

Venn considers the role ‘if’ would play in a deterministic world in which we had the data to predict the future. Fortunately he is considering a material world that has removed the complication of Mind. This is not to denigrate science, merely to point out the obvious, that being science is working towards a complete understanding, it is not there yet.

In January of 1878 Clifford has already published his ‘The Ethics of Belief’.<sup>125</sup> I do not wish to enter into the discussion of Clifford’s ‘ethics’. No doubt they are important but I will leave it to others to analyse them. Those that do attempt to analyse his ethics should consider not only his written word on the issues in question but the social environment in which they were written. In any discussion of ethics it is necessary to differentiate the subjective from the objective. This may be the point that Venn was making in his essay. If that were the case then Clifford’s essay ‘On the Nature of Things-in-Themselves’ may be seen as an attempt to bridge the subjective-objective divide.

‘On the Nature of Things-in-Themselves’ as published in *Mind* will now be considered. Three years and five months after presenting his essay to the Metaphysical Society Clifford presents a modified version of the essay to the general public by publishing his essay in *Mind*. Some changes have been made. The initial reference to the thought of Huxley is removed. The comment on ‘cause’ is changed from:

The word *Cause*, πολλαχῶς λεγόμενον and misleading as it is, may yet be of some use, if it is kept to denote a relation between objective facts, to describe certain parts of the phenomenal order.

To

The word *Cause*, πολλαχῶς λεγόμενον and misleading as it is, having no legitimate place in science or philosophy, may yet be of some use in conversation or literature, if it is kept to denote a relation between objective facts, to describe certain parts of the phenomenal order.

No reference is made in the second version to *transfigured realism*. The final section of the essay becomes ‘*Mind-stuff is the reality which we perceive as Matter.*’

The problem of interpreting the final version of ‘On the Nature of Things-in-Themselves’ is how much of Clifford’s prior thought is taken to be still relevant to the interpretation. Clifford has put forward the following:

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<sup>125</sup> ‘The Ethics of Belief’, *Contemporary Review*, January, 1877. Clifford had presented an address to the Metaphysical Society under the same title 11 April, 1876.

- 1) Space theory of matter.
- 2) Discrete nature of time.
- 3) Filling in of our perceptions.
- 4) Feelings as defined in ‘The Unseen Universe’.
- 5) We know nothing of possibilities or impossibilities.

Clifford has not retracted any of the five speculations. If all five prior speculations are taken to be still held by Clifford it would seem he has constructed a model that although coherent defies confirmation. The space theory of matter becomes a space theory of mind-stuff. If time is discrete the possibility that there are gaps between the ‘instants’ expands the world-in-itself to something inaccessible to us. Solipsism has been avoided rather than being disproved.

Clifford writes:

That element of which, as we have seen, even the simplest feeling is a complex, I shall call *Mind-stuff*.

In order to make sense of this sentence it is necessary to refer to the definition of ‘feeling’ as given in ‘The Unseen Universe’. The complex is formed of ‘stuff’ and position. If it is held that ‘stuff’ is a property of space then the usual notions of position and stuff have been transcended.

Clifford next tells us that inorganic matter does not possess mind, or consciousness, but it does possess a small piece of mind-stuff. Clifford writes the following:

When the molecules are so combined as to form the brain and nervous system of a vertebrate, the corresponding elements of mind-stuff are so combined as to form some kind of consciousness; that is to say, changes in the complex which take place at the same time get so linked together that the repetition of one implies the repetition of the other. When matter takes the complex form of a living human brain, the corresponding mind-stuff takes the form of a human consciousness, having intelligence and volition.<sup>126</sup>

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<sup>126</sup> Clifford is discussed in the article ‘Panpsychism’ however the discussion relates to his comments in ‘Body and Mind’.

Clifford draws an analogy between the material and the mental. Atoms combine to form molecules and molecules group together to form perceptible things. The combination of hydrogen and oxygen gives water. The combination of mind-stuff gives rise to consciousness, intelligence and volition. I can sense water, but I cannot sense a molecule of water. I believe I am conscious, but I cannot isolate a single bit of mind stuff. I accept that there are molecules of water that are composed of two hydrogen atoms and one oxygen atom. I accept that there are a plethora of subatomic particles. I believe there are as yet undiscovered subatomic particles. If I start from the perceived material world I can accept the scientific models that reduce the material structure to ever smaller building blocks. I accept that other minds exist. The problem is that the foundational building blocks of the material world are inferred from human perceptions of the human world. I was aware of dogs and cats long before I was aware they had a heart and two kidneys. If a unified model is the aim of scientific endeavour then it cannot ignore the mental. Perhaps it should be recognized that the present state of scientific enquiry does not allow for the mental to be constructed out of the presently understood scientific material model. This does not necessitate that it will not be at some future time, but at that future time the material model itself will be much richer.

Clifford continues:

Suppose that I see a man looking at a candlestick. Both of these are objects, or phenomena, in my mind. An image of the candlestick, in the optical sense, is formed upon his retina, and nerve messages go from all parts of this to form what we may call a cerebral image somewhere in the neighbourhood of the optic thalami in the inside of his brain. This cerebral image is a certain complex of disturbances in the matter of these organs; it is a material or physical fact, therefore a group of my possible sensations, just as the candlestick is. The cerebral image is an imperfect representation of the candlestick, corresponding to it point for point in a certain way. Both the candlestick and the cerebral image are matter; but one material complex represents the other material complex in an imperfect way.

This is straight forward; the cerebral image is a material complex representing another material complex in an imperfect way. Clifford continues:

Now the candlestick is not the external reality whose existence is represented in the man's mind; for the candlestick is a mere perception in *my* mind. Nor is the cerebral image the man's perception of the candlestick; for the cerebral image is merely an idea of a possible

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Seager, William and Allen-Hermanson, Sean, "Panpsychism", *The Stanford Encyclopedia of Philosophy* (Fall 2013 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/fall2013/entries/panpsychism/>.

perception in my mind. But there *is* a perception in the man's mind, which we may call the *mental image*; and this corresponds to some external reality. *The external reality bears the same relation to the mental image that the (phenomenal) candlestick bears to the cerebral image.* Now the candlestick and the cerebral image are both matter; they are made of the same stuff. Therefore the external reality is made of the same stuff as the man's perception or mental image, that is, it is made of mind-stuff. And as the cerebral image represents imperfectly the candlestick, in the same way and to the same extent the mental image represents the reality external to his consciousness.

Clifford has provided us with five things to consider. One is 'common' to Clifford and the other man, that being the external candlestick. It is conceivable that Clifford's cerebral image and the other man's cerebral image can be viewed at the same time by Clifford; it only needs a mirror for arguments sake. The mental image of Clifford is available to Clifford, but the other man's mental image is not available to Clifford. The cerebral image of Clifford and the other man's cerebral image of the candlestick are not identical. The mental image which is derived from the cerebral image is not material and cannot be of the objective order.

Clifford has two categories, the material and the mental. This is nothing new. It is the mind body problem. Clifford does provide a speculative solution to the mind body problem. Clifford continues:

Thus in order to find the thing- in-itself which is represented by any object in my consciousness, such as a candlestick I have to solve this question in proportion, or rule of three:-

As the physical configuration of my cerebral image of the object

*is to* the physical configuration of the object,

*so is* my perception of the object (the object regarded as complex of my feelings)

*to* the thing-in-itself.

Hence we are obliged to identify the thing-in-itself with that complex of elementary mind-stuff which on other grounds we have seen reason to think of as going along with the material object. Or, to say the same thing in other words, the reality external to our minds which is represented in our minds as matter, is in itself mind-stuff.

This is similar to Berkeley's thought, but Clifford derives a different conclusion. If we knew for certain what material is then it would be reasonable to argue for some version of parallelism or that mind is a construct from material building blocks. It seems to me that we do not know what the material is so Clifford is as justified in positing mind-stuff as another person is justified in positing the Higgs Boson. The difference between these two speculations is that one allows of a possible justification by way of experimentation, the other does not. It does not at the present time but maybe at some future time it will. Now the argument that mind is a material construct dissolves if it is accepted that we have not yet finalised what it is we understand the material to be. Both the physicists of today and Clifford are being equally scientific in their approaches to in the one case 'mind-stuff' and in the other a 'particle'. Both speculations consist of an abstruse speculative model that seeks to answer a problem. I take it as given that no physicist posits a particle that is the building block of minds, but that is only because they have better things to posit to attempt to create a more 'exact' model of the external world. Clifford was a mathematician. In 1982 C.S. Sharma presented a paper titled 'The Role of Mathematics in Physics'.<sup>127</sup> In the paper Sharma writes the following:

Few mathematicians or physicists are ever told what mathematics is-it is assumed to be what they learn in their mathematics courses. This is most unsatisfactory, particularly because students of modern mathematics are repeatedly told that in mathematics existence is synonymous with freedom from contradictions and in mathematics only those things or concepts exist which can be defined in a contradiction-free way. I am talking here about the usual textbooks and the usual courses. This is not to say that no one has ever attempted to define mathematics: on the contrary as is well-known there are tomes written on the definition and the philosophy of mathematics. It seems that there is no universal agreement even among the experts about the definition of mathematics and its role in other disciplines.

Sharma tells us that existence is synonymous with freedom from contradiction. He then goes on to show that the abstruse models generated by pure mathematics although free from contradiction are not necessarily abstractions applicable to the external world. Sharma goes on to provide examples of attempts to define mathematics. He writes the following:

There are thus differences of opinion even among the experts about what mathematics is, but mathematicians seem to agree that mathematics, by which I mean pure mathematics, has nothing to do with the reality of the world as perceived by our senses and that it is independent of other sciences, which study reality.

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<sup>127</sup> 'The Role of Mathematics in Physics' C. S. Sharma, *Brit. J. Phil. Sci.* 33 (1982), 275-286.

How Sharma would differentiate exist from real is of interest. The argument that mathematical concepts are eternally true raises problems. If a concept within a structure that is free from contradiction is independent of sciences which study reality, how can its 'truth' be determined?

Clifford continues his essay:

Hence we are obliged to identify the thing-in-itself with that complex of elementary mind-stuff which on other grounds we have seen reason to think of as going along with the material object. Or, to say the same thing in other words, the reality external to our minds which is represented in our minds as matter, is in itself mind-stuff.

This is similar to Berkeley's argument that we perceive only ideas therefore ordinary objects are ideas. The difference is that 'ideas' are comprised of mind-stuff. If Clifford's cerebral image is taken to be idea then Clifford has posited something more fundamental than ideas, he has posited complexes of mind-stuff, which are feelings. It could be argued that Clifford's cerebral image is an impression. If this line of argument were to be taken the problem arises as to where the impression is located. If the impression is located in the brain then impressions can be created that have no correspondence to the external. Clifford addresses this problem in his essay 'Body and Mind' as follows:

The optic ganglion cannot tell whether this message which comes along the nerve has come from the eye or is the result of a tapping of the telegraph, whether it is produced by light or by pressure upon the nerve.

Under normal circumstances the impression is complex. The impression is not the raw data received, but the raw data interpreted by the brain.

Clifford continues his essay:

The universe, then, consists entirely of mind-stuff.

Clifford makes the claim that the universe consists entirely of mind-stuff. Clifford has told us that 'Perception of the object' is 'the object regarded as complex of my feelings'. It seems to me that Clifford considers 'feelings' to be fundamental. Clifford began this section of his essay with: "That element of which, as we have seen, even the simplest feeling is a complex, I shall call *Mind-stuff*." It

seems strange that Clifford should make the claim that the universe consists entirely of mind-stuff. Clifford has presented previously the five 'beliefs' he holds itemised above. In light of these 'beliefs' his claim regarding mind-stuff cannot be taken as being absolute. When Clifford writes 'entirely of mind-stuff' he is, in my opinion, informing his reader that mind-stuff is all there is in the model he has constructed. This is seen in his previous essay 'Atoms' quoted previously and quoted again here:

There is one other point of very great interest to which I want to call your attention. The word 'atom,' as you know, has a Greek origin; it means that which is not divided. Various people have given it the meaning of that which cannot be divided; but if there is anything which cannot be divided we do not know it, because we know nothing about possibilities or impossibilities, only about what has or has not taken place. Let us then take the word in the sense in which it can be applied to a scientific investigation. An atom means something which is not divided in certain cases that we are considering.

If Clifford can have the insight that to claim that atoms cannot be divided is to make a claim that is not justified, an insight that was shown to be correct, then he is unlikely to make a similar claim in his speculative metaphysical thought.

Clifford continues:

Some of this is woven into the complex form of human minds, containing imperfect representations of the mind-stuff outside them, and of themselves also, as a mirror reflects its own image in another mirror, ad infinitum. Such an imperfect representation is called a material universe. It is a picture in a man's mind of the real universe of mind-stuff.

This section of the essay is difficult to interpret. Nothing I have discussed in the text so far can shed light on Clifford's meaning. A book that recorded three lectures for a University Extension Course in December of 1874 might provide a clue to the intent of Clifford.<sup>128</sup>

Clifford writes the following in *Seeing and Thinking*:

Now a surface, you will remember, is that which separates two different regions of space; the difference between them being that something is in one and is not in the other. But two regions of space may differ in this way: that, five minutes ago, a thing was in one of them and was not in the other. These two regions are still adjacent, still separated by a

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<sup>128</sup> Nature Series, *Seeing and Thinking*, W.K. Clifford, Macmillan and Co. 1879.

surface. So that although a thing is moved away and its surface is moved away with it, yet it is also true that the surface remains in the same place. It is no longer the surface of the thing, but it is the surface of those two regions which were marked out by the thing. *The two regions, of course, are always there, and from having been different once they are distinct for ever.* Thus when anything is moved you see that there must be an infinite number of surfaces, each of which has at some instant or other been the surface of the thing.<sup>129</sup>

Clifford holds that time is discrete, and if, as I believe to be the case, he holds time is discrete with gaps, then conflating this with the quote immediately above, it is possible to interpret the quote above from ‘On the Nature of Things-in-Themselves’.

A possible interpretation is that Clifford is explicating mind in terms of a framework that incorporates discrete time with gaps, ‘matter’ as space, and the relationship of instant to instant in his model. The time that is discrete with gaps I will term  $T_1$ . If a second time  $T_2$  is posited that bridges the gaps in  $T_1$ , and mind-stuff is stuff that resides in  $T_2$ , then  $T_2$  can be provided with a nature that allows for complex human minds to contain imperfect representations of the mind-stuff outside them, and of themselves also.

This could be dismissed as speculation gone wild. Perhaps it is speculation gone wild, but if it is the question of what a tame speculation would be is raised. Speculation should be logical. John Venn made the point clear at the beginning of his essay ‘The Use of Hypotheses’ that:

THE thorough working out of that general view of the nature and province of Logic which, for the sake of brevity, may be termed the Material or Objective view, throws a new light upon, and therefore demands a reconsideration of, a good many detached points.

If Venn is of the opinion that ‘logic’ is of the ‘material, objective’ realm, then its application to the mental, assuming the mental is, is wrong. The problem is to construct a logic that is applicable to the mental. It seems to me that an acceptance of evolutionary theory requires that humility and patience is required in our approach to the problem of minds. I wrote above the following:

Gauss was arguably one of the greatest mathematical minds.

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<sup>129</sup> Pgs. 135-136, *Seeing and Thinking* emphasis in italics is mine.

If I accept that there are minds, that minds are complex structures, and an evolutionary theory of mind, it would be wrong to claim that Gauss was the greatest mathematical mind once a von Neumann had arrived on the scene. A comment made by James Joseph Sylvester may be relevant:

As a public teacher of mere striplings, I am often amazed by the facility and absence of resistance with which the principles of the infinitesimal calculus are accepted and assimilated by the present race of learners. When I was young, a boy of sixteen or seventeen who knew his infinitesimal calculus would have been almost pointed at in the streets as a prodigy, like Dante, as a man who had seen hell. Now-a-days, our Woolwich cadets at the same age talk with glee of asymptotes and points of contrary flexure, and discuss, questions of double maxima and minima, or ballistic pendulums, or motion in a resisting medium, under the familiar and ignoble name of sums.<sup>130</sup>

Clifford concludes his essay as follows:

The two chief points of this doctrine may be thus summed up:-

Matter is a mental picture in which mind-stuff is the thing represented. Reason, intelligence, and volition are properties of a complex which is made up of elements themselves not rational, not intelligent, not conscious.

I see no problem with the conclusion Clifford arrives at, the problems are contained in the structure Clifford posits that lead to the conclusion.

Clifford does include a note that is supplementary to the essay. The note reads as follows:

NOTE.-The doctrine here expounded appears to have been arrived at independently by many persons; as was natural, seeing that it is (or seems to me) a necessary consequence of recent advances in the theory of perception. Kant threw out a suggestion that the *Ding-an-sich* might be of the nature of mind; but the first statement of the doctrine in its true connection that I know of, is by Wundt. Since it dawned on me, some time ago, I have supposed myself to find it more or less plainly hinted in many writings; but the question is one in which it is peculiarly difficult to make out precisely what another man means, and even what one means one's self. Some writers (*e.g.*, Dr. Tyndall) have used the word *matter* to mean the phenomenon *plus* the reality represented; and there are many reasons in favour of such usage in general. But for the purposes of the present discussion I have

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<sup>130</sup> *Nature* Volume 1 Pg.238

thought it clearer to use the word for the phenomenon as distinguished from the thing-in-itself.

Ernst Mach found this note ‘delightfully humorous’.<sup>131</sup> My own comment on the ‘Note’ would be to borrow from Hume and suggest that ‘Reason is the slave of feelings’.

## 2.12 Is Clifford’s Thought Coherent?

It has been seen that Clifford held some unusual views; a space theory of matter, the nature of time to be discrete, and mind–stuff. My understanding of Clifford’s thought is that it stems from a rejection of absolutes. As he said in his lecture ‘Atoms’:

....we know nothing about possibilities or impossibilities, only about what has or has not taken place. Let us then take the word in the sense in which it can be applied to a scientific investigation. An atom means something which is not divided in certain cases that we are considering.

He also held that the infinite is infinite. This might appear to be trivial but I am not so sure.

Mathematics has developed understandings of the infinite that are beyond the understanding of a person not amenable to mathematical thought. Poincaré provided an explanation of the origin of the mathematical continuum as opposed to the physical continuum. Poincaré tells us that the mathematical continuum derives from a physical continuum and a material logic. His argument is given in *Science and Hypothesis*, and in *The Value of Science*.<sup>132</sup>

My purpose is not to enter into Poincaré’s thought, rather it is to show that Poincaré’s thought follows on, to some degree, from the thought of Clifford. Poincaré writes:

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<sup>131</sup> *The Analysis of Sensations*, Ernst Mach, Preface to the third edition. November 1901.

<sup>132</sup> *The Foundations of Science*, H. Poincaré . Authorised Translation by George Bruce Halsted, The Science Press, New York and Garrison, N.Y. 1921. Pgs. 52-54 and Pgs. 240-244

The mind uses its creative faculty only when experience requires it.<sup>133</sup>

Clifford made use of his creative faculty to explicate mind and create a model that removed mind/body duality.

The thought of Poincaré was translated by George Bruce Halsted. The translation was *authorised*. Halsted writes the following in his 'Translator's Introduction' to *The Value of Science*:

4. Without Hypotheses, no Science.—Nobody ever observed an equidistancial, but also nobody ever observed a straight line.

Emerson's Uriel

"Gave his sentiment divine

Against the being of a line.

Line in Nature is not found."

Clearly not, being an eject from man's mind. What is called 'a knowledge of facts' is usually merely a subjective realization that the old hypotheses are still sufficiently elastic to serve in some domain; that is, with a sufficiency of conscious or unconscious omissions and doctoring and fudgings more or less wilful. In the present book we see the very foundation rocks of science, the conservation of energy and the indestructibility of matter, beating against the bars of their cages, seemingly anxious to take wing away into the empyrean, to chase the once divine parallel postulate broken loose from Euclid and Kant.<sup>134</sup>

Halsted uses the word 'eject'.

Poincaré provided a preface to the translation of his work. In his preface Poincaré writes the following:

The American public is therefore much better prepared than has been thought for investigating the origin of the notion of space. Moreover, to analyze this concept is not to sacrifice reality to I know not what phantom. The geometric language is after all only a

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<sup>133</sup> Ibid Pg.52

<sup>134</sup> Ibid Pg.203

language. Space is only a word that we have believed a thing. What is the origin of this word and of other words also? What things do they hide? To ask this is permissible; to forbid it would be, on the contrary, to be a dupe of words; it would be to adore a metaphysical idol, like savage peoples who prostrate themselves before a statue of wood without daring to take a look at what is within.<sup>135</sup>

Poincaré tells us that geometry is expressed in the nature of a language. Clifford, like Poincaré, was a mathematician. If geometry is expressed and developed as a formal language it is reasonable to consider what the nature of that language is. This is what Clifford had done. Clifford had dared to take a 'look inside'. Clifford had told us the following:

These elements of feeling have relations of *nextness* or contiguity in space, which are exemplified by the sight-perceptions or contiguous points; and relations of succession in time, which are exemplified by all perceptions. Out of these two relations the future theorist has to build up the world as best he may. Two things may perhaps help him. There are many lines of mathematical thought which indicate that distance or quantity may come to be expressed in terms of *position* in the wide sense of the *analysis situs*. And the theory of space-curvature hints at a possibility of describing matter and motion in terms of extension only.

Poincaré was to develop analysis situs to topology. He also applied himself to space-curvature.

Clifford looked inside and attempted an explication of the nature of language. It has been seen that Clifford failed to emerge from his mental realm without resorting to the positing of mind-stuff. Frege was to take the external as a given, and from the external attempt to find a path to the inner realm.

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<sup>135</sup> Ibid Pg. 5

### Chapter 3 An Overall Analysis

In Chapter 2 I have attempted to provide the essays in chronological order. The ‘Space Theory of Matter’ has a date it was communicated to the Cambridge Philosophical Society but not the date it was written. What was communicated was an ‘Abstract’. I am unaware of anything other than the Abstract.

The essay ‘Knowledge and Feeling’ was seen to be a fragment found among Clifford’s papers after his death.

*The following fragment appears to represent what was the conclusion of the series of Lectures as they were delivered in March, 1873. It was found among Professor Clifford's papers without any external indication of its proper context; and as the Lectures now stand after the author's revision, it seems to come in better as an appendix to the first of them. Clifford himself regarded it apparently (note to the Third Lecture in 'Nineteenth Century,' March 1879) as superseded by his article on 'the Nature of Things-in-themselves;' but it contains critical remarks and illustrations which are not there, and it has seemed best to the Editors to let it stand in this place.*

This quoted paragraph is not the thought of Clifford. The following is the thought of Clifford as presented in a footnote found on the first page of the ‘paper’ published in the *Nineteenth Century*:

This paper completes the publication of the substance of a series of three lectures delivered at the Royal Institution in 1873. The first two were published in the *Contemporary Review* while it was under the guidance of the present Editor of the *Nineteenth Century*. The third lecture contained—besides the substance of what is now here published—a statement of the doctrines afterwards set forth in a paper on the nature of things in themselves published in *Mind*, 1878.

The thought of Clifford as presented in *Lectures and Essays* is like a shuffled pack of cards, what is more some of the cards have bits missing. It is necessary where possible to go to the original source of the essays and read the original. This has been made less onerous by the availability of databases on the internet. It seems to me that the presentation by the authors of *Lectures and Essays* has been

the cause of much confusion. Clifford is difficult enough to understand without the added problem of first having to untangle the chronology of his thought.

The following may be of use:

On Some Conditions of Mental Development	Royal Institution	6. 03. 1868
Space Theory of Matter [Abstract]	Cambridge Philosophical Society	21. 02.1870
On Theories of the Physical Forces	Royal Institution	18. 02.1870
Atoms	Sunday Lecture Society	07. 01.1872
	Manchester	20. 11.1872
Aims and Instruments of Scientific Thought	British Association, at Brighton	19. 08.1872
The Philosophy of the Pure Sciences	Royal Institution	03.1873
On the Nature of Things-in-Themselves	Metaphysical Society	09. 06.1874
Body and Mind	Sunday Lecture Society	01. 11.1874
The Scientific Basis of Morals	Metaphysical Society	09. 03.1875
	Contemporary Review	26. 09.1875
The Unseen Universe	Fortnightly Review	06.1875
Ethics of Belief	Metaphysical Society	11. 04.1876
	Contemporary Review	1877
On the Nature of Things-in-Themselves	Mind	01.1878

This list includes those essays I used to establish my interpretation of Clifford's metaphysic. I include 'The Scientific Basis of Morals' and 'The Ethics of Belief' for reasons that will be apparent in this chapter.

### 3.1

Clifford wrote that he held time to be discrete. I have suggested that Clifford held time to be discrete with gaps. This is how Clifford introduced his holding of discrete time:

... That is to say, for instance, if I move my hand so in front of me, and apparently see it take up in succession every possible position on its path between the two extreme positions; do I really see this, or do I only see my hand in a certain very large number of distinct positions, and not at all in the intervening spaces?

I have no doubt whatever myself, that the latter alternative is the true one, and that the wheel of life is really an illustration and type of every moment of our existence. But I am not going to give my reasons for this opinion, because it is quite a different question from the one I am trying to get at.

Clifford tells us he is not going to give his reasons for this opinion. Whether or not his reason could be gleaned from his mathematical works I would not know.

Within his essays that I have considered the discrete nature of time is mentioned by using the phrase 'relations of succession in time'. This is my interpretation.

Clifford wrote his essay 'The Unseen Universe' in a single 'all night' sitting. I feel that Clifford was incensed by something. I'm not sure what it was that had incensed him. Perhaps it was that the book *The Unseen Universe* had been published initially anonymously. Did Clifford know who the authors were? Irrespective of these mysteries Clifford did provide an insight into his speculative thought by providing his understanding of feelings. Clifford wrote the following:

These elements of feeling have relations of *nextness* or contiguity in space, which are exemplified by the sight-perceptions or contiguous points; and relations of succession in time, which are exemplified by all perceptions. Out of these two relations the future theorist has to build up the world as best he may. Two things may perhaps help him. There are many lines or mathematical thought which indicate that distance or quantity may come to be expressed in terms of *position* in the wide sense of the *analysis situs*. And the theory of space-curvature hints at a possibility of describing matter and motion in terms of extension only.

The following is taken from 'The Reception of a Mathematical Theory: Non-Euclidean Geometry in England, 1868-1883'<sup>136</sup>:

This interpretation of non-Euclidean geometry through different definitions of distance in projective geometry represented the perfect solution to the problem facing English mathematicians. The belligerently empirical differential geometry of Riemann, Helmholtz, and Clifford could be ignored as their mathematical results were reinterpreted through the philosophically conservative projective geometry.

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<sup>136</sup> 'The Reception of a Mathematical Theory: Non-Euclidean Geometry in England, 1868-1883' Joan L. Richards, in *Natural Order Historical Studies of Scientific Culture* Eds. Barry Barnes and Steven Shapin, Sage Publications 1979.

One of the problems of grouping people together for their preferred position is that first it is necessary to establish what their position is. Clifford has been said to be a 'Member of the Scientific Naturalists'. I am not qualified to enter into a discussion of geometries but Clifford's suggestion that a future theorist will employ analysis situs to resolve certain problems suggests to me that he recognises other geometries than differential geometry. I would take note of the comment made by Sylvester:

Like the late Dr. Whewell, Professor Clerk Maxwell, and Sir William Thomson, Mr. Clifford was Second Wrangler at the University of Cambridge. I believe there is little doubt that he might easily have been first of his year had he chosen to devote himself exclusively to the University curriculum instead of pursuing his studies, while still an undergraduate, in a more extended field, and with a view rather to self-culture than to the acquisition of immediate honour or emolument.

Why would a person that does not seek immediate honour or emolument shackle himself to some 'group objective', why would a group take into their ranks a person that because of their honesty is likely to veer from the group position? I find this tangential to main purpose of my thesis, that being to provide an overall view of Clifford's metaphysic, however it has raised its head so I will run with it a short way.

It seems to me that although Clifford is regarded as being outspoken there is something he was holding back on. If Clifford can tell us of his position in regard to discrete time, and analysis situs being the path to an understanding of feelings, why are there no Cliffordian papers that show his work in these areas? Maybe there are in his mathematical works. I have not ventured into those because my abilities in abstruse mathematics limit my understanding. However if they are in his mathematical works then presumably a person researching Clifford from the mathematical side would have found them long ago. Is Clifford's thought mere attention seeking? I don't believe it is. If it were why would John Wheeler have recognised Clifford's work? I'll leave it to others better qualified to pursue this line of enquiry.

It seems to me that Clifford has established his metaphysic by mid 1874 when he presented 'On the Nature of Things-in-Themselves' to the Metaphysical Society. The essay 'Body and Mind' does nothing to further Clifford's model. Clifford had made known his 'Space Theory of Matter' in 1870. If Clifford had been able to achieve a mathematical model for his postulate he would have published. It is impossible for one person to know another but it is possible to have sympathy for them. Clifford has mathematical abilities that are exceptional. He has the ability to visualize things in space. It seems to

me that he can feel his model of space and time but fails to express the feelings in a ‘mathematical language’. This must have been frustrating for Clifford.

I’m not a mathematician. I make no claim to being a metaphysician. My working life was as a mining engineer. There is a thing known to miners that is referred to as ‘pit sense’. Maybe it is a belief that is needed if you are going to retrieve machinery in broken ground. Poincaré was a mining engineer so I assume he would be aware of ‘pit sense’. There are no books or instruction manuals that can provide a person with pit sense.

It seems to me that Clifford was able to feel something he could not express. Interestingly it is in ‘The Unseen Universe’ that he blurts out his ‘definition of feeling’. In light of my thought just presented the following becomes clearer to me:

These elements of feeling have relations of *nextness* or contiguity in space, which are exemplified by the sight-perceptions or contiguous points; and relations of succession in time, which are exemplified by all perceptions. Out of these two relations the future theorist has to build up the world as best he may. Two things may perhaps help him. There are many lines of mathematical thought which indicate that distance or quantity may come to be expressed in terms of *position* in the wide sense of the *analysis situs*. And the theory of space-curvature hints at a possibility of describing matter and motion in terms of extension only.

Whatever else Clifford has said in his essay ‘The Unseen Universe’ he has told us he has failed. He must leave it to a future theorist. As a believer in evolution of the mind Clifford has recognised that he is not ‘evolved enough’ to convert his own ‘feelings’ into thought.

I would ask two more questions on this matter. Did those persons responsible for the private papers of Clifford after his death have the ability to recognise his notes [should there have been any] on the speculation of a space theory of matter or an ‘analysis situs’ that would be relevant to feelings? Secondly if such papers were recognised could they have been discarded to protect Clifford or the Establishment?

### 3.2 Emergentism

It is seen above that it was Lewes that coined the word emergent in regard to properties. It was C.D. Broad that presented an analysis of emergentism in his Turner Lectures of 1923. These lectures form his book *The Mind and its Place in Nature* first published in 1925<sup>137</sup>. Broad writes the following:

This sort of over-simplification has certainly happened in the past in biology and physiology under the guidance of the mechanistic ideal; and it of course reaches its wildest absurdities in the attempts which have been made from time to time to treat mental phenomena mechanistically.

On the emergent theory we have to reconcile ourselves to much less unity in the external world and a much less intimate connexion between the various sciences. At best the external world and the various sciences that deal with it will form a kind of hierarchy. We might, if we liked, keep the view that there is only one fundamental kind of stuff. But we should have to recognise aggregates of various orders. And there would be two fundamentally different types of law, which might be called “intra-ordinal” and “trans-ordinal” respectively.<sup>138</sup>

I will not present Broad’s thought as it is there to read in his book. I would consider the emergent nature found in Clifford’s model. In his ‘On the Nature of Things-in-Themselves’ Clifford wrote the following:

*Of such a nature is the correspondence or parallelism between mind and body. The fundamental “deliverance” of consciousness affirms its own complexity. It seems to me impossible, as I am at present constituted, to have only one absolutely simple feeling at a time. Not only are my objective perceptions, as of a man’s head or a candlestick, formed of a great number of parts ordered in a definite manner, but they are invariably accompanied by an endless string of memories, all equally complex. And those massive organic feelings with which, from their apparent want of connection with the objective order, the notion of consciousness has been chiefly associated,—those also turn out, when attention is directed to them, to be complex things.*

I have highlighted what I believe to be relevant to emergence. If I take ‘fundamental “deliverance”’ to be emergence then it seems to me that there is a link between ‘emergence’ and ‘parallelism’. If

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<sup>137</sup> *The Mind and its Place in Nature* C.D. Broad, New York Harcourt, Brace & Company, Inc. 1925

<sup>138</sup> *Ibid.* Pg.77

Clifford had no need to resort to emergentism and thus parallelism his model would be complete and absolute. I do not accept that Clifford did hold that his model was complete, so it would be expected that it would involve emergence and thus a *kind* of parallelism. In order to understand Clifford it should be remembered, as always, that in his essay he is arguing from his mind to an externality. Clifford's 'objective order' is still within the 'internal', that is his mind. In Clifford's model consciousness emerges from mind-stuff, and Clifford's objective order emerges from his consciousness.

This line of thought is possible if my interpretation of Clifford is first accepted. Obviously if my interpretation of Clifford's model is rejected as being non-sense then this understanding of emergence and its application would also be non-sense. Whether or not Broad's explication of emergence is applicable to a speculative metaphysic I'm unsure. At the stage of Clifford's speculation the role of intra-ordinal and trans-ordinal laws may not be applicable.

### 3.3 Clifford's discrete time and the possibility that he held that time was discrete with gaps

I would suggest that Clifford's understanding of time stems from his work on the space theory of matter. This relates to Thomas Young's work on light. Following Young there were two classical theories of light. I assume that Clifford recognised both and sought to develop a model that would remove the requirement of a 'parallelism'. In the 20<sup>th</sup> C the parallelism was removed by development of quantum theories.

Planck time is the smallest duration of time that would allow for measurement in the prevailing model of physics. Clifford postulates a discrete time. Whether or not Clifford understood his discreteness to be of duration or an instant I am unsure. If it is of duration then there can be change within the duration. Clifford draws inspiration for his theory of discrete time from the Zoetrope. The images of the Zoetrope are fixed, they do not change. In-between the images there is no image. One static image is followed by another static image. The one image is succeeded by another.

If the world of Clifford's model is to be verified, the verification would require advances in technology and experimental procedures that would be outside the limitations of the present paradigm of science. It seems to me that Clifford's model is still one of speculative metaphysics and we must wait for its refutation or confirmation.

If Clifford held that time is discrete [instants] with gaps then he has the problem of how two successive instants relate to each other.

### 3.4 Further comments on a quote of Clifford

Now this establishment of correspondence between two aggregates and investigation of the properties that are carried over by the correspondence may be called the central idea of modern mathematics: it runs through the whole of the pure science and of its applications. It may be conceived, therefore, that propositions which are apparently as general and certain as those we have discussed to-day may be analysed in the same manner, and shown to be really statements about the apparatus of thought.

My interpretation of Clifford's 'apparatus of thought' is that it is 'apparatus of *language*'; language being taken in its broadest sense. The problem is that thought suggests 'thinking' but it seems to me that 'thinking' takes place at a deeper level than that of '*language*'. My own understanding is that there is a hierarchy as follows:

Feeling

Idea

Thought

I take it to be necessary to take 'thought' as something that is of the world. As such it is within the realm of what Clifford terms the 'objective order'. 'Ideas' cannot be of the objective order. 'Feelings' are the foundation that Clifford arrives at for the formation of ideas. Clifford's model is a model not a complete ontology, and so although Clifford takes things further back he is still left with something deeper. Many scientists and mathematicians recognise the close relationship of abstruse mathematical thought and poetry, examples being Sylvester, Maxwell, and Bronowski. It was seen above that Pollock made this point in his comments contained in the Introduction to *Lectures and Essays*. In Clifford's model the relationship between his 'subjective order' and 'objective order' [ both being within the internal] is important. How this relationship could be explicated employing my understanding of *language* is problematic.

Berkeley had employed 'ideas' in his metaphysic. Clifford by positing feelings and mind-stuff has taken his metaphysic 'further back' and not made reference to God. Clifford cannot deny God or something deeper than his mind stuff without claiming his model is an absolute model. I would suggest that Clifford held a version of 'Ultimism' as presented by J.L. Schellenberg.

The following is taken from *Word and Object* by Willard van Orman Quine:

Section 10 left the linguist unable to guess the trend of the stimulus meaning of a non-observational occasion sentence from sample cases. We now see a way, though costly, in which he can still accomplish radical translation of such sentences. He can settle down and learn the native language directly as an infant might. Having thus become bilingual, he can translate the non-observational occasion sentences by introspected stimulus synonymy.

This step has the notable effect of initiating clear recognition of native falsehoods. As long as the linguist does no more than correlate the native's observation sentences with his own by stimulus meaning, he cannot discount any of the native's verdicts as false—unless *ad hoc*, most restrainedly, to simplify his correlations. But once he becomes bilingual and so transcends the observation sentences, he can bicker with the native as a brother.

The problem I have with Quine's assertion that "He can settle down and learn the native language directly as an infant might." is that the 'objective order' of the linguist contains his first language, whereas the native infant's objective order contains no 'natural language' prior to his acquiring it.

I have already quoted Craik in the introduction in regard to the 'bottomless morass'.

How the realms of 'Idea' and 'Feeling' could be explicated by the apparatus of thought is the problem. This was my reason for writing the first paragraph of my introduction above; anyone that requires the comfort of 'knock down arguments' will be disappointed. Clifford said it himself:

Since it dawned on me, some time ago, I have supposed myself to find it more or less plainly hinted in many writings; but the question is one in which it is peculiarly difficult to make out precisely what another man means, and even what one means one's self.

### 3.5 Clifford's ethic and its relevance to his metaphysic

I find ethics difficult. I hold that Clifford's metaphysic is established by the time he presents his 'On the Nature of Things-in-Themselves' to the Metaphysical Society June 1874. Clifford's essay 'The Scientific Basis of Morals' was presented to the Metaphysical Society March 1875. I presume that Clifford worked to justify his metaphysic. His ethical writings could be taken as being Clifford's justification [to himself] for his efforts to justify his metaphysic.

## Chapter 4 Reactions to Clifford

It has been seen that Clifford received support from Sylvester, Cayley, Maxwell, Robertson and Huxley. He also attracted strong criticism.

### 4.1 Clement Mansfield Ingleby

Ingleby was a contemporary of Clifford. They were known to each other. Both were members of the London Mathematical Society.

Clement Mansfield Ingleby ( October 1823-September 1886 ) was born in Edgbaston, Birmingham, and studied mathematics at Cambridge. He returned to Birmingham to take up a position in his father's law firm. In 1859 he left Birmingham for the south of England and concentrated on writing. He wrote '*An Introduction to Metaphysics*'<sup>139</sup>, a two volume work that appeared in 1864 and 1869. The role Ingleby played in the 19<sup>th</sup> Century debates relating to mathematics and metaphysics is given in Peter C. Kjærgaard 'Migraine and Metaphysics: Sentinels of Science in Nineteenth-century Physics'<sup>140</sup>.

Ingleby wrote a letter to the Editor of *Nature* in February of 1873.<sup>141</sup> The letter contained the following:

The friend, who (as I stated in my letter in *Nature*, Feb. 6) called my attention to Prof. Clifford's address in *Macmillan's Magazine* for October last, asked me certain questions respecting curved space, which I was quite unable to answer; and another friend, occupying the foremost place among English philosophers, has since communicated to me the great discomfort which Prof. Clifford's views had occasioned him, and suggested that I should comment upon them in *Nature*.

Ingleby's letter of 6 February began as follows:

My attention has been directed by a friend to an address by Prof. W. K. Clifford, in *Macmillan's Magazine* for this month, containing a curious misrepresentation of Kant's teaching, and therein an instructive instance of *ultracrepidism*.<sup>142</sup>

<sup>139</sup> '*An Introduction to Metaphysics. Part 1*' London: A.Asher & Co., 1864

<sup>140</sup> *Journal of Cambridge Studies, Volume 5, No.4*

<sup>141</sup> '*Nature*' Feb. 13, 1873 'Letters to the Editor' pp. 282-283 C.M. Ingleby, Athenaeum Club, Feb. 8

<sup>142</sup> *Ibid* Pg. 262. 'ultracrepidism' seems to be a shortened version of 'ultracrepidarianism'.

The letter also contained the following:

*In limine* allow me to express my regret that Prof. Clifford should have selected such a topic for the entertainment of a popular audience. It is quite incredible that any of his hearers could have apprehended his meaning. There was assuredly no need for the lecturer to have cast a glamour on their mental eye by the invocation of those awful names, Lobatchewsky and Gauss, Riemann and Helmholtz.

In 1870 Ingleby had published a book titled *The Revival of Philosophy at Cambridge*.<sup>143</sup> Ingleby wrote the following:

According to my judgment, Hume is the only author before Kant with whom the student of Modern Philosophy has any need to be conversant. Locke, Condillac, Leibnitz, Berkeley, and Wolff may be dispensed with. Accordingly, Hume's Treatise on Human Nature, and his Essays, should be added to the Revised List. New editions of both, by Messrs. T. H. Green, and T. H. Grose, of Balliol College, Oxford, are at press, and will shortly be published by Longmans & Co.

There is but one portal to Modern Philosophy, and but one key to Ancient Philosophy; that portal is Kant, and that key is furnished by the greatest outcome of Kant's Philosophy, viz. Hegel. I am not disposed to dogmatise on these matters. I assert a self-evident fact, that for the advanced student of Metaphysics no other door stands open. To employ Dr. Stirling's figure of speech, no teacher that comes after Kant should be listened to, unless it be certified that he has emptied Kant's vessel into his own.<sup>144</sup>

The Clifford Ingleby letters of February 1873 show the forces that Clifford was up against. The philosophy of Kant was revered by certain members of the *intelligentsia* of Clifford's time. Clifford does respond to Ingleby but after a short exchange of letters walks away from the 'debate'.

## 4.2 Gottlob Frege

Frege was born in 1848 and died in 1925. Frege was a contemporary of Clifford.

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<sup>143</sup> *The Revival of Philosophy at Cambridge*, C.M. Ingleby, J.Hall and Son, 1870.

<sup>144</sup> *Ibid* Pg. 54

Frege's PhD was "On a Geometrical Representation of Imaginary Forms in the Plane". Both Clifford and Frege were geometers.

Frege was a logician.

The January 1878 edition of *Mind* has already been discussed above. The contents of that edition would be relevant to Frege. I take it as given that Frege would be aware of it. The problem for Frege is that *Mind* was in the English language, and its interpretation would be first subject to interpretation from English to German. It is possible that Frege would have a pre-conceived understanding of *idealism*. Rather than take the essays that appeared in *Mind* to be speculative models, he may have seen them as a retrograde step to his understanding of idealism.

Frege being aware of the January 1878 edition of *Mind* is speculation. Frege was aware of the work of Czolbe and Lotze. What Frege understood by 'idealism' involves understanding the academic world he found himself in. Hans Sluga provides an account of this world.<sup>145</sup> Whatever the background Frege wrote the following in 1879:

[Frege commented on this fact in 1879 (NS, pp. 155-6)]

Psychological treatments of logic have their source in the error that the thought (the judgment, as one usually says) is something psychological just like an idea. This leads then necessarily to epistemological idealism.....This flowing into idealism is the most remarkable in physiological psychology, because it is in sharp contrast to its realistic starting-point.<sup>146</sup>

Frege tells us the starting-point is realistic. In what sense Frege uses the word 'realistic' I am unsure. There are problems with interpreting Frege from the original German into English. It will be seen that Max Black initially translated the German to give 'concept' but later this was to become 'idea'. Wittgenstein was influenced by Frege. In regard to starting points Wittgenstein wrote the following:

5.4.

[ Here there is still a big gap in my thinking. And I doubt whether it will be filled now.]

<sup>145</sup> *The Arguments of the Philosophers Gottlob Frege*, Hans D. Sluga, Routledge and Kegan Paul Ltd. 1980.

<sup>146</sup> *Ibid* Pg. 31. [NS *Nachgelassene Schriften*, ed. H. Hermes *et al.*, Hamburg, 1969.]

471. It is so difficult to find the *beginning*. Or, better: it is difficult to begin at the beginning. And not try to go further back.<sup>147</sup>

It seems to me that Venn has stated the case clearly.<sup>148</sup>

Vast amounts of opinions have been given on Frege's thought. Michael Dummett wrote the following:

He accounts for tone as a matter of the association with a word or expression of certain 'ideas' (Vorstellungen), by which he means mental images. This is not a particularly plausible explanation of the phenomenon: we indeed speak of words which carry the same sense as having different associations, but we should be hard put to it to describe the distinct mental images called up by hearing the words 'dead' and 'deceased', or 'sweat' and 'perspiration', still less by 'and' and 'but'. Frege makes a poor explanation worse by suggesting that mental images are incommunicable in principle: no two people can ever know that they have the same mental image. It would follow that tone was a feature of meaning which was, in principle, subjective. This conclusion is a simple contradiction. Meaning, under any theory whatsoever, cannot be *in principle* subjective, because meaning is a matter of what is *conveyed* by language.<sup>149</sup>

Dummett tells us that Frege means by 'ideas' 'mental images'. Dummett also tells us that meaning cannot be subjective [in principle] because meaning is what is conveyed in language.<sup>150</sup> Dummett's world, if it could ever be encountered, would be very pleasant; misunderstandings would be a thing of the past. It would also be a world in which there was no deception. It would also be a world in which that which is comprehensible to one person is comprehensible to another.

In May 1948 Max Black presented his translation of 'Sense and Reference'.<sup>151</sup> Black wrote:

<sup>147</sup> *On Certainty*, Ludwig Wittgenstein, ed. G.E.M. Anscombe and G.H. von Wright, Translated by Denis Paul and G.E.M. Anscombe, Basil Blackwell, Oxford 1969-1975.

<sup>148</sup> See the first sentence of his essay 'The Use of Hypotheses' quoted above.

<sup>149</sup> *Frege philosophy of language*, Second Edition, Michael Dummett, Harvard University Press, 1981. Pg. 85

<sup>150</sup> Cf. Clifford: "but the question is one in which it is peculiarly difficult to make out precisely what another man means, and even what one means one's self."

<sup>151</sup> 'Sense and Reference' *The Philosophical Review*, Vol. 57, No. 3 (May, 1948), pp. 209-230 Max Black

We can include with the conceptions the direct experiences in which sense- impressions and activities themselves take the place of the traces which they have left in the mind. The distinction is unimportant for our purpose, especially since memories of sense- impressions and activities always help to complete the conceptual image. One can also understand direct experience as including any object, in so far as it is sensibly perceptible or spatial.

Hence it is inadvisable to use the word "conception" to designate something so basically different.

In 1952 Peter Geach and Max Black present the book *Translations from the Philosophical Writings of Gottlob Frege*.<sup>152</sup> Changes have been made to the translation of 'Sense and Reference'. The revised translation is:

\* We can include with ideas the direct experiences in which sense- impressions and acts themselves take the place of the traces which they have left in the mind. The distinction is unimportant for our purpose, especially since memories of sense- impressions and acts always go along with such impressions and acts themselves to complete the perceptual image. One may on the other hand understand direct experience as including any object, in so far as it is sensibly perceptible or spatial.

† Hence it is inadvisable to use the word 'idea' to designate something so basically different.

'Conceptions' have become 'ideas'.

Translation is no easy task. Barry Smith discusses the problems in his address 'German Philosophy: Language and Style'.<sup>153</sup> Smith writes the following:

In spite of all of this, however, the typical Anglo-Saxon philosopher will still insist on linguistic simplicity. And he will tolerate no talk of any special persons or traditions or epochs enjoying a special relation to the language of philosophy. His conception of philosophy will be orientated much rather around ideas concerning objective meaning derived from Bolzano or Frege. For such a philosopher, even if he rejects a Platonistic ontology of ideal meanings, will still conceive his philosophical writings as consisting of

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<sup>152</sup> *Translations from the Philosophical Writings of Gottlob Frege*, Edited by Peter Geach and Max Black, Basil Blackwell Oxford 1952

<sup>153</sup> 'German Philosophy: Language and Style', Barry Smith, preprint version of paper published in *Topoi*, 10 (1991), 155-161

objective and therefore unproblematically translatable propositions (theses, arguments, refutations). Moreover, he will insist that a modest vocabulary and syntax not only contributes to ensuring optimal intelligibility but allows also the rigorous formulation of more complex chains of argument than a more literary language would permit.

This is all well and good but it masks the problems brought to light in the Frege Hilbert controversy and Poincaré's rejection of the work of Cantor. As Sluga wrote:

The exchange between Frege and Hilbert and Frege's essays on the foundations of geometry are disappointing because the interests and views of the two opponents remain too far apart. What separates Frege from Hilbert is not just a disagreement about the role of axioms in geometry, but an altogether different conception of the nature of geometry itself. Hilbert's work is the culmination of a process that began with Gauss's suggestion of the possibility of non-Euclidean geometry. If we take that suggestion seriously we begin to drain geometry of its intuitive content and turn it into a formal theory. In Hilbert's work the separation of the formal theory from its intuitive filling is complete. Frege, on the other hand, believes with Kant that geometry is a theory of intuitive contents. Just as he rejects the formalist interpretation of arithmetic he also rejects the formalist interpretation of geometry as expressed in Hilbert's work.<sup>154</sup>

Max Black presented his first translation of 'Sense and Reference' in 1948. In the summer of 1949 Black met Wittgenstein in New York. The following is taken from *From Frege to Wittgenstein*:

Wittgenstein's *Philosophical Investigations* (essentially finished in 1949) was his last major work. It is, however, not the last piece of evidence for us to consider. There are three more such pieces, all three involving not Wittgenstein's writings, but his interactions with students and friends. First, in the summer of 1949, Wittgenstein went on a trip to the United States, at the invitation of Norman Malcolm. In July and August of that year he was in Ithaca, New York, where he had various conversations with Malcolm and his colleagues at Cornell University. More particularly, Malcolm and the others engaged Wittgenstein in several reading groups. Participants in these groups, besides Wittgenstein

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<sup>154</sup> *The Arguments of the Philosophers Gottlob Frege*, Hans D. Sluga, Routledge and Kegan Paul Ltd. 1980, Pg. 172

and Malcolm, were Max Black, Oets Bouwsma, Stuart Brown, Willis Doney, and John Nelson. Later both Malcolm and Bouwsma reported on various aspects of these meetings. Both tell us that Wittgenstein did not just want to talk about his own work with them, but also about some other texts—including some of Frege's writings. In this case it was especially Frege's article "Über Sinn und Bedeutung" he wanted to discuss. Finally, both Malcolm and Bouwsma relate that Wittgenstein's attitude toward this text was not, as one might expect, that toward an antiquated, long-refuted work. Rather he still, or again, was very much engaged in its content; he still found it worthwhile, even necessary, to actively separate what was in his view right in it from what was wrong.<sup>155</sup>

Wittgenstein influenced Geach and Black regarding their interpretation of Frege. Geach is quoted as follows:

[Wittgenstein] advised me to translate 'Die Verneinung' but not 'Der Gedanke': that, he considered, was an inferior work – it attacked idealism on its weak side, whereas a worthwhile criticism of idealism would attack it just where it was strongest. Wittgenstein told me he had made this point to Frege in correspondence: Frege could not understand – for him, idealism was the enemy he had long fought, and of course you attack your enemy on his weakest side.<sup>156</sup>

What Wittgenstein understood 'idealism' to be is debateable. In regard to 'Der Gedanke', my understanding is that Frege starts from a materialist position, attempts to argue to the 'mind', fails and posits a 'third realm'.

The following is taken from 'On Sense and Reference' as reprinted in A.W. Moore (ed.) *Meaning and Reference*:

The reference and sense of a sign are to be distinguished from the

[p25]

associated idea. If the reference of a sign is an object perceivable by the senses, my idea of it is an internal image, [5] arising from memories of sense impressions which I have had and acts, both internal and external, which I have performed. Such an idea is often

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<sup>155</sup> *From Frege to Wittgenstein* Edited by Erich H. Reck, Oxford University Press 2002, 'Wittgenstein's "Great Debt" to Frege' by Erich H. Reck, Pg. 26

<sup>156</sup> *Ibid* Pg.27

saturated with feeling; the clarity of its separate parts varies and oscillates. The same sense is not always connected, even in the same man, with the same idea. The idea is subjective: one man's idea is not that of another. There result, as a matter of course, a variety of differences in the ideas associated with the same sense.

Frege tells us that “..idea of it is an internal image,..”. If the reference of a sign were an internal image Frege could have said:

‘If the reference of a sign is an object perceivable by the senses, it is an internal image.’

Frege does not say that, he says much more.

Dummett has told us: “He accounts for tone as a matter of the association with a word or expression of certain ‘ideas’ (Vorstellungen), by which he means mental images.”

Wittgenstein has told us [Geach] that Frege’s enemy was ‘idealism’. What does Frege and Wittgenstein consider ‘idealism’ to be? If Frege can tell us that “Such an idea is often saturated with feeling; the clarity of its separate parts varies and oscillates.” what does he understand ‘feelings’ to be?

Dummett seems to hold that ‘ideas’ can be expressed.

Paul Redding provided his understanding of “Idealism” as understood in the German tradition as follows:

“Idealism” is a term that had been used sporadically by Leibniz and his followers to refer to a type of philosophy that was opposed to *materialism*.<sup>157</sup>

If Frege is against idealism then presumably he holds a materialistic position. If he does hold a materialistic position what are ‘feelings’? It seems to me that Frege has recognised that the world contains the psychological. Frege chooses to restrict his work to the ‘external’. If pushed by an inquirer into his position regarding ‘idealism’ Frege would have to explain his recognition of ‘feelings’. Frege would either have to discard any notion of the psychological and take a purely ‘materialistic’ position, or appeal to a version of dualism. It seems to me that Frege attempts to avoid dualism in his later thought as expressed in the essay ‘Der Gedanke’ by positing a ‘third realm’. Any form of dualism or parallelism, or for that matter third realmism, recognises the realms as being part

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<sup>157</sup> <http://plato.stanford.edu/entries/hegel/> accessed 21/09/2013

of the world; world being taken as the totality rather than an isolated 'realm'. The differentiation of 'worlds' and 'realms' was addressed by Robert M. Harnish in an unpublished paper 'Frege on Apprehending Thoughts'. Harnish 'corrects' the translation of 'The Thought'<sup>158</sup> from:

Having visual impressions is certainly necessary for seeing things but not sufficient. What must still be added is non-sensible. And yet this is just what opens up the outer world for us; for without this non-sensible something everyone would remain shut up in his inner world. So since the answer lies in the non-sensible, perhaps something non-sensible could also lead us out of the inner world and enable us to grasp thoughts where no sense-impressions were involved.... So that in which the distinction between the way in which a thing and a thought is given mainly consists is something which is attributable, not to both realms, but to the inner world.<sup>159</sup>

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Maybe Frege was aware of Clifford's thought expressed in his essay 'On the Nature of Things-in-Themselves' and considered Clifford's thought to be materialistic.

Redding tells us that "Idealism" is opposed to *materialism*. Redding also writes:

As Leibniz's use of Plato to exemplify idealism suggests, idealists in the German tradition tended to hold to the reality or objectivity of "ideas" in the Platonic sense, and for Plato, it would seem, such ideas were not conceived as "in" any mind at all—not even the mind of Plato's "god". The type of picture found in Berkeley was only to be found in certain late antique Platonists and, especially, early Christian Platonists like St Augustine, Bishop of

<sup>158</sup> The Thought: A Logical Inquiry *Mind*, New Series, Vol. 65, No. 259 (Jul., 1956), pp. 289-311

<sup>159</sup> 'Frege on Apprehending Thoughts' Robert M. Harnish

<http://www.u.arizona.edu/~harnish/papers/unpublished/thoughts.pdf> 17 May 2012

<sup>160</sup> Ibid. The emphasis by underlining is due to Harnish.

Hippo. But especially for post-Kantian idealists like Hegel, Plato's philosophy was understood through the lenses of more Aristotelian varieties of neo-Platonism, which pictured the “thoughts” of the “divine mind” as immanent in matter, and not as contained in some purely immaterial or spiritual mind. It thus had features closer to the more pantheistic picture of divine thought found in Spinoza, for example, for whom matter and mind were attributes of the one substance.

It is difficult to understand a person unless the situation in which they live is taken into consideration. Frege rejected psychologism and idealism. It is necessary to understand what Frege understood ‘psychologism’ and ‘idealism’ to be. It seems to me that Frege rejected psychologism and idealism in order to concentrate his efforts in a particular realm. In doing so Frege was able to make advances in logic. At the beginning I quoted C.D. Broad. If the thought of Broad is taken to apply to realms, then differences between the thought of Frege and of Clifford are easier to understand. Clifford’s work was not logic, it was mathematics. Clifford was a successful mathematician. His speculative metaphysics were extra. In the case of Frege the situation is different. Frege’s work on logic required that he retreat to the realm of objective logic if he were to establish a systematic objective logic. I quoted Geach above. Wittgenstein told Geach that Frege “... could not understand – for him, idealism was the enemy he had long fought, and of course you attack your enemy on his weakest side.” How can idealism be an enemy? Is Frege fighting idealism or trying to establish a system of logic that will be a useful tool?

### 4.3 Ernst Mach

Ernst Mach was born 1838 and died in 1916. He was Austrian.

My interest in Mach is how he relates to Clifford, Frege, and Wittgenstein.

Frege published his essay ‘Über Sinn und Bedeutung’ in 1892. The previous year Mach’s essay ‘Some Questions of Psycho-Physics. Sensations and the Elements of Reality’ was published in *The Monist*.<sup>161</sup> The editor of *The Monist* was Paul Carus. Carus was a German born American. Carus had been introduced to Charles Sanders Peirce. The essay of Mach was the result of a private communication between Mach and Carus. Carus had published an article titled ‘Feeling and Motion’. Mach writes the following:

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<sup>161</sup> *The Monist*, Vol. 1, No. 3 (April, 1891), pp. 393-400

I HAVE read Dr. Carus's article "Feeling and Motion" with care, and have also perused Clifford's essay on "The Nature of Things in Themselves." Let me attempt to present the points in which our agreements and differences consist.....

Let me cite, first, a few passages from "Feeling and Motion" to which I give my full assent. They are the following :

"The interconvertibility of motion and feeling is an error."

"Feeling is real as much as are matter and motion."

"Its reality accordingly is most immediate and direct, so that it would be ridiculous to doubt it."

"Man's method of understanding the process of nature is that of abstraction." "Every concept is formed for some purpose, and every concept by serving one purpose necessarily becomes one-sided.... We must bear in mind .... (i) the purpose it has to serve, and (2) that the totality of things from which abstractions can be made is one indivisible whole. . . . We must not imagine that the one side only is true reality."

Mach is aware of Clifford's essay 'On the Nature of Things-in-Themselves'. Assuming Mach read Clifford's essay as presented in the January 1878 edition of *Mind* he would be aware of the other essays in that edition. Mach recognises the role played by 'feelings'. Carus would almost certainly been aware of the essays in the January 1878 edition of *Mind*. As editor of *The Monist* he would be monitoring other journals.

Clifford defined feelings in his essay 'The Unseen Universe'. William James had also reviewed the book *The Unseen Universe*. James met with Mach on 2 November 1882. James and Mach corresponded for years following their first meeting.<sup>162</sup>

Mach mentions Clifford in his essay that appears in the *Monist* in 1891. Mach writes:

With regard to Clifford I may make the following remarks. The notion "eject" pleases me very much. I have long had the idea in mind, but have not defined it because its limitation is not clear to me; nor has Clifford given me any light on the subject. Is the representation in us of the material nature of things we *cannot lay hold of* (the sun, the moon) to be called an eject? Are the abstract concepts of physical hypotheses, which in their very

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<sup>162</sup> [http://web.mit.edu/sts/pubs/pdfs/MIT\\_STS\\_WorkingPaper\\_4\\_Holton.pdf](http://web.mit.edu/sts/pubs/pdfs/MIT_STS_WorkingPaper_4_Holton.pdf) accessed 22/09/2013

nature can never become sense-affective, ejects? Such things are abstract in widely differing degrees, and are bound up with the sensory in very unequal proportions; the impossibility of becoming sense-affective is partly absolute,- partly only relative, that is, it exists for the time being. I do not at all agree with Clifford's notion "mind-stuff"; in this I wholly concur with Dr. Carus. It is not unbiased philosophising to come down in the end to a *psychological* notion as *comprehensive of the world*,--a notion on the face of it pre-eminently one-sided.

The comments made by Mach concerning Clifford's thought are of 1891. Ten years later Mach was to mention Clifford in the Preface to the Third Edition of his book *The Analysis of the Sensations*. In the preface Mach writes the following:

Unless all indications are deceptive, I no longer occupy, as regards my views, anything like so isolated a position as I did even a few years ago. In addition to the school of Avenarius, there are also younger thinkers, such as H. Gomperz; who are approaching my point of view by their own paths. The differences that still remain over seem to me not irreconcilable. But it would be premature to dispute about them yet. "But the question is one in which it is peculiarly difficult to make out precisely what another man means, and even what one means oneself." The author of this delightfully humorous remark was W. K. Clifford, the mathematician ("On the Nature of Things-in-themselves," Lectures vol. ii. p. 88), a writer with an extremely close affinity to myself in the direction of his thought.

Vienna, November 1901

In 1891 Mach writes "I HAVE read Dr. Carus's article "Feeling and Motion" with care, and have also perused Clifford's essay on "The Nature of Things in Themselves."" In 1901 Mach references Clifford's comment to Lectures vol. ii. P.88.<sup>163</sup> Mach would have read *Lectures and Essays by the late William Kingdon Clifford* if he was to pronounce Clifford to have an extremely close affinity to himself in the direction of his thought.

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<sup>163</sup> The reference refers to the first edition of *Lectures and Essays* published in 1879. Mach wrote the Preface in 1901 in Vienna. There had been two further editions of *Lectures and Essays*, 1886 and 1901. This begs the question of how long the edition Mach used had been in Vienna. [Maybe?]

William James referred to Clifford as that ‘delicious enfant terrible’. An *enfant terrible* is terrifyingly candid. Interpreting the candour can prove difficult.

#### 4.4 George S. Fullerton

Fullerton was appointed as the first Adam Seybert Professor in Moral and Intellectual Philosophy, University of Pennsylvania, in 1883<sup>164</sup>, holding the position until 1904.

In 1904 Fullerton’s book *A System of Metaphysics* was published.<sup>165</sup> Fullerton is of interest because he provides a critique of Clifford’s thought.

Fullerton writes the following:

In this extract Professor Clifford plays directly into the hand of Zeno, although it is no part of his purpose to support the contention of that philosopher. He is merely trying to make quite clear what we mean by calling space continuous; and is it not generally admitted that space *is* continuous? But, then, how can anything move through space? The difficulties that beset a moving point Clifford has himself admirably exhibited, and again without the slightest intention of unduly emphasizing these difficulties or of denying the possibility of motion.<sup>166</sup>

Fullerton was criticising Clifford’s comments made in his *Seeing and Thinking* Pg. 134 that discusses ‘continuous’ and the ‘infinite’. Fullerton makes no reference to Clifford’s holding that time is discrete.

Fullerton writes a chapter on ‘The Automaton Theory: Parallelism’. Fullerton writes:

In describing the modern doctrine of the physical automaton with parallel psychical states, I cannot do better than to follow that clearest of writers, Professor W. K. Clifford, who has set it forth in detail in his lecture on " Body and Mind."<sup>167</sup>

Maybe Fullerton is correct in his interpretation of Clifford’s essay ‘Body and Mind’. I just don’t get it.

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<sup>164</sup> See <http://philosophy.sas.upenn.edu/department-history>. Accessed 22/10/2013.

<sup>165</sup> *A System of Metaphysics*, George Stuart Fullerton, New York, The Macmillan Company, 1904

<sup>166</sup> *Ibid.* Pgs. 172-173

<sup>167</sup> *Ibid.* Pg. 298

In a footnote Fullerton writes the following:

<sup>2</sup>Besides the internal evidence of the influence of Spinoza's thought furnished by Clifford's papers, "Body and Mind" and "On the Nature of Things-in-themselves," we have the direct testimony of his friend and biographer, Sir Frederick Pollock. See the introduction to the "Lectures and Essays."

I have already discussed Pollock above.

Fullerton writes the following in his chapter 'What is Parallelism':

It must be admitted that it is exceedingly difficult to use language that will not suggest such confusions. No man tries more earnestly than Clifford to relegate mind and matter to different and distinct worlds.<sup>168</sup>

Fullerton again:

The materialistic suggestion in Clifford's words is quite unmistakable: "The reality which underlies matter, the reality which we perceive as matter, is the same stuff which, being compounded together in a particular way, produces mind. What I perceive as your brain is really in itself your consciousness, is You; but then that which I call your brain, the material fact, is merely my perception." *Where* is the reality which we perceive as matter? *Where* are you, while I am perceiving your brain? Are you not out there, where I seem to perceive the brain? If you are not in this direction from my body rather than in that, if you are no nearer to this particular brain than to the brain of a man I never saw and never shall see, how comes it that I am perceiving *you*, that you are affecting *me*, when I see this brain? Is the reality or substance of the brain not to be found where the brain is? Surely the reader can see that Clifford's words draw all their force from a materialistic "outside" and "inside" conception. We have here the philosophy of the plain man forced to do service in a new field, but equipped with all its old arms and accoutrements.<sup>169</sup>

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<sup>168</sup> Ibid. Pg. 317

<sup>169</sup> Ibid. Pgs. 329-330

It is interesting to read another's interpretation, however if the 'dots being connected' are not in 'the same place' a different picture will be generated. Fullerton was interested in 'Parallelism'. I will provide my understanding of parallelism as it relates to Clifford in the following chapter.

#### 4.5 Karl Pearson

Karl Pearson was born in 1857 and died in 1936. He studied at Cambridge and Heidelberg universities. His interests were broad, ranging from mathematics to German literature. He spent much of the 1880's in Germany. Karl Pearson completed Clifford's *Common Sense of the Exact Sciences*.

Pearson's book *The Grammar of Science* was published in 1892. Pearson makes repeated references to the thought of Clifford. Pearson is not a slave to the thought of Clifford, he takes it and presents criticisms of it. Pearson wrote the following:

This point needs to be specially emphasised, for we are often told that the scientific method applies only to the external world of phenomena, and that the legitimate field of science lies solely among immediate sense-impressions. The object of the present work is to insist on a directly contrary proposition, namely, that science is in reality a classification and analysis of the contents of the mind; and the scientific method consists in drawing just comparisons and inferences from the stored impresses of past sense-impressions, and from the conceptions based upon them. Not till the immediate sense-impression has reached the level of a conception, or at least a perception, does it become material for science. In truth, the field of science is much more consciousness than an external world. In thus vindicating for science its mission as interpreter of conceptions rather than as investigator of a "natural law" ruling an "external world of material," I must remind the reader that science still considers the whole contents of the mind to be ultimately based on sense-impressions. Without sense-impressions there would be no consciousness, no conceptions for science to deal with. In the next place we must be careful to note that not every conception, still less every inference, has scientific validity.<sup>170</sup>

Pearson mentions Clifford four times in his text, and thirteen times in footnotes. In his Summary of his chapter 'The Facts of Science' Pearson writes the following:

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<sup>170</sup> *The Grammar of Science*, Karl Pearson, London, Adam and Charles Black, 1900. Pg. 52

2. When an interval elapses between sense-impression and exertion filled by cerebral activity marking the revival and combination of past sense impressions stored as impresses we are said to think or to be conscious. Other-consciousness is an inference, which, not yet having been verified by immediate sense-impression, we term an *eject*; it is conceivable, however, that it could become an object. Consciousness has no meaning beyond nervous systems akin to our own; it is illogical to assert that all matter is conscious, still more that consciousness or will can exist outside matter.<sup>171</sup>

Pearson holds that ejects may come to be conceivable. How does Pearson differentiate between what may and what may not become conceivable? The similarity of Pearson's position to that contained in Newton's 'fourth Rule of Reason' is relevant to how Pearson understands the scope of scientific thought. Newton's 'fourth Rule of Reason':

*In experimental philosophy, propositions gathered from phenomena by induction should be taken to be either exactly or very nearly true notwithstanding any contrary hypotheses, until yet other phenomena make such propositions either more exact or liable to exceptions.*

Phillip Sloan writes the following:

Pearson's deep philosophical commitment to a neo-positivist empiricist epistemology, inspired in many respects by Viennese physicist and philosopher Ernst Mach (1838–1916), also added an epistemological level to this disagreement. Pearson rejected, on epistemic grounds, the search for hidden causes and theoretical entities in science generally, and this lay behind his denial of inheritance by non-observable entities, such as De Vries's pangens (Gayon, 2007; Sloan 2000; Pearson 1892).<sup>172</sup>

It seems to me from these quotes of Pearson and Sloan that there is some tension in the thought of Pearson. Pearson by writing "Without sense-impressions there would be no consciousness, no conceptions for science to deal with. In the next place we must be careful to note that not every conception, still less every inference, has scientific validity." has diverged from the speculative metaphysic of Clifford. Pearson has a different 'understanding' of consciousness to the one that I interpret Clifford to hold, or Pearson accepts the metaphysic but considers it not part of science.

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<sup>171</sup> Ibid Pg. 75

<sup>172</sup> Sloan, Phillip, "Evolution", *The Stanford Encyclopedia of Philosophy (Fall 2010 Edition)*, Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/fall2010/entries/evolution/>>. Accessed 27/12/2015

A critique of *The Grammar of Science* is beyond the scope of this thesis. It is obvious that Clifford has influenced Pearson. Pearson is not a 'slave' to Clifford's thought. Pearson deserves greater analysis than I provide here.

#### 4.6 Einstein

In 1901 Einstein was in Bern. Einstein met Maurice Solovine, and Conrad Habicht. The three became the founding members of the 'Akademie Olympia'. The group read and discussed books. The books discussed included: Ernst Mach's *Analyse der Empfindungen (Analysis of the Sensations)* and *Die Mechanik in ihrer Entwicklung (Mechanics and its development)*, Karl Pearson's *Grammatik der Wissenschaft (Grammar of Science)*, Henri Poincaré's *Wissenschaft und Hypothese (Science and Hypothesis)*, John Stuart Mill's *Logik (Logic)*, David Hume's *Traktat über die menschliche Natur (Treatise of Human Nature)* and Spinoza's *Ethik (Ethics)*.<sup>173</sup>

It has already been seen that Karl Pearson's book draws on the thought of Clifford and 'extends' it. It would be interesting to know which edition of Mach's book the group read, but I have no way of knowing. [I have tried to find details of a German version of Pearson's *Grammar of Science* but as of now have been unsuccessful.]

Two letters written to Lucy Clifford are of interest. Lord Haldane wrote to Lucy Clifford on the 22 June 1921. The following is part of that letter:

Letter from Lord Haldane to Lucy Clifford. (28 Queen Anne's Gate, Westminster.) 'I had talk with Einstein about your husband's genius & his anticipations of some of the ideas involved in Relativity. At these Prof Eddington had hinted in his book [*Space, Time, and Gravitation*], which Einstein has read. But Prof. Einstein does not read English readily, & it is of little use to send him English books.' Will call on her on Sunday....<sup>174</sup>

This letter is followed by another 10 August 1923:

Letter from Lord Haldane to Lucy Clifford. (Cloan, Auchterarder, Perthshire.) Is hesitant about sending the enclosed [E1/1-2] to Einstein, as he cannot read English and has no historical interest in his subject. She should keep them until someone is heard of who is 'working out the genesis of the present, historically'. Has been at Cloan for a week,

<sup>173</sup> [http://www.einstein-website.de/z\\_biography/olympia-e.html](http://www.einstein-website.de/z_biography/olympia-e.html) accessed 25/09/2013

<sup>174</sup> <http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FCLIF%2FE1> accessed 25/09/2013

reading and walking. Hopes she will have a good holiday. . (*With envelope.*) .

1 doc.

#### 4.7 Arthur Eddington

Eddington was born in 1882. He died in 1944. Eddington is famous for his observations of the solar eclipse of 29 May 1919 which he believed confirmed Einstein's theory of general relativity. Eddington's book *The Nature of the Physical World* was published in 1928.<sup>175</sup>

Eddington wrote the following:<sup>176</sup>

This is not a very profound beginning to a course which ought to reach transcendent levels of scientific philosophy. But we cannot touch bedrock immediately; we must scratch a bit at the surface of things first. And whenever I begin to scratch the first thing I strike is— my two tables.

One of them has been familiar to me from earliest years. It is a commonplace object of that environment which I call the world. How shall I describe it? It has extension; it is comparatively permanent; it is coloured; above all it is substantial. By substantial I do not merely mean that it does not collapse when I lean upon it; I mean that it is constituted of "substance" and by that word I am trying to convey to you some conception of its intrinsic nature. It is a thing; not like space, which is a mere negation; nor like time, which is—Heaven knows what! But that will not help you to my meaning because it is the distinctive characteristic of a "thing" to have this substantiality, and I do not think substantiality can be described better than by saying that it is the kind of nature exemplified by an ordinary table. And so we go round in circles.

Eddington provides a chapter of this book titled 'Mind Stuff'. The following is taken from that chapter:<sup>177</sup>

We are acquainted with an external world because its fibres run into our consciousness; it is only our own ends of the fibres that we actually know; from those ends we more or less successfully reconstruct the rest, as a palaeontologist reconstructs an extinct monster from its footprint.

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<sup>175</sup> *The Nature of the Physical World*, A.S. Eddington, The Macmillan Company, 1928

<sup>176</sup> *Ibid.* Pg. ix

<sup>177</sup> *Ibid.* Pgs. 278-279

The mind-stuff is the aggregation of relations and relata which form the building material for the physical world. Our account of the building process shows, however, that much that is implied in the relations is dropped as unserviceable for the required building.

Our view is practically that urged in 1875 by W. K. Clifford—

"The succession of feelings which constitutes a man's consciousness is the reality which produces in our minds the perception of the motions of his brain."

That is to say, that which the man himself knows as a succession of feelings is the reality which when probed by the appliances of an outside investigator affects their readings in such a way that it is identified as a configuration of brain-matter. Again Bertrand Russell writes—\*

What the physiologist sees when he examines a brain is in the physiologist, not in the brain he is examining. What is in the brain by the time the physiologist examines it if it is dead, I do not profess to know; but while its owner was alive, part, at least, of the contents of his brain consisted of his percepts, thoughts, and feelings. Since his brain also consisted of electrons, we are compelled to conclude that an electron is a grouping of events, and that if the electron is in a human brain, some of the events composing it are likely to be some of the "mental states" of the man to whom the brain belongs. Or, at any rate, they are likely to be parts of such "mental states"—for it must not be assumed that part of a mental state must be a mental state. I do not wish to discuss what is meant by a "mental state"; the main point for us is that the term must include percepts. Thus a percept is an event or a group of events, each of which belongs to one or more of the groups constituting the electrons in the brain. This, I think, is the most concrete statement that can be made about electrons; everything else that can be said is more or less abstract and mathematical.

I quote this partly for the sake of the remark that it must not be assumed that part of a mental state must necessarily be a mental state. We can no doubt analyse the content of consciousness during a short interval of time into more or less elementary constituent feelings; but it is not suggested that this psychological analysis will reveal the elements out of whose measure-numbers the atoms or electrons are built. The brain-matter is a partial aspect of the whole mental state; but the analysis of the brain-matter by physical investigation does not run at all parallel with the analysis of the mental state by psychological investigation. I assume that Russell meant to warn us that, in speaking of

part of a mental state, he was not limiting himself to parts that would be recognised as such psychologically, and he was admitting a more abstract kind of dissection.

\* *Analysis of Matter*, p. 320

I provide the above quote as a means of showing that the thought of Clifford was relevant to Eddington [and Russell]. I take note that Eddington writes the following in the above quote: “...elementary constituent feelings:....”

Eddington’s book is concerned with the nature of the physical world. The ‘revolution’ in physics that had taken place since 1800 and the publication of the book had changed our understanding of the physical nature of the world. When Clifford wrote ‘On the Nature of Things-in-Themselves’ he made a distinction between the subjective order and the objective order; the objective order being treated by physical science. Eddington recognises this distinction. Eddington writes the following:

If you take a pack of cards as it comes from the maker and shuffle it for a few minutes, all trace of the original systematic order disappears. The order will never come back however long you shuffle. Something has been done which cannot be undone, namely, the introduction of a random element in place of arrangement.

Illustrations may be useful even when imperfect, and therefore I have slurred over two points, which affect the illustration rather than the application which we are about to make. It was scarcely true to say that the shuffling cannot be undone. You can sort out the cards into their original order if you like. But in considering the shuffling which occurs in the physical world we are not troubled by a *deus ex machina* like you. I am not prepared to say how far the human mind is bound by the conclusions we shall reach. So I exclude you—at least I exclude that activity of your mind which you employ in sorting the cards. I allow you to shuffle them because you can do that *absent-mindedly*.

Secondly, it is not quite true that the original order never comes back. There is a ghost of a chance that some day a thoroughly shuffled pack will be found to have come back to the original order. That is because of the comparatively small number of cards in the pack. In our applications the units are so numerous that this kind of contingency can be disregarded.<sup>178</sup>

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<sup>178</sup> *The Nature of the Physical World*, A.S. Eddington, The Macmillan Company, 1928. Pgs. 63-64

Eddington writes: “at least I exclude that activity of your mind which you employ in sorting the cards.” I find this of interest because in the first sentence of the quote Eddington has written: “If you take a pack of cards as it comes from the maker and shuffle it for a few minutes, all trace of the original systematic order disappears.” It seems that the original order was systematic, whereas the order of the cards after shuffling is not systematic. This appears to me to be the same as the ordinal cardinal distinction that is recognised in ‘numbers’.

Eddington makes the comment: “I am not prepared to say how far the human mind is bound by the conclusions we shall reach.” It is this problem that Clifford had addressed. Eddington devotes a chapter of his book to ‘mind-stuff’, and the quote above suggests that Eddington arrives at a similar answer to that of Clifford.

Eddington may appear to be taking a similar view as Clifford concerning mind-stuff, but he is less amenable to a ‘space theory of matter’.

Eddington writes the following:

In the last century it was widely believed that aether was a kind of matter, having properties such as mass, rigidity, motion, like ordinary matter. It would be difficult to say when this view died out. It probably lingered longer in England than on the continent, but I think that even here it had ceased to be the orthodox view some years before the advent of the relativity theory. Logically it was abandoned by the numerous nineteenth-century investigators who regarded matter as vortices, knots, squirts, etc., in the aether; for clearly they could not have supposed that aether consisted of vortices in the aether. But it may not be safe to assume that the authorities in question were logical.

Nowadays it is agreed that aether is not a kind of matter. Being non-material, its properties are *sui generis*.<sup>179</sup>

If the aether is a ‘kind of matter’ then is the aether a kind of mind-stuff? If logic is *pace* Venn objective logic then that logic is derived from the objective order, but in the metaphysic of Clifford that objective order is within the individual mind. If, as Eddington tells us, ‘nowadays’ it is agreed that the aether is not a kind of matter, then how can an objective [material] logic be applied to it? I do not consider Clifford to have held that space is a kind of matter; rather matter is a construct of minds.

Eddington makes the following assertion:

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<sup>179</sup> *The Nature of the Physical World*, A.S. Eddington, The Macmillan Company, 1928. Pg. 31

Number (of discrete individuals) is absolute. It is the result of counting, and counting is an absolute operation.<sup>180</sup>

It will be seen below that Hilbert considered the foundation of number to be a recognition of extra-logical entities. Does the absolute nature of number derive from its being extra-logical? The logic to which extra-logical pertains being objective logic pace Venn. I take note that Eddington qualifies 'Number'. He tells us that "Number (of discrete individuals) is absolute." The question of individuality is beyond the scope of this thesis, yet permeates it. What makes a thing discrete is also a question at the foundation of our appreciation of the world. Most people would agree that the mechanism of information transfer from sense organs to the brain are 'continuous' and of the same nature, yet from this information is generated the distinct feelings of individuated discrete 'things'.

#### 4.8 Bertrand Russell & James R. Newman

In 1945 Russell wrote the preface for a new edition of Clifford's book *The Common Sense of the Exact Sciences*; the book completed after Clifford's death by Karl Pearson. The book was published in 1946 by Alfred A. Knopf, Inc.

In the preface he recounts how his tutor had given him a copy of the original book. As a fifteen year old Russell read the book. Russell found it clearly explicated the basics of mathematics. He also mentions that Clifford was optimistic. Russell, writing in 1945, notes the difference in the world of Clifford's time and that of 1945. Russell was a pacifist. On the 9 July 1955 the Russell-Einstein Manifesto was issued in London. The Manifesto highlighted the dangers posed by nuclear weapons.

Russell writes the following:

The Book's explicit rejection of "matter" and "force" as concepts to be used in physics is due to Karl Pearson, but has some sanction in Clifford's notes and is clearly in line with his thinking.

Clifford's 'space theory of matter' and his holding that 'force' is an abstraction relating to position and matter, suggests that Clifford had rejected 'matter' and 'force' as fundamental concepts to be used in physics.

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<sup>180</sup> Ibid. Pg.23

Russell writes:

Clifford was much more than a mathematician; he was a philosopher of considerable merit in what concerned the foundations of mathematical knowledge.

In 1955 a new Dover edition of the 'book' was published. It was an unabridged and unaltered republication of the Knopf edition. The Dover edition contained an introduction by James R. Newman. This introduction is forty seven pages long. Newman provides a background to Clifford's thought.

Newman writes the following:

Throughout his life Clifford searched for a general philosophy he could make his own, but developed none that stands out as clearly as his interpretation of the pure sciences. One can make little of his theory of "mind-stuff," obscure, involved, and unconvincing. A harsh critic might condemn it with Clifford's own phrase as "that rhetoric which frequently assumes the name of philosophy." Pollock implies that the concept of "mind-stuff" was a half-hearted idea that could not have satisfied Clifford for long, little more than a scaffolding in his thought: he may have advanced it as a sheer intellectual exercise without even a momentary commitment of belief.

Newman makes reference to *Lectures and Essays*, and to the *Dictionary of National Biography*, in footnotes. The references are in relation to the thought of Pollock, which Newman extrapolates, and to Leslie Stephen. Stephen had written the following in the *Dictionary of National Biography*:<sup>181</sup>

His view is most fully given in his essay on the 'Philosophy of the Pure Sciences.' The metaphysical theory to which he inclined is given in the essays on 'Body and Mind' and the 'Nature of Things in themselves.' He was more inclined than most English psychologists to believe in the possibility of constructing a definite metaphysical system, in which he was probably influenced by his admiration for Spinoza. His doctrine is described by Professor Pollock as an 'idealist monism.' He agreed with Berkeley that mind is the ultimate reality; but held that consciousness as known to us is built up out of simple elements or atoms of 'mindstuff' the characteristic phrase which gives the keynote

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<sup>181</sup> *Dictionary of National Biography* Edited by Leslie Stephen, Vol. XI. New York, Macmillan and Co. London: Smith, Elder, & Co. 1887

of theories full of suggestion, and showing curious affinities to other philosophies, but not fully worked out.

I cannot accept that Clifford believed in ultimates [definites?].

The following is taken from Encyclopaedia Britannica:

**James Roy Newman**, (born 1907, New York City, N.Y., U.S.—died 1966, Washington, D.C.), American lawyer, best known for his monumental four-volume historical survey of mathematics, *The World of Mathematics* (1956).

Newman earned a law degree from Columbia University in New York City and served with various U.S. government agencies. He helped to write the bill that placed atomic development under civilian control.<sup>182</sup>

As a mathematical historian I would assume Newman was aware of Eddington.

#### 4.9 David Hilbert

Hilbert was born 1862 and died 1943.

In 1925 Hilbert presented his paper 'On the Infinite'. The paper is the text of an address delivered in Munster on 4 June 1925 at a meeting organized by the Westphalian Mathematical Society to honor the memory of Weierstrass. This paper can be found in *From Frege to Gödel*.<sup>183</sup>

My interest in Hilbert is how he relates to Clifford. The following is taken from Hilbert's paper:

We saw earlier that the infinite is not to be found anywhere in reality, no matter what experiences and observations or what kind of science we may adduce. Could it be, then, that thinking about objects is so unlike the events involving objects and that it proceeds so differently, so apart from all reality? Is it not clear, rather, that when we believed we had discovered that the infinite was in some sense real we were only allowing ourselves to be led to that belief by the circumstance that we so often actually encounter in reality such

<sup>182</sup> <http://www.britannica.com/EBchecked/topic/1555776/James-Roy-Newman> accessed 21/06/2014

<sup>183</sup> *From Frege to Gödel*, Jean van Heijenoort, Harvard University Press, 1967 Pg. 378

immeasurable dimensions in the large and in the small? And has the contentual logical inference ever deceived and abandoned us anywhere when we applied it to real objects or events? No, contentual logical inference is indispensable. It has deceived us only when we accepted arbitrary abstract notions, in particular those under which infinitely many objects are subsumed. What we did, then, was merely to use contentual inference in an illegitimate way; that is, we obviously did not respect necessary conditions for the use of contentual logical inference. And in recognizing that such conditions exist and must be respected we find ourselves in agreement with the philosophers, especially with Kant. Kant already taught-and indeed it is part and parcel of his doctrine-that mathematics has at its disposal a content secured independently of all logic and hence can never be provided with a foundation by means of logic alone; that is why the efforts of Frege and Dedekind were bound to fail. Rather, as a condition for the use of logical inferences and the performance of logical operations, something must already be given to our faculty of representation [in der Vorstellung], certain extralogical concrete objects that are intuitively [anschaulich] present as immediate experience prior to all thought. If logical inference is to be reliable, it must be possible to survey these objects completely in all their parts, and the fact that they occur, that they differ from one another, and that they follow each other, or are concatenated, is immediately given intuitively, together with the objects, as something that neither can be reduced to anything else nor requires reduction. This is the basic philosophical position that I consider requisite for mathematics and, in general, for all scientific thinking, understanding, and communication. And in mathematics, in particular, what we consider is the concrete signs themselves, whose shape, according to the conception we have adopted, is immediately clear and recognizable.

Let us call to mind the nature and methods of ordinary finitary number theory. It can certainly be developed through the construction of numbers by means solely of intuitive contentual considerations. But the science of mathematics is by no means exhausted by numerical equations and it cannot be reduced to these alone. One can claim, however, that it is an apparatus that must always yield correct numerical equations when applied to integers. But then we are obliged to investigate the structure of the apparatus sufficiently to make this fact apparent. And the only tool at our disposal in this investigation is the same as that used for the derivation of numerical equations in the construction of number theory itself, namely, a concern for concrete content, the finitist frame of mind. This scientific requirement can in fact be satisfied; that is, it is possible to obtain in a purely intuitive and finitary way, just like the truths of number theory, those insights that

guarantee the reliability of the mathematical apparatus. Let us now consider number theory in more detail.

In number theory we have the numerals

I, II, III, IIII,

each numeral being perceptually recognizable by the fact that in it I is always again followed by I [if it is followed by anything]. These numerals, which are the object of our consideration, have no meaning at all in themselves. In elementary number theory, however, we already require, besides these signs, others that mean something and serve to convey information, for example, the sign 2 as an abbreviation for the numeral II, or the numeral 3 as an abbreviation for the numeral III ; further we use the signs  $+$ ,  $=$ ,  $>$ , and others, which serve to communicate assertions. So  $2 + 3 = 3 + 2$  serves to communicate the fact that  $2 + 3$  and  $3 + 2$ , when the abbreviations used are taken into account, are the same numeral, namely, the numeral IIII.

Likewise, then,  $3 > 2$  serves to communicate the fact that the sign 3 (that is, III) extends beyond the sign 2 (that is, II), or that the latter sign is a proper segment of the former.

When communicating, we also use letters, such as  $a$ ,  $b$ ,  $c$ , for numerals. Accordingly,  $b > a$  is the communication that the numeral  $b$  extends beyond the numeral  $a$ . And likewise, from the present point of view, we would regard  $a + b = b + a$  merely as the communication of the fact that the numeral  $a + b$  is the same as  $b + a$ . Here, too, the contentual correctness of this communication can be proved by contentual inference, and we can go very far with this intuitive, contentual kind of treatment.

This is a lengthy quote. My understanding is that the thoughts contained within it are the mature position taken by Hilbert. Hilbert tells us that:

But then we are obliged to investigate the structure of the apparatus sufficiently to make this fact apparent. And the only tool at our disposal in this investigation is the same as that used for the derivation of numerical equations in the construction of number theory itself, namely, a concern for concrete content, the finitist frame of mind.

Clifford mentions 'counting apparatus' as well as 'apparatus of thought'. Clifford chose the fingers as his 'counting apparatus'. I can see my fingers, but I also use them to touch things. If I count a pile of

coins I do so by picking up one coin at a time and moving it. To make my counting easier I arrange the coins in a pattern. I cannot feel the pattern but I can see it. I combine sight and touch. The pattern of my fingers on my hands is 'fixed'. I can move things and place them in a different order; I cannot do this for the fingers on my hands. I could of course rotate my left hand which would change the order of my digits taken from left to right. If I have the palms facing me this problem of left and right is removed, but then there is always the problem of up and down. Assuming I can overcome these two problems I have at my disposal an apparatus of counting that is always with me and can be used as a standard.

Counting is an advanced procedure. It involves numbers. Can I 'count' without using numbers? This is a silly question, but it can be reframed. Is my left hand similar to my right hand? I can bring my left hand into contact with my right hand. My thumbs are different to my fingers. I touch my left thumb with my right thumb. Next to my left thumb there is a finger, next to my right thumb there is a finger. I bring these two fingers together. I now have my thumbs and my first fingers touching. Without a loss of contact I can 'move' my hands. I can deform my hands to a certain degree. If I touch my middle finger of my left hand with my right hand middle finger the remaining fingers, the ring fingers and little fingers are still able to move but the movement is more restricted. Once all five fingers are touching they are locked together. I touch in each case with the tips of my thumbs and fingers. I can still 'deform' my hands by bringing my wrists closer to the tips of my fingers, but where the tips of the fingers connect is fixed. What I have done is to bring my digits of my left hand into a 'one to one' connection with the digits of my right hand. It seems trivial, but I do know my left hand from my right. If I place my right hand on a mirror I can see that my right hand 'touches' the left hand of my image in the mirror. I can see the image in the mirror but I touch the mirror, I feel the mirror, not a hand.

Hilbert tells us:

Rather, as a condition for the use of logical inferences and the performance of logical operations, something must already be given to our faculty of representation [in der Vorstellung], certain extralogical concrete objects that are intuitively [anschaulich] present as immediate experience prior to all thought.

What does 'intuitively' and 'thought' mean? It seems to me that Clifford addresses this question. His answer is given in his metaphysic. Clifford tells us that feelings are:

What we might perceive as a plexus of nerve-disturbances in itself a feeling; and the succession of feelings which constitutes a man's consciousness is the reality which

produces in our minds the perception of the motions or his brain. These elements of feeling have relations of *nextness* or contiguity in space, which are exemplified by the sight-perceptions or contiguous points; and relations of succession in time, which are exemplified by all perceptions. Out of these two relations the future theorist has to build up the world as best he may. Two things may perhaps help him. There are many lines or mathematical thought which indicate that distance or quantity may come to be expressed in terms of *position* in the wide sense of the *analysis situs*. And the theory of space-curvature hints at a possibility of describing matter and motion in terms of extension only.

When I bring the tips of my fingers together, they are next to each other. The one to one relationship is established.

If I have a flock of sheep I know I have a flock of sheep. If there are a lot of sheep how do I know that I have the same 'number' of sheep this morning that I had last night? I could tally them. I have a large jar and there are lots of pebbles at my disposal. Before going to sleep I place a pebble in the jar for each of my sheep. I don't use a notch in a stick because that is a shape rather than a thing. In the morning I take a pebble out of the jar for each sheep. If I have a pebble remaining in the jar at the end of the procedure I have lost a sheep. I have not counted the sheep; I have only brought my flock into a one to one relationship with pebbles.

The pebbles are not next to the sheep. It does not matter which pebble I choose to put next to a particular sheep. Counting requires an order. My fingers are always in the same order. [Assuming I don't get one bitten off.] My middle finger of my left hand is always between the thumb and little finger of my left hand. My first finger is always next to my thumb and middle finger. But my middle finger is not next to my thumb. 1 is next to 2, and 2 is next to three, but three is not next to 1.

Counting requires a fixed order; to have a concept of number does not. Cardinals and ordinals are of a different nature. Cardinals have a fixed order. Ordinals can have different orders but map to the same cardinal. The problem I have is with the word 'concept'. Frege's thought includes 'concepts' and 'thoughts' and 'ideas'. These three words have caused a lot of confusion. More fundamental to these three words is 'feelings'.

Feelings seem to me to be relational properties. Whether or not there are intrinsic properties other than the relational properties is a question that requires an answer. Clifford answers the question by constructing a model out of mind stuff. Frege ended up positing a third realm. I'm inclined to go with Clifford. Clifford's model is a model. Does 'mind-stuff' exist or is it merely real? This question collapses on itself because to be real requires a mind, and minds are composed of mind-stuff. This

may cause mind-stuff to be ruled out by way of circularity. My understanding of Clifford is that he has presented a model in which mind-stuff is all there is. Clifford's model is not all there is. I do not believe that Clifford held that his model is all there is.

Cornelius Lanczos wrote the following in regard to the thought of Clifford:

[He] with great ingenuity foresaw in a qualitative fashion that physical matter might be conceived as a curved ripple on a generally flat plane. Many of his ingenious hunches were later realized in Einstein's gravitational theory. Such speculations were automatically premature and could not lead to anything constructive without an intermediate link which demanded the extension of 3-dimensional geometry to the inclusion of time. The theory of curved spaces had to be preceded by the realization that space and time form a single four-dimensional entity.<sup>184</sup>

Maybe Clifford's hunch that time is discrete [with gaps?] is still to be realized.

#### 4.10 Russell and Whitehead

Whitehead and Russell produced their three volume work *Principia Mathematica* in the early 20<sup>th</sup> Century. The volumes were published in 1910, 1912 and 1913. In this work they attempted to ground mathematics on a few simple axioms and inference rules of logic.

It seems to me that the work is concerned with what Venn termed "Logic which, for the sake of brevity, may be termed the Material or Objective view ..."

Hilbert writing in the 1920's held that at the foundation of number were extra-logical entities.

Kurt Gödel's incompleteness theorem of 1931 confirmed Hilbert's position.

#### 4.11 Whitehead

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<sup>184</sup> Cornelius Lanczos (1970) *Space through the Ages: The evolution of geometrical ideas from Pythagoras to Hilbert and Einstein*, page 222, Academic Press

In 1929 Alfred North Whitehead's *Process and Reality*<sup>185</sup> was published. A critique of *Process and Reality* is beyond the scope of this thesis however some initial observations are pertinent. I will cherry pick from the first few pages of the work.

There remains the final reflection, how shallow, puny, and imperfect are efforts to sound the depths in the nature of things. In philosophical discussion, the merest hint of dogmatic certainty as to finality of statement is an exhibition of folly.<sup>186</sup>

Clifford said much the same thing when he told us that we know nothing of impossibilities.

Secondly, that the true method of philosophical construction is to frame a scheme of ideas, the best that one can, and unflinchingly to explore the interpretation of experience in terms of that scheme.<sup>187</sup>

I find this problematic because not only do I need to 'interpret' experience, but I also need to interpret 'idea'.

Speculative Philosophy is the endeavour to frame a coherent, logical, necessary system of general ideas in terms of which every element of our experience can be interpreted. By this notion of 'interpretation' I mean that everything of which we are conscious, as enjoyed, perceive, willed, or thought, shall have the character of a particular instance of the general scheme.<sup>188</sup>

This is problematic on many levels. 'Our experience' assumes we experience the same things in the same way. That a 'speculative philosophy' should be subject to logic requires that the logic be taken as a given prior to our endeavours. Whitehead tells us that:

The term 'logical' has its ordinary meaning, including 'logical' consistency, or lack of contradiction, the definition of constructs in logical terms, the exemplification of general logical notions in specific instances, and the principles of inference. It will be observed

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<sup>185</sup> *Process and Reality an Essay in Cosmology*, Alfred North Whitehead. Use is made here of the Corrected Edition edited by David Ray Griffin and Donald W. Sherburne, The Free Press, 1978.

<sup>186</sup> Ibid. Pg. xiv

<sup>187</sup> Ibid. Pg. xiv

<sup>188</sup> Ibid. Pg. 3

that logical notions must themselves find their places in the scheme of philosophic notions.<sup>189</sup>

How it could be established that a particular 'logic' had primacy I cannot imagine. Again, it seems to me that Venn stated the obvious when he wrote: "THE thorough working out of that general view of the nature and province of Logic which, for the sake of brevity, may be termed the Material or Objective view, throws a new light upon, and therefore demands a reconsideration of, a good many detached points."

Metaphysical categories are not dogmatic statements of the obvious; they are tentative formulations of the ultimate generalities.<sup>190</sup>

This quote I agree with. How it can be reconciled with the requirement that a material logic be taken as given I'm not sure. Maybe Whitehead understood 'logic' as something I've missed.

The following quote from Whitehead is of pertinence to my understanding of Clifford and provides me with some insight into Whitehead's project.

It is a process of 'feeling' the many data, so as to absorb them into the unity of one individual 'satisfaction.' Here 'feeling' is the term used for the basic generic operation of passing from the objectivity of the data to the subjectivity of the actual entity in question. Feelings are variously specialized operations, effecting a transition into subjectivity. They replace the 'neutral stuff' of certain realistic philosophers. An actual entity is a process, and is not describable in terms of the morphology of a 'stuff.' This use of the term 'feeling' has a close analogy to Alexander's use of the term 'enjoyment'; and has also some kinship with Bergson's use of the term 'intuition.' A near analogy is Locke's use of the term 'idea,' including 'ideas of particular things' (cf. his *Essay*, III, III, 2, 6, and 7). But the word 'feeling,' as used in these lectures, is even more reminiscent of Descartes. For example: "Let it be so; still it is at least quite certain that it seems to me that I see light, that I hear noise and that I feel heat. That cannot be false; properly speaking it is what is in me called feeling (*sentire*); and used in this precise sense that is no other thing than thinking."<sup>191</sup>

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<sup>189</sup> Ibid. Pg. 3

<sup>190</sup> Ibid. Pg. 8

<sup>191</sup> Ibid. Pgs. 40-41

It is the sentence “They replace the ‘neutral stuff’ of certain realistic philosophers.” that I find intriguing. Is ‘neutral stuff’ referring to ‘mind-stuff’? Does ‘certain realistic philosophers’ include Clifford? Whitehead makes no explicit mention of Clifford. The quote provides Whitehead’s understanding of ‘feeling’. Whitehead tells us that ‘feeling’ is a term used for the basic generic operation of passing from the objectivity of the data to the subjectivity of the actual entity in question. It seems to me that Whitehead takes the external world, the objective world, to be, and then by a process of transition [feeling?] the subjective is arrived at. Whitehead may well be correct. I find it back to front. The objective world, whatever it may be, is known only because we have a subjective appreciation of it. Whatever the case may be it seems to me that ‘feelings’ are important.

#### 4.12 Wittgenstein

Wittgenstein met with Russell, Whitehead, and Frege. Wittgenstein did not meet Clifford. Clifford influenced Russell and was acknowledged by Mach. Wittgenstein was either directly or indirectly influenced by Mach. Sluga wrote the following:

By the time he started to write the *Tractatus* he had probably read Mach and was certainly influenced by the views of Hertz, who in turn was indebted to Mach.<sup>192</sup>

My purpose is to show the similarities in thought of Wittgenstein, Frege, and Clifford. Having done that I will turn to the use of ‘feelings’ by them.

1]

Not only are my objective perceptions, as of a man's head or a candlestick, formed of a great number of parts ordered in a definite manner, but they are invariably accompanied by an endless string of memories, all equally complex.

From ‘On the Nature of Things-in-Themselves’. Clifford

2]

We can include with the conceptions the direct experiences in which sense- impressions and activities themselves take the place of the traces which they have left in the mind. The distinction is

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<sup>192</sup> *Gottlob Frege*, Hans D. Sluga, Routledge & Kegan Paul Ltd. London, 1980. Pg. 183

unimportant for our purpose, especially since memories of sense-impressions and activities always help to complete the conceptual image.

From 'On Sense and Reference'. Frege<sup>193</sup>

3]

[1932-1934]

My thinking, like everyone's, has sticking to it the shrivelled remains of my earlier (withered) ideas.<sup>194</sup>

From 'Culture and Value'

All three seem to have a similar understanding. Clifford does not make use of the word 'idea', rather he uses the term 'objective perceptions'. Clifford's objective perceptions are confined to his own mind so may be taken as analogous to 'ideas'.

#### 4.12.1 Feelings

The following is taken from Wittgenstein's notebooks 1914-1916:

25.5.15

The urge towards the mystical comes of the non-satisfaction of our wishes by science. We *feel* that even if all *possible* scientific questions are answered *our problem is still not touched at all*. Of course in that case there are no questions any more; and that is the answer.

Wittgenstein has emphasised the word 'feel'. Presumably Wittgenstein has an understanding of the word 'feel'.

The following is taken from 'On Sense and Reference':

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<sup>193</sup> The 'concept'/'idea' problem has already been discussed.

<sup>194</sup> *Culture and Value*, Ludwig Wittgenstein, Edited by G.H. von Wright in collaboration with Heikki Nyman, Translated by Peter Winch, Basil Blackwell Oxford, 1980. Pg. 23c

Such an idea is often saturated with feeling; the clarity of its separate parts varies and oscillates.

Clifford begins his essay 'On the Nature of Things-in-Themselves'<sup>195</sup> as follows:

MY feelings arrange and order themselves in two distinct ways. There is the internal or subjective order, in which sorrow succeeds the hearing of bad news, or the abstraction "dog" symbolises the perception of many different dogs. And there is the external or objective order, in which the sensation of letting go is followed by the sight of a falling object and the sound of its fall. The objective order, *qua* order, is treated by physical science, which investigates the uniform relations of *objects* in time and space. Here the word *object* (or *phenomenon*) is taken merely to mean a group of my feelings, which persists as a group in a certain manner; for I am at present considering only the objective order of my feelings.

It seems to me that in all three usages the word 'feeling' is different from 'sensation' and 'emotion'. As far as I am aware only Clifford defines 'feelings', as has been noted previously. Whitehead tells us that his usage of the word 'feeling' is as follows: "But the word 'feeling,' as used in these lectures, is even more reminiscent of Descartes." Reminiscent is lacking precision.

Frege tells us that "Such an idea is often saturated with feeling..." What Frege understands 'feeling' to be I'm not sure. If ideas have separate parts the question is raised as to what the parts are. The separate parts are unlikely to be ideas as this would lead to regression. If the separate parts are feelings then feelings are more fundamental than ideas.

If ideas are as Frege tells us, that is "the clarity of its separate parts varies and oscillates." then we presumably have an appreciation of the 'clarity' of something that is varying and oscillating.

This feels to me like a fall into the concept of entelechies.

'Feelings' as used by Frege, Wittgenstein, and Clifford is important. That importance cannot be recognised and then left to float wherever it may in the mind of the reader. Clifford defines 'feelings'.

#### 4.12.2 'On Certainty'

Wittgenstein wrote the following:

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<sup>195</sup> January 1878 *Mind*.

396. In the language-game (2), can he say that he knows that those are building stones? - "No, but he does know it." [[Philosophical Investigations I, 2: ... and write with confidence "In the beginning was the deed." Goethe, Faust I. ]]<sup>196</sup>

Clifford too was interested in Faust.

Wittgenstein writes:

5/4

[Here there is still a big gap in my thinking. And I doubt whether it will be filled now.]

471. It is so difficult to find the beginning. Or, better: it is difficult to begin at the beginning. And not try to go further back.

'5/4' is the date 5<sup>th</sup> April 1951. At the time Wittgenstein wrote '471' he was aware that he was terminally ill. He died on the 29<sup>th</sup> April 1951.

'471' has troubled me since I first read it several years ago. I felt it to be important. Starting points are important.<sup>197</sup> Logic is important. If objective logic is taken as the tool to move forward from the starting point then reasoning leads to certain conclusions. If, however, a person were to be bold enough to question the absolute nature of objective logic and consider the possibility of subjective logic the absolute nature of any conclusions arrived at would be thrown into question. Perhaps this is the underlying problem that Wittgenstein is referring to. "it is difficult to begin at the beginning. And not try to further back." he may be telling us that we must start with objective logic and not concern ourselves with subjective logic. We must do this even though our 'feelings' tempt us to probe deeper.

#### 4.12.3 *Zettel*<sup>198</sup>

The posthumous 'Zettel' is commenced in 1929. Whatever else Wittgenstein was doing between the years 1929 and 1948, he was putting bits of paper into a box that would eventually be put together by others and published as 'Zettel'.

<sup>196</sup> <http://web.archive.org/web/20051210213153/http://budni.by.ru/oncertainty.html> accessed 16/10/2013

<sup>197</sup> Cf. Peter Suber 'The Problem of Beginning' <http://legacy.earlham.edu/~peters/writing/begin.htm> Accessed December 2014

<sup>198</sup> *Zettel*, by Ludwig Wittgenstein, Editors G.E.M. Anscombe, G.H. Wright, University of California Press, 1967.

It was seen above that Wittgenstein considered Frege's 'The Thought' to attack idealism on its weakest side. In Zettel Wittgenstein makes appeals to higher dimensional answers to problems. He writes the following:

166. *This* floats before my mind as I read. So does something go on in reading...?-This question doesn't get us anywhere.

167. But how can it float before me?-Not in the dimensions you are thinking of.

Gauss had speculated that there might be higher dimensional realms. I find appeals to higher dimensional realms or worlds unconvincing. Our models of a three dimensional spatial realm are founded on our perceptions and an objective logic. It seems to me much more likely that the answer lies in a model that takes into consideration the nature of mind.

#### 4.12.4 Was Wittgenstein aware of Clifford's metaphysic?

I am not aware of any documentation that provides a definite answer to this question.

There are circumstantial reasons for believing that Wittgenstein was aware of Clifford. Both of them were associated with Trinity College. Both were Cambridge 'Apostles'. Wittgenstein worked closely with Russell. Russell was influenced by Clifford and wrote the Preface to the 1946 Edition of *The Common Sense of the Exact Sciences*. Wittgenstein was probably influenced by Ernst Mach.<sup>199</sup> Mach recognised the thought of Clifford. If Wittgenstein was aware of the work of Clifford the question I would want answered by Wittgenstein is whether he considered Clifford to be a materialist or an idealist.

#### 4.13 Donald Davidson

There is no justification to claim that Davidson was influenced by Clifford however the social nature of language suggests a similarity of thought.

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<sup>199</sup> *Gottlob Frege*, Hans D Sluga, 1980 Pg. 183. "By the time he started to write the *Tractatus* he had probably read Mach and was certainly influenced by the views of Hertz, who in turn was indebted to Mach."

Davidson's essay 'A Nice Derangement of Epitaphs' has received considerable attention. In the essay Davidson discusses two people that meet [presumably for the first time] and enter into a conversation. I will assume that each person has competence in one language that is common to them both. Davidson does not provide any background to these two people. I will assume one comes from London and the other from Alice Springs. Both are on holiday and have left their home towns for the first time in their lives. They meet in a restaurant in a city in western China. They order a meal by pointing at the dishes on display. They do not know what they are eating but it tastes good. They share their immediate environment. The social objects are common to them both. Davidson discusses prior and passing theories of these two people. They bring with them their social objects as acquired in London and Alice Springs, but they share objects in the restaurant. Their passing theory relates to the time they share in the restaurant. How each one combines their prior store of memories with the immediate sense impressions of the food does not detract from the shared social objects they have at the particular time and place they share.

My purpose in mentioning Davidson's essay is that I feel Davidson is pointing out that language is essentially shared objects. Social objects are initially objects as perceived. It is only after we acquire competence in a natural language that we can use the language as a surrogate for the objects themselves.

## Chapter 5 Some Concluding Remarks

It will be noted that I have not discussed Clifford's work regarding ethics. I have not discussed his positing of 'The Tribal Self'. I have not discussed Clifford's work in higher mathematics other than to mention them. I do not have the ability in abstruse mathematics that would allow me to do that.<sup>200</sup> These omissions are failings on my part to provide a full picture of Clifford. However I believe that the thesis has given some insight into the man. I believe that Clifford was a good and honest man. I do not believe he was either atheist or agnostic but rather a deist. Whether he should be considered a pantheist or not I will leave to one side for others to debate.

My thesis was that the work of Clifford removed certainty from the world of man. Obviously this is nonsense. It was not the work of a single man that led to the lack of certainty. It was the work of mankind itself. This point was made by the Dean of Westminster (Stanley) in his paper 'Do we Form our Opinions on External Authority?' presented to the Metaphysical Society 19 December 1871. Stanley presented the following:

One is the authority of eminently gifted men.....

The other is less convincing, but still of considerable weight, and that is the general sense of mankind, especially educated mankind.

What Clifford did do was show us that our models of the world are just models. It is not a criticism of Clifford to point out that he failed to produce something he himself, in my opinion, would have accepted was incapable of production; that being a 'comprehensive philosophy'.

Clifford was one of the foremost mathematicians of his day. His knowledge of mathematics is shown by that recorded in *Mathematical Papers by William Kingdon Clifford*.<sup>201</sup> What I find significant is that despite his knowledge of mathematics he questions the very basis of mathematics in his metaphysical work. In the present day it is impossible in a single lifetime to acquire an understanding of all branches of mathematics, and speculative theoretical physics, let alone write children's stories, acquire languages and lead a full social life. Perhaps the comment made on the title page of *Mathematical Papers* is correct that being:

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<sup>200</sup> I use abstruse as per Sharma.

<sup>201</sup> *Mathematical Papers by William Kingdon Clifford* edited by Robert Tucker, London Macmillan and Co. 1882

“If he had lived we might have known something.”

Conditional statements are intrinsically difficult. The brute fact is that Clifford did not live longer than he did. It is impossible to know what great things Clifford could have accomplished had he lived longer. What is not impossible is to recognise his recorded thought and use that thought to construct a world model that includes his postulates.

Clifford postulated the following:

- 1) cause has no legitimate place in science or philosophy
- 2) time is discrete [ with gaps in my opinion ]
- 3) space theory of matter
- 4) mind stuff
- 5) we know nothing of possibilities or impossibilities
- 6) each individual ‘fills in’ to construct objective logic
- 7) the ‘only’ thing external to ‘my’ mind is the minds of others
- 8) solipsism [voluntarily rejected]
- 9) “I was not, and was conceived. I loved and did a little work. I am not and grieve not.” - *epitaph*.<sup>202</sup>
- 10) these elements of feeling have relations of *nextness* or contiguity in space, which are exemplified by the sight-perceptions or contiguous points; and relations of succession in time, which are exemplified by all perceptions. Out of these two relations the future theorist has to build up the world as best he may. Two things may perhaps help him. There are many lines or mathematical thought which indicate that distance or quantity may come to be expressed in terms of *position* in the wide sense of the *analysis situs*. And the theory of space-curvature hints at a possibility of describing matter and motion in terms of extension only.

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<sup>202</sup> Clifford provided the inscription for his gravestone. See <http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FCLIF> Accessed 19 November 2013

Holding (2) requires that (1) be the case unless logical consequence is known for the model that is satisfied by the postulates.

The positing of (3) removes the material as normally 'perceived'.

Clifford is forced to posit (4) in order that he himself and other minds are.

Stating (5) demonstrates the non-dogmatic nature of Clifford's thought. His acceptance of a scientific method, under laid by a metaphysical structure that would dismantle the scientific structures he himself worked to extend shows his ability to hold two paradoxical structures at the same time.

Clifford's positing of (6) is perhaps the most interesting as it relates to his comment: "but the question is one in which it is peculiarly difficult to make out precisely what another man means, and even what one means one's self." I have often experienced the existence of a new understanding to 'come and go' when it was first presented to my mind. I would grasp the concept, then lose it, only for it to present again. If it is correct that we 'fill in' *logic* then the grasping of a novel concept may require that our prior *logic* required a modification in order to grasp the novel concept. Logic in the sense used to describe this process is not the logic that is set out in a text book on logic. It would also have implications for all prior conceptualisations. Perhaps this is demonstrated by the formation of the 'passing theory' posited by Davidson.

Maybe there is a link between (5) and (6).

It seems to me that (7) is overstated. Although it is true that the only things that are external to his mind are the minds of others the word usage is unusual. Minds of others must include all elements of mind-stuff, even those elements that do not constitute a complexity recognisable as a human mind. In addition those elementary elements of mind-stuff must be in a relationship intimated at in (10). This requires that there be a space that is underlying the perceived ordinary space. It is this underlying space that constitutes the world of Clifford. I would hold that Clifford recognised that this radical speculation was not an end in itself but entailed a regression. It is the regressive nature of his posited world that would require his acceptance of ignorance expressed in (5). Perhaps this ignorance requires, or is, the deity, that I would suggest Clifford recognised. If this is correct then the hostility shown by Clifford to the attempt in *The Unseen Universe* to verify God by scientific method would be reasonable.

Strong solipsism is rejected by Clifford by stating it would be absurd to consider another as being the only mind in the world. Weak solipsism is confirmed by (6). It is (6) that denies that one person can fully understand another. By grasping one concept we affect other concepts. Our ability to avoid dogmatism requires an ability to not seek absolutes in the first place; hence (5).

I include (8) because it is Clifford's opinion of his own existence.

Clifford's understanding of 'feeling' has been discussed above. My understanding of (10) is that it requires structure. Despite lack of knowledge of that structure the structure itself suggests to me that it must be founded on something deeper.

Clifford's thought could lead to interpretations that would present Clifford as a neutral monist. The problem is into which version of neutral monism Clifford's thought would fit. Perhaps the closest fit is Kenneth Sayre's version of neutral monism. The following is taken from 'Neutral Monism'<sup>203</sup>:

Neutral Monism is the view that neither mind nor matter is ontologically basic, but are both reducible (in some appropriate sense of reduction that requires specification) to another more fundamental principle that is "neutral" between them. The neutral monism I advocate holds that the fundamental principle to which both mind and matter are reducible is not a *substance* in any sense (Aristotelian, Cartesian, whatever), but is rather [a] structure of a sort that can only be represented mathematically. This structure is what information theorists...call "information." The neutral monism I advocate, accordingly, has more in common with the ontology of the late Platonic dialogues than with that of the early Russell which the name 'neutral monism' commonly brings to mind. (Memo circulated in the Notre Dame philosophy department)

Sayre's version of neutral monism in relation to Clifford's understanding of 'feelings' is worthy of investigation. I will not attempt such an investigation at this time. One point that should be made is that 'Neutral Monism' is introduced as follows<sup>204</sup>:

Neutral monism is a monistic metaphysics. It holds that ultimate reality is all of one kind.

Clifford's thought does not seem to me to accept 'ultimates'. A full investigation of neutral monism in relation to Clifford's thought will not be attempted at this time.

Clifford found Darwinian evolution useful in his speculations. Clifford's (10) has within it the belief that there will be future theorists. The future theorist will not only have a greater store of 'thoughts of others' to draw on but will have evolved. If Clifford's model is accepted then evolution of human mind is one of increasing complexity.

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<sup>203</sup> Stubenberg, Leopold, "Neutral Monism", *The Stanford Encyclopedia of Philosophy* (Winter 2013 Edition), Edward N. Zalta (ed.), URL = <<http://plato.stanford.edu/archives/win2013/entries/neutral-monism/>>.

<sup>204</sup> Ibid.

The following is a possible insight to how Clifford could be appreciated:

In science, as well as in other fields of human endeavor, there are two kinds of geniuses: the “ordinary” and the “magicians.” An ordinary genius is a fellow that you and I would be just as good as, if we were only many times better. There is no mystery as to how his mind works. Once we understand what he has done, we feel certain that we, too, could have done it. It is different with the magicians. They are, to use mathematical jargon, in the orthogonal complement of where we are and the working of their minds is for all intents and purposes incomprehensible. Even after we understand what they have done, the process by which they have done it is completely dark. They seldom, if ever, have students because they cannot be emulated and it must be terribly frustrating for a brilliant young mind to cope with the mysterious ways in which the magician’s mind works. Richard Feynman is a magician of the highest caliber. Hans Bethe, whom Dyson considers to be his teacher, is an “ordinary genius”; so much so that one may gain the erroneous impression that he is not a genius at all. But it was Feynman, only slightly older than Dyson, who captured the young man’s imagination.<sup>205</sup>

I would suggest that Clifford was a magician. The following is an anecdote given by Robert Tucker:

One more anecdote which will give an idea of the quickness and clearness of his perception of complicated relations in space, must close this brief sketch. Mr Frost, in his previously cited letter, goes on to say, “My brother A. H. Frost, who was in England for a short holiday from his missionary work in India, brought with him a complicated puzzle which was to be taken to pieces. It was not a two-dimension one, like many, but solid; about as big as a good snowball. My brother said, ‘I have heard you talk of the wonderful capacity of Clifford, prove it to me by asking him to tea, and I will believe you if he can take my puzzle to pieces.’ I accordingly asked him, and on my brother’s giving him the thing, he, without fingering it but simply looking it over for a few minutes, put his head in his hands for some ten minutes and then took hold of the puzzle, and at once, to my brother’s astonishment, dislocated it, and my brother believed in him ever afterwards.”<sup>206</sup>

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<sup>205</sup> *Enigmas of Chance : An Autobiography* (1985), Pg. Xxv, Mark Kac. Taken from [http://en.wikiquote.org/wiki/Richard\\_Feynman](http://en.wikiquote.org/wiki/Richard_Feynman), accessed 23/11/2013

<sup>206</sup> *Mathematical Papers by William Kingdon Clifford* Edited by Robert Tucker, with an introduction by H. J. Stephen Smith, London: Macmillan and Co. 1882. Pgs. xviii-xix

I would also place George Daniels, and John Harrison, in the category of magicians. Magicians are rare. Another example of a magician would be Leonardo da Vinci. Several artists employed the sfumato technique in painting, but it was Leonardo that created the Mona Lisa.

Clifford died on the 3 March 1879. His health had been in serious decline for two years prior to his death. The affection and respect for Clifford can be seen in the efforts of his colleagues to help him. These efforts are shown in the papers held by Janus.<sup>207</sup> A list of obituaries can be found at Janus.<sup>208</sup> The list does not include the 'obituary' presented in *Nature*.<sup>209</sup> *The Times* reported Clifford's death as follows on the 6 March 1879:

DEATH OF PROFESSOR CLIFFORD----We regret to announce the death of Professor Clifford, F.R.S., which occurred on Tuesday, at Madeira, from consumption. The son of an alderman and justice of the peace for Exeter, Mr. Clifford was born in 1845. He was second Wrangler and first Smith's prizeman in 1867, and was elected a Fellow of Trinity College, Cambridge, in the following year. Not long afterwards he was appointed Professor of Applied Mathematics and Mechanics at University College, London. He was distinguished not only by a rare talent for mathematics, but by a singular capacity for bringing the most advanced scientific ideas within the range of ordinary knowledge. At the time of his death a movement was in active progress to collect a fund for Professor Clifford and his family, on account of his enforced retirement from active work. It is intended to proceed with the raising of the fund for the benefit of his widow and children.<sup>210</sup>

On 22 October 1879 *The Times* published a review of *Professor Clifford's Lectures and Essays*. This cannot be considered an obituary in any normal sense of the word appearing as it does seven months after the death of Clifford.

<sup>207</sup> See <http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FCLIF> Accessed 25/11/2013 In particular <http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FCLIF%2FA7>

<sup>208</sup> See <http://janus.lib.cam.ac.uk/db/node.xsp?id=EAD%2FGBR%2F0016%2FCLIF%2FC1>

<sup>209</sup> *Nature* 13 March 1879, Pgs. 443-442

<sup>210</sup>

[http://find.galegroup.com.ezproxy.sl.nsw.gov.au/ttda/newspaperRetrieve.do?sgHitCountType=None&sort=DateAscend&tabID=T003&prodId=TTDA&resultListType=RESULT\\_LIST&searchId=R1&searchType=BasicSearchForm&currentPosition=3&qrySerId=Locale%28en%2C%29%3AFQE%3D%28tx%2CNone%2C8%29Clifford%3AAnd%3ALQE%3D%28da%2CNone%2C23%2903%2F02%2F1879+-+01%2F01%2F1880%24&retrieveFormat=MULTIPAGE\\_DOCUMENT&userGroupName=slnsw\\_public&inPS=true&contentSet=LTO&&docId=&docLevel=FASCIMILE&workId=&relevancePageBatch=CS152222822&contentSet=UDVIN&callistoContentSet=UDVIN&docPage=article&hilite=y](http://find.galegroup.com.ezproxy.sl.nsw.gov.au/ttda/newspaperRetrieve.do?sgHitCountType=None&sort=DateAscend&tabID=T003&prodId=TTDA&resultListType=RESULT_LIST&searchId=R1&searchType=BasicSearchForm&currentPosition=3&qrySerId=Locale%28en%2C%29%3AFQE%3D%28tx%2CNone%2C8%29Clifford%3AAnd%3ALQE%3D%28da%2CNone%2C23%2903%2F02%2F1879+-+01%2F01%2F1880%24&retrieveFormat=MULTIPAGE_DOCUMENT&userGroupName=slnsw_public&inPS=true&contentSet=LTO&&docId=&docLevel=FASCIMILE&workId=&relevancePageBatch=CS152222822&contentSet=UDVIN&callistoContentSet=UDVIN&docPage=article&hilite=y) Accessed 25/11/2013

The obituary that appears in *Nature* is of interest because it suggests that Clifford was prominent for his philosophical and polemical writings rather than his mathematical work.

A critical examination of the value of his mathematical labours cannot be attempted; few, indeed, could do justice to them; but it is hoped that it not long remain undone. All that can be said in concluding this brief sketch of his short and brilliant life is to give expression to the regret so widely felt that it was so prematurely cut off. He was --- some of his friends may think unfortunately --- most generally known for his philosophical and polemical writings. That his fame will rest on no such narrow basis, the following list of papers from the Royal Society Catalogue abundantly testifies:--

I find it strange that Clifford's mathematical work and his speculative metaphysic should be seen as separate. It is Clifford's imagination that gives purpose to his mathematics, and his understanding of mathematics that provides his speculative metaphysic. The two are not separate but intertwined. Clifford's mathematics does not provide proofs for his speculations, but his speculations do present challenges to the mathematical models. My understanding of this is that a problem can be recognised and put into words. The example of the co-axial escapement created by George Daniels is an example. Daniels wanted to create an escapement that was more efficient than any previous escapement; this is the problem. Daniels provided a novel escapement that was more efficient; however that act of creation was not in answer to a 'question'. Clifford held that time is discrete. I would suggest he held that time was discrete with gaps. Clifford has been considered by some to have done some of the ground work for Einstein to provide the 'paradigm shift' that was his theories of relativity. Some have argued that Clifford failed to recognise the 'space time' continuum and it was this that would not have allowed him to present the theories of relativity prior to Einstein presenting them. This is obviously true. However if Clifford had lived he may well have created his own model that would have been a paradigm shift. Clifford's new paradigm would have been much richer than that of Einstein<sup>211</sup>, and perhaps have included a type of quantum theory within it. This is speculation of the most extreme form, but I believe it reasonable. Clifford's Problem was on a much grander scale than Einstein's.

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<sup>211</sup> "Yes, the mind does algebra, and the mind carries out actions and does all kinds of things, but it does not arrive at its actions by actually doing the computations as a finite-state machine does-that is, as a digital computer does. All right, how does it do it? As Einstein used to say, "Meine lieben Damen und Herren....!", "Dear ladies and gentlemen, if I knew that, I would know everything!"

“I was not, and was conceived. I loved and did a little work. I am not and grieve not.”

This was presented as 9) above. I find Clifford’s choice of words for the inscription on his gravestone disturbing. It seems to me that in three short sentences Clifford has summed up his metaphysic. It is not pleasant to contemplate my own death; it is more unpleasant to contemplate the death of loved ones. If I take seriously my understanding of Clifford’s metaphysic it leads to a world view I would rather not hold. My own existence is not the problem; it is rather the existence of those that are dear to me. Perhaps others that have attempted to understand Clifford’s metaphysic have been troubled by the same feeling.

The problem that I have with Clifford’s metaphysic is perhaps of my own making. I have taken the position that time is discrete with gaps. This is not explicitly stated by Clifford. It is my interpretation of his thought. Clifford does explicitly state that time is discrete.

The following is an attempt to explicate my own speculation of a discrete ‘time’ with gaps.

One instant in which there is a certain arrangement of space that is an arrangement of mind-stuff is succeeded by another instant. There is a ‘gap’ between the two instants. Within this gap there is room for an infinite number of other arrangements. If using ‘infinite’ is problematic it can be replaced by a very big number of other arrangements. Within this arrangement there is a complex of mind-stuff that constitutes me. There is also a complex that constitutes you. My arrangement brings with it its own ‘time’. I come into being by a coming together of two complications of mind-stuff. Because the complication of mind-stuff that constitutes me delivers my consciousness then it also delivers my world and my time. Neither my world nor my time was existing prior to me. My world and time ceases at my death. To explicate the mechanism of this would be to take speculative metaphysical thought into the realm of scientific thought. To explicate it in thought and provide an abstruse ‘language’ construct of the feelings would be a first step. I believe this eluded Clifford and it certainly eludes me.

In Chapter 3 above I discussed emergents and parallelism. It seems to me that the one entails the other. If the preceding paragraph is credible then there are seen to be parallels and emergents. The model provides a deeper level of ‘ontological’ explication but this explication brings with it parallels and emergents as are found in models that do not descend so deep. The understanding of monisms found in ‘idealism’, materialism, and neutral monism, can be contrasted with the dualisms of emergentism, epiphenomenalism, and parallelism. It seems to me that Clifford’s mature metaphysic does not constitute a monistic philosophy. Although it provides a model that is deeper that model is still in the realm of dualism. Maybe in years to come Clifford’s model may become scientific. However should it do so it would be like all other scientific models, and as such subject to refutation.

## Addendum

One of the problems of doing research is that you never know what you will find. The other problem is that when you find things it is necessary to be critical of the findings and try to avoid reading more into the findings than the findings deserve. Failure to do this leads to unwarranted ‘conspiracy theories’, or what is worse indefensible conclusions, having said that it would be wrong not to recognise the implications of the interpretation of the information for fear of ridicule.

I wrote above that a person that does not seek ‘immediate honour or emolument’ will eventually become an affront to those that do.

Clifford’s obituary in *Nature* mentioned in the previous chapter contains “He was—some of his friends may think unfortunately—most generally known for his philosophical and polemical writings.” In 1883, four years after Clifford’s death, F.H. Bradley published his *Principles of Logic*. Bradley’s *Appearance and Reality* appeared in 1893. He was a member of the British Idealists. He argued for ‘objective (or absolute) idealism’. Bradley makes no mention of Clifford in either of the books mentioned. Bradley was active during Clifford’s lifetime. He was engaged with Henry Sidgwick. Sidgwick was a member of the Metaphysical Society. Catherine Marshall’s paper ‘Sidgwick’s utilitarianism in the context of the rise of Idealism: a reappraisal’<sup>212</sup> states the following:

Henry Sidgwick gave six papers throughout the life span of the Metaphysical Society and at a time when he was writing *The Methods of Ethics* (1874). Therefore, Sidgwick wrote all his papers for the Metaphysical Society at the time when he was either writing or revising his most famous work, *The Methods of Ethics* (which was revised seven times up to 1907 – another edition was published in 1981 with an introduction by John Rawls) and one can see the changes in his opinions and ideas through the papers. Sidgwick was also writing at a time when he was openly opposed to Idealism (even though he was close to T. H. Green) and was attacked by F. H. Bradley for what Bradley believed was a defence of utilitarianism in *The Methods of Ethics*. Sidgwick revised *The Methods of Ethics* after F. H. Bradley’s 1877 criticism of his ideas in the critical work entitled *Mr Sidgwick’s Hedonism: An examination of the main argument of The Methods of Ethics*.

I believe Bradley to have been aware of Clifford’s metaphysic. How Bradley interpreted Clifford is not known to me.

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<sup>212</sup> <http://etudes-benthamiennes.revues.org/678> Accessed 2/03/2014

In 1886 Pollock wrote in the introduction to the second edition of *Lectures and Essays* that he no longer accepted Clifford's 'mind-stuff'.

In 1886 it was Huxley that took offence at Clifford, Spencer and Huxley himself being labelled materialists by Lilly. The following is a footnote found in Karl Pearson's *The Grammar of Science*:

The chief German representatives of this materialism are J. Moleschott and L. Büchner, and it has found its warmest supporters in England among the followers of the late Mr. Bradlaugh. It is perhaps needless to add that the gifted lady, who speaks of secularists as holding the "creed of Clifford and Charles Bradlaugh," has failed to see the irreconcilable divergence between the inventor of "mind-stuff" and the follower of Büchner.<sup>213</sup>

The 'gifted lady' appears to be Hypatia Bradlaugh Bonner.<sup>214</sup>

It seems to me that Clifford cannot be considered to be materialist. What is the alternative to being a materialist? Two possible alternative positions to hold are subjective (empirical) idealism and objective (absolute) idealism. It has been noted above that Clifford argued against the plurality of spirits. This entails that Clifford must reject the subjective idealism of Berkeley. The idealism of Bradley is objective or absolute idealism. Clifford argues against absolute idealism, but acknowledges that "each individual may be unable to justify his dissent from it." If Clifford is not a materialist, a subjective idealist, or an absolute idealist, can he be taken as holding some variant of parallelism? One possible version is the epiphenomenalism of Huxley. I suggest that Clifford does not hold an epiphenomenalist position

Much of Clifford's metaphysic was arrived at during the period he was involved with the Metaphysical Society. My understanding of the Metaphysical Society was that it attempted to resolve the problems faced by society confronted by scientific advances that were putting in question the authority of religion. Clifford was undoubtedly 'anti religious'. I do not accept that he was an atheist. I do not see evidence that would suggest that Clifford was an atheist, rather I see Clifford as being a deist. Even the word 'deist' is perhaps misleading. A deist believes in God, but denies a relationship between man and God. Clifford's 'God' is at the end of a regression of worlds. I have interpreted Clifford in such a way that his model is a single step in a very long walk. Perhaps the 'ism' that best fits Clifford is a version of Ultimism. This, if it is correct, leaves the uncertainty presented to

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<sup>213</sup> *The Grammar of Science* Karl Pearson Second Edition, London, Adam and Charles Black, 1900. Pg. 297

<sup>214</sup> *Charles Bradlaugh—A Record of His Life and Work by His Daughter Hypatia Bradlaugh Bonner* Vol.2 London: T. Fisher Unwin 1894. Pg. 133

humanity by Clifford's model. It is perhaps this that resulted in the incredulous attitude towards Clifford's metaphysic following his death. The established structure of society in the Britain of 1880 could tolerate atheists, theists, and agnostics, but how could it cope with the model that I understand Clifford was presenting? The Metaphysical Society dissolved the year following Clifford's death. If my understanding of Clifford is correct, acceptance of it removes dogma. It is not a system that claims to be complete. Its very nature of being incomplete denies the possibility of having two opposing views. The model undermines the mind body problem rather than arguing within the structure of mind body duality. Humanity demands something to believe in. Clifford does not provide that, he provides rather an unknown that is to be explored. This I find personally satisfying. Others that are more interested with 'getting on with their lives' would not. What constitutes the most 'beneficial' model for the stability of humanity and its progress is another matter.

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