

# Intellectual Property Protection: What Role in the 20th Century History of Innovation?

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I have to say I feel I'm here as something of a fraud. I've never regarded myself as an expert on development, but I have always rather fancied myself as an intellectual and, in common with most intellectuals, I rather like the idea of intellectual property. It has a ringing sound about it. It's something for me.

I started to have doubts, however, when I was involved in a dispute in the United Kingdom over copyright in television listings — printed schedules of what will be on television each day. It occurred to me that in terms of intellectual creativity, in a country that had produced the plays of William Shakespeare, the poems of Keats and the novels of Jane Austen, television listings did not rank very highly in terms of their creative contribution. It also occurred to me that even if it were determined that broadcasters had no copyright in television listings, it was unlikely that they would wish to withhold knowledge of what was on their television programmes from the public at large, i.e. the listings would be produced and disseminated anyway. What I found particularly interesting was that neither of these arguments were of any relevance whatsoever to the legal position that governed intellectual property.

I then noticed that, while the broadcasters did have copyright in these particular listings and derived substantial amounts of revenue from them, they obtained that revenue by using their exclusive access to them to maintain a position in distributing and selling magazines called *Radio Times* and *Television Times*. They created commercial monopolies in other areas on the back of their intellectual property rights. So these intellectual property rights did indeed create substantial profits for particular firms. I also noticed, however, that Shakespeare, Keats and Jane Austen had derived no benefit of any kind from intellectual property legislation. Indeed, the conclusion to which I've been gradually coming is that while it's a nice sounding phrase, what is called "intellectual property" is really neither intellectual nor property.

To pursue this further and to give us something to talk about this morning, I asked some of my scientific colleagues what they regarded as the most important contributions to knowledge, the most important innovations of the 20th century. The

three they came up with were the following: Einstein's theory of relativity, the invention of computing and the structure of DNA. I then asked the economist's questions about these innovations: who paid for them and who benefited from them?

Well let's ask first who paid for them? Start with Einstein. He invented the theory of relativity whilst employed as a civil servant, a clerk in the Swiss government patent office. He was actually employed there — and this will be relevant later — because he had failed to get a university job in Germany or Switzerland. He did manage to get a job, I'm pleased to say, after inventing the theory of relativity, and he spent the rest of his life as an employee in universities in Germany and the United States. Einstein, after discovering relativity, had a pleasant and comfortable life, although not perhaps the pleasant and comfortable life that one would expect to enjoy as the chief executive of a high-tech company. There was no personal office, no chauffeurs, certainly no corporate jets, but a comfortable enough life all the same, paid for from his university salary and the hospitality of those who valued his intellect and his presence.

Let's go on to computing. Perhaps I should explain what's at issue here. Bill Gates, contrary to common belief, did not invent the computer. But who did? The person with the strongest claim is probably Alan Turing. What Turing invented, back in the 1930s, was the idea of computing. Of course, calculating machines had been around for a very long time. The key insight of Alan Turing was that if you could do a sufficiently long string of calculations sufficiently quickly, you would be able to do things that were almost indistinguishable — some people think *actually* indistinguishable — from the functioning of the human brain.

Turing created this conceptual structure in the 1930s. He was then part of a team who developed the first computer, at Bletchley Park in Britain during the Second World War. It was part of the remarkable Allied success in cracking German codes. Ask again the economist's question: who paid? Turing's initial work was done while he was employed in the University of Cambridge, as a fellow of King's College. For the rest of his short life — Turing was a deeply unhappy man who ultimately committed suicide — he was a civil servant employed by the British Government.

My third major innovation is the unravelling of the structure of DNA. A British post-graduate student, Francis Crick, and an American post-doctoral fellow, James Watson, did this, again in Cambridge, in the 1950s.

In short, universities and governments financed the major scientific advances of the 20th century. Intellectual property did not play much of a role in them. Indeed, not to put too fine a point on it, it played no role, whether in stimulating these inventions or in rewarding the people who made them.

When I've put that argument before, people have said to me, well, what you are talking about is fundamental, basic scientific knowledge, and intellectual property is not about that. Intellectual property is for products rather than about knowledge. Well, maybe that's right. So I reframed the question to my scientific colleagues. What were the most important product innovations of the 20th century? In discussion, they came up with four: computers, antibiotics, television and transistors. So once

again I asked the economist's questions. Who paid for these innovations? Who benefited from them? Computers, I've talked about already. So, let's go on and look at the other three.

We'll start with antibiotics. How were antibiotics discovered? Who paid? There is a rather strongly British theme to these particular innovations, and I honestly wondered when setting all this down whether there was actually some bias in my selection. Having been over it carefully and discussed it again with colleagues, I really don't think there is. It truly is the case that the British contribution to major 20th century innovations is disproportionate.

The first antibiotic, penicillin, was discovered by Alexander Fleming, a professor in a London teaching hospital, a quarter of a mile from where I live. Fleming was a somewhat idle person who discovered it by accident. Some of the materials in his laboratory hadn't been cleaned out properly and mould grew on them. That laziness went a bit further because even after penicillin had been discovered, it was ten years before major follow-up work was done. That's deeply significant, because in retrospect we know that the discovery of antibiotics was — perhaps along with the computer — the most significant *commercial* innovation of the 20th century. Notwithstanding that the basic principles had been established very little was invested in developing the concept. If you ask who did, ultimately, fund such development, the answer is that it was the Rockefeller Foundation, an American philanthropic foundation, which sponsored research by Howard Florey and others at Oxford University that created the first administered antibiotics. Further, research funded by Rockefeller and government during the Second World War led to the development of a whole variety of antibiotics, which essentially eliminated infectious diseases as a cause of death in otherwise healthy adults in the West. So the basic funding for the development of this activity came from a charity, and Fleming and Florey again spent their careers as employees of either British hospitals or British universities.

Now let's turn to television. Who paid for television? Well, every encyclopaedia will tell you that yet another Briton, a Scot this time, John Logie Baird, invented television. The truth is that Baird's television did not work very well. Television was essentially invented simultaneously, as sometimes happens with major innovations, by many people in many countries at about the same time.

Take the United States for illustration. There were two major strands of development. For the inventive strand, the person who should probably be credited with inventing American television — what a thing to be credited with — is a gentleman by the name of Philo Farnsworth from Utah. Certainly, it was to Philo Farnsworth that the US patent office finally awarded the major United States patents for television. They awarded them after interminable disputes with the Radio Corporation of America. RCA was by far the largest provider of radio programmes in the United States. It repeatedly claimed to have invented television. The US Patent Office and the US courts found very little merit in this claim. Indeed RCA's chief executive at the time is reported to have said, "Our policy is that we don't pay royalties in this company, we

receive them”, and that did indeed seem to be their policy. Anyway, they sued everyone else involved in the television business. They lost in the courts, but they did manage to reduce Mr. Farnsworth to penury. He ultimately sold the patents he had been granted in television to RCA for a modest sum.

One aspect of this saga is reproduced often in the modern intellectual property world. The returns from intellectual property rights went not to those who had the greatest capacity for innovation, but to those who had the greatest capacity to pursue legal processes in order to claim intellectual property rights, deserved or otherwise.

The last product innovation I want to take this morning is transistors. Transistors are probably the most important 20th century innovation to have come out of a commercial laboratory. Bell Labs in New Jersey discovered the transistor in 1947. Bell Labs were of course then the research arm of the American Telephone & Telegraph Company (AT&T).

Yet that’s a very interesting case because Bell Labs were a very peculiar kind of commercial research laboratory. They were actually prohibited, by antitrust agreement, from conducting research in ways that would benefit the parent company. The result of that was that when the transistor was invented in Bell Labs, what Bell Labs did was to grant licenses to develop this innovation to around 30 companies around the world, for nominal sums. Most of the subsequent development of the transistor occurred in Japan and in spin-off companies established by Bell Labs employees. As a result of being able to take away his employer’s intellectual property and build his own company around the innovation that he developed while in the employ of Bell Labs, William Shockley became the *only* inventor on my list who became what my City of London friends would call seriously rich.

The issues in and around intellectual property are a good deal more complicated than normally presented. I think that, in one aspect or another, every one of the cases I have taken illustrates that. Yet the common thread is that as far as major innovation is concerned, intellectual property issues are *not* very important. The creation of intellectual property rights does not seem to have had much to do with the ways in which these 20th century innovations evolved.

An argument — it’s quite a subtle argument — says that intellectual property is not very important for big innovations but is important for small innovations. I think that argument is actually wrong, but it would require more time than I have to deal with it. The blunt fact is that most major innovation is actually funded either by the State or philanthropically. That is true of virtually all the innovations that I have described this morning.

Nevertheless, one needs to be very careful about that, because we also know that centralised State control is something that stifles innovation. Centralised State control of the innovation process has in history produced nonsenses like Lysenkoism. It is striking that, despite the rather high quality of most Russian medical services, Russia produced nothing of much significance in the way of new pharmaceutical products in the course of the 20th century.

Indeed, the need for pluralism in this kind of support for innovation is illustrated forcibly by two cases I have cited. Einstein failed to get a university job because he was regarded as a difficult person (as it's quite clear he was). On that account he got poor references from the professors who had taught him in his undergraduate and post-graduate studies. It's unfortunately the case — true of most of the characters on my list — that people who are highly creative innovators are often awkward people to work with and difficult for big organisations, especially tightly run commercial organisations, to cope with. Einstein was able to develop his theory only because he got a job in the Swiss patent office. Like many government jobs, it was not particularly demanding and allowed him to develop the theory of relativity in his spare time. Crick and Watson weren't supposed to be doing research on DNA at all. The money allocated for that kind of work had been sent somewhere else and Crick and Watson were being paid to do quite different kinds of research. In these two cases, only the ability of people to defy the central organisation of research enabled them to produce what they did.

Let me sum up with some final lessons. The rationale often presented for intellectual property regimes — that they are needed in terms of rights and justice for creative individuals — is extremely tenuous. The individuals whom I've described, the most scientifically creative individuals of their century, got very little out of intellectual property regimes. The people who *have* got a lot out of intellectual property regimes are people like Harold Robbins and the songwriters of "White Christmas". In terms of rights and justice for creative people, the current intellectual property structures we have don't achieve a great deal.

That doesn't mean that we shouldn't have intellectual property structures. I think we should, but we should understand that the rationale of intellectual property regimes is as a mechanism of economic regulation. Such mechanisms need to be very carefully designed, because they may stifle innovation as much as they stimulate it. What we need is a judicious balance between incentives and opportunities. The class of intellectual property that our current rules protect is far too narrow. The areas in which intellectual property legislation matters for economic activity are very limited, and the legislation we have gives far too much protection to those things that it does protect. The result is that intellectual property, in the television-listings case, is largely a matter of finding a basis for the establishment of commercial monopolies.

It's conventional, as you know, for academics to end their papers by saying that more research on the subject is needed, but for what I'm talking about this morning I think that is true. There is an enormous amount of discussion of intellectual property, based — to my mind with very little justification — on assertions and claims about a structure of rights and justice. Alternatively, claims are made about balances between incentives to innovate and incentives to disseminate, which are not justified by reference to any empirical analyses of the relationship between innovation and the exploitation of intellectual property rights.

I don't believe that my ideal world would be one in which there were no intellectual property rights. If forced to choose between the intellectual property regime we have today and none at all, however, I'd be tempted to go for none at all.