Einstein's Meaning in Society by Andrew Miles

Albert Einstein's papers on Special Relativity in 1905 and on General Relativity in 1915 helped him become one of the most famous scientists of all time and a global and cultural icon. However, although people recognise his image, not all recognise his work or what it meant to not only the scientific community but all communities around the world. In the present day, in the centenary of the year that Einstein changed the way we think about the universe with Relativity, what exactly does Einstein mean to society as a whole?

There is no doubt about the fact that Einstein is a global icon, not just the most famous scientist but arguably the most famous person in history. This is easily shown by "Baby Einstein" books in shops, the cartoon-like Einstein that can help you in Microsoft Word if you have a problem **[Rodgers, 2005, Pg 15**] and posters displaying his image with him poking his tongue out. There are two different answers to the question posed at the start of this essay, one from the point of view of scientists and one from the point of view of those not into science.

First the former of those two points above. Einstein was, and still is, seen as a genius whose papers on Special relativity, general relativity, Brownian motion and quantum theory (to name a few) and the "fierce simplicity" of the solutions throughout his work [**Bondi, 1979, pg 1**], endeared him to the scientific community. His papers allowed the understanding of various phenomena and changed how we look at the physics of the world. For example, his paper on Special Relativity brought together the understanding "reached by a century of struggle with the phenomena of electricity and magnetism" [**Schmartz & McGuinness, 1979, pg 168**]. Relativity is also essential when it comes to making calculations for the huge particle accelerators. If these particles, which are travelling at speeds comparable to the speed of light, had their momentum and/or energy been calculated using only Newtonian equations, then the results would be very wrong and may have meant such accelerators would not have been able to exist as they do today. But, if it wasn't for Einstein's paper on Brownian motion atoms themselves may never have been proved "real" or at least done so at a later date. He set the mathematical background to the problem of determining the velocity of a Brownian particle so that Jean Perrin could prove Einstein's theories right and seal "the reality of the discontinuous, atomic nature of matter" [**Haw, 2005, pg 21**]. In 1922 he was awarded the 1921 Nobel Prize for Physics for his discovery of the photoelectric effect.

The latter of those two points presents a different view of Einstein. To those not into science, Einstein is still seen as a genius but the majority of people do not know exactly why. Many quote $E=mc^2$ as the reason why without too much thought as to what this equation actually means and some know of the term relativity again, not knowing what it really means. Einstein's theory of relativity and therefore all his work, has a reputation that precedes it; a reputation of being so incredibly difficult that to try and understand any part of it is to be on the receiving end of immense headache. This could be the reason why Brownian motion and photoelectric effect is no longer taught at secondary school level and hasn't been for the past few years [**Francis-Jones, 2005, pg 18**]. It could be that children, having heard of Einstein and his legendary intelligence "shut off" when his

name is mentioned within the teaching of, for example, the photoelectric effect. This could be because Einstein's reputation of a genius therefore means it's very difficult, so why bother trying to learn it? It could also be because of teasing and mocking from classmates if you are seen learning such and intelligent theorem. However, the reasons why are just speculation but it does mean that a good proportion of children will not know of any of the theories of a man whose work published in 1905 is being celebrated this year to mark its centenary, along with other things as part of the International Year of Physics.

A similar question to that posed at the start of this essay was asked on two internet message boards which don't have little, if anything, to do with science, [**http://www.action-figure.com/index.php?name=PNphpBB2&file=viewtopic&t=11725**] [**http://www.shoryuken.com/forums/showthread.php?t=88553**] but the regular patrons are from all over the world not just from Britain. The replies that came back consisted of either saying he was a genius, mentioning his fuzzy white hair, saying he was a bit barmy/different shaped brain to the rest of us and the theory of relativity/$E=mc^2$. These comments were just simply stated and when asked for further elaboration the few replies honestly said they just knew of them not about them. One person even replied by saying they only pretended to know what Einstein was saying, on the other hand this may have been a reply in jest. Despite this, the majority of those who replied did so with aspects of Einstein's image, physical and otherwise and backs up the point made earlier on that many know not of Einstein's work. The "mad scientist" image that Einstein has gained has not dented his power to inspire. A recent poll actually showed that Britons are inspired by Albert Einstein more than David Beckham, but, despite this, only 15% have thought of becoming a scientist as many feel they don't have what it takes [**http://www.mori.com/polls/2001/crc-icr.shtml**].

Many people also associate Einstein with the atomic bomb, seeing him as an essential part in its construction. This was a common view until recently (with various television programs documenting his life. He actually wrote a letter to President Roosevelt warning of dangers of atomic bomb and signed an anti-war manifesto) but a few people still believe it. The truth is Einstein just argued that "energy has inertia and inertia has energy" [**Schmartz & McGuinness, 1979, pg 166-167**] and as relativity was proposed in 1905 and the atomic bomb project started in 1939 Einstein had little to do with nuclear physics. However, he did encourage the United States to counter the Germans if they "might be able to utilise a new weapon of frightening proportions" [Ronald C. Clark The Life of Albert Einstein pg 548-550]. Just before he died he signed the "Russell-Einstein manifesto" urging nations to renounce nuclear weapons [**Durrani, 2005, pg 14**].

Because of the popularity of Einstein around the world, his image is million dollar business in itself. The Hebrew University of Jerusalem holds the rights to most of everything Einstein and along with the Roger Richman Agency in the US, keep a tight control over how and when his wispy white hair and bushy moustache, among other things, can adorn a certain publication or television programme. The Einstein "brand" [**9**] can be seen everywhere. Book shops these days might sell the "Baby Einstein" books and

CD's and there's the Einstein that helps you on your computer as stated before. Apple also used his image in an advertising campaign ("Think different…") to sell computers and T-shirts, posters, magazines, books, mugs and even an action figure carry the image, face or form of Albert Einstein. The money generated through the letting of Albert Einstein, the product, does not just disappear into some lucky relatives pocket but goes back into the University that holds his rights His popularity has meant that his image "helps to support the 70% of its 24,000 students who receive scholarships" [**Gwynne, 2005, pg 35**], giving some undergraduates the chance to follow in his footsteps.

Why Einstein has become such an icon to so many people may seem to be a bit confusing as many scientists have published scientific papers and have nowhere near the same recognition. His popularity, which has increased recently due to the celebrations happening for the International Year of Physics, is due to what his papers were about and due to what he was like as a person. Relativity at the time went against a lot of scientific theories when it was published and some aspects were difficult to imagine (Einstein's "thought experiments", e.g. if you travel at the speed of light while holding a mirror your image does not appear on the mirror as light from your face cannot reach it [**Durrani, 2005, pg 14**]) which got everyone thinking and the more people thought, the more they realised he was right. However, there are still experiments happening today to prove relativity, the hunt for gravitational waves as predicated by the general theory of relativity being one of them. Also, Einstein himself had an "extraordinary, clear, self-sufficient and very humble personality" [**Bondi, 1979, pg 9**] and along with his genuine nature, people found very him very endearing and when combined with the papers published in his miracle year (1905) set his popularity soaring with not only scientists but everybody. Perhaps the most incredible thing was that his papers on relativity had no references on them unheard of even today and apparently characteristic of Einstein [**Bondi, 1979, pg 9**].

Einstein is also responsible, albeit indirectly, for some of the technology and gadgets that are used in society every single day. For example, this essay would be incredibly difficult to write if it wasn't for Einstein's work on the photoelectric effect as LCD monitors would not exist today. Also, it would not be possible to sit down and watch your favourite TV show or film while enjoying a nice bowl of popcorn as television screens and microwave ovens would not be around today either! Einstein's work has also been put to good use in helping people to recover from various accidents and ailments. X-rays and CAT (Computed Axial Tomography) [**http://www.colorado.edu/physics/2000/index.pl**] would not be around for use in hospitals meaning that diagnosing patients would be a lot less accurate and, possibly, more painful.

His work on the photoelectric effect also made the creation of the Laser (which stands for Light Amplification through Stimulated Emission of Radiation) possible. He realised that when a photon hits an already excited atom, it releases another photon which is identical to the incident one this therefore leads to two photons travelling and eventually leads to a monochromatic light source. Lasers are used for many things within scientific research in the past and still are today. For example, Young used a laser in his famous experiment

showing the diffraction pattern of light when passing through two slits [**http://www.colorado.edu/physics/2000/lasers/lasers2.html**]. Eventually the same was discovered for electrons and why it happened is described through quantum physics, another area of science that Einstein published a paper on in 1905! Today lasers have varying strength and are used in, for example, the testing of optic fibres. Optical fibres are now being used all around the world to carry information quickly without it being all jumbled up.

From what is written above it appears that the majority of the general public just know the Einstein image and see him as *the* face of science or the "poster-child" for intelligence without really knowing or understanding why or how. To the scientific community he is seen, in general, as the "symbol of relativity" [**Clark, 1973, pg 548-550**] as well as everything described above but, the majority understand why and/or how he became such a global icon for science. On the other hand, this kind of view is not set in stone as there are people from the general public who know about relativity and can explain its postulates and, in much the same way, there are people within the science community who can not explain relativity or quantum theory. This leaves the conclusion that Albert Einstein's meaning throughout society is incredibly mixed, with his meaning to a certain individual varying, regardless of job or background. People also take for granted the fact that if wasn't for his paper on the photoelectric effect, we would not have CD players or LCD computer monitors. Overall, Albert Einstein's meaning in society today is very positive as the distinctive image of such a famous genius can provoke a lot inspiration in anyone, regardless of whether his intelligence was mainly scientifically based (he was also a bit of a philosopher which have yielded many quotations). This is backed up by the huge amount of money generated through the Einstein brand, people will obviously pay good money to use his image in magazines, books, television programs and even (possibly) in a computer game as it is proven to sell and sell well. It is safe to say that if Einstein's miracle year, his *annus mirabilis*, never happened, we may not have had many of the technologies and gadgets we have today. There are plenty of stories about Einstein, good and bad, which will be retold for many many years to come further cementing his image into history(for example, in 1952 he turned down an opportunity to be President of Israel![**Durrani, 2005, pg 14**]) and therefore influencing and inspiring future generations to come.

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