What's wrong with the Nobel Prize?

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Introduction

The Nobel Prize is the single greatest honour that can be bestowed upon a scientist, and yet it has received its fair share of criticism. Even Nobel Laureate, Max Dulbrück, has criticised the Prize stating "by some random selection procedure, you pick out a person and make them the object of a personality cult. After all, what does it amount to?" [1] Recently, there have been calls to reform the Nobel Prizes with ten scientists writing an open letter to the executive director of the Nobel Foundation. [2] This article presents a critical analysis of the Nobel Prize and its role in science, showing that whilst flawed the Prize is still valuable.

The origin of the Nobel Prize

The Nobel Prize is named after Alfred Nobel, who made a fortune in the munitions industry after inventing dynamite. When he died in 1896, Nobel's estate was worth more than 33 million kronor with one year's interest from the fortune equal to the annual budget of Sweden's greatest university. [1] Nobel's will, written in 1895, dedicated the majority of this estate to prizes for those who had "conferred the greatest benefit on mankind" by making "the most important discovery or invention" in the fields of physics, chemistry and physiology or medicine. In just one short paragraph, Nobel directed how the Prizes should be awarded: the Swedish Academy of Sciences was appointed to award the Physics and Chemistry Prizes and the Karolinska Institute was given responsibility for the Prize for Physiology or Medicine. [3] Nobel also included Prizes in Literature and Peace, but these will not be discussed in detail in this article. For various reasons, Nobel's will remained in legal peril until 1898 when the Nobel Foundation was finally established as the legal legatee. [4] In 1901, five years after Nobel's death, the first Nobel Prizes were awarded.

The role of the Nobel Prize in recognising and rewarding great discoveries

The purpose which Alfred Nobel intended his Prizes to serve remains their primary role: to recognise and reward great scientific discoveries. [5] Indeed, one of the reasons that the Nobel Science Prizes now demand so much respect is that their histories give testimony to many of science's most significant discoveries. Only on a few occasions has a Nobel Prize in Science been awarded for an undeserving discovery. Most notably, Johannes Fibiger won the 1926 Nobel Prize for Medicine for discovering that parasites caused cancer, a discovery which later turned out to be completely unfounded. [1,6] There have also been instances in which outstanding advances in scientific thinking have gone unrecognised by the Nobel Prize. Albert Einstein, although awarded a Nobel Prize for the discovery of the photoelectric effect, received no recognition for his most important achievement, the theory of special relativity. On the whole however, the Nobel Prizes for Science have been awarded for great scientific discoveries. The prizes have found their value in the calibre of their recipients. [5]

The Nobel Prizes for Peace, and in particular Literature, have not fared as well. [1,4] In the early years the Nobel Committee for Literature favoured conventional authors and failed to recognise greats such as Tolstoy. Consequently, the reputation of the Literature Prize was damaged and still suffers. Some suggest that the Science Prizes have

enjoyed more success because science is objective, and the selection of Prize winners is less arbitrary than in the subjective fields of literature and peace. This is not the case. The selection process for the science awards is also subjective and may be influenced by the bias of the decision-makers.

Is the decision-making process arbitrary?

The statutes of the Nobel Foundation dictate rules for selecting Prize winners, adding several criteria to those stipulated by Nobel. These can be summarised as follows: [7]

- Prizes may only be awarded for work that "by expert scrutiny has been found to be of ... outstanding importance" and of great benefit to mankind.
- "The awards shall be made for the most recent achievements in the fields of culture referred to in the will and only for older works if their significance has not become apparent until recently."
- "To be eligible to be considered for a Prize, a written work shall have been issued in print or have been published in another form."
- Prizes may not be awarded posthumously but a Prize may still be presented if the Prize winner dies before the presentation ceremony.
- Prizes may be shared between two or three co-workers or between two discoveries but not between more than three people.

The Foundation's statutes also provide guidelines for nominations and adjudication of the awards. Nominations are not open to the public and to be considered for an award, a written nomination must be received from "a person competent to make such a nomination." This includes all Nobel Laureates, members of the Prize-awarding bodies (the Swedish Academy of Sciences and the Karolinska Institute) and those invited to submit nominations. [6] Each Prize-awarding body sends out thousands of invitations every year to scientists world-wide, and a rotation system is used to include as many people as possible. Nominations for an award are then considered by a subset of the Prize-awarding body, the Nobel Committee, which consists of three to five persons appointed by the Prize-awarding body. After careful deliberation, the Nobel Committee votes to determine which candidate should be recommended for the award. Although the final

decision is made by the Prize-awarding body, the recommendation of the Nobel Committee is generally upheld, meaning that the decision effectively lies in the hands of just five people. Since there is no empirical means by which the value of a discovery can be weighed, the Committee members' partialities and understanding of science can easily influence how Prizes are awarded. [8]

In order to protect the decision-makers from criticism and protect the reputation of the award, the Foundation's statutes include a secrecy clause. [9] This states that "no appeals may be made against the decision of a Prize-awarding body" and that "investigations and opinions concerning the award of the Prize may not be divulged." Only after fifty years and for historic research may any records be accessed. Thus, the decision-making process is by no means transparent.

The lack of explicit criteria on which decisions are based, the small number of people responsible for making decisions and the secrecy in which they are made are ample reason for questioning the objectivity of the decision-making process. However, it is difficult to imagine a better system for determining which discoveries are most worthy of the Prize. Opening the award to popular vote (to increase the number of people involved in making the decision) is not a feasible solution given the level of technical understanding and historical research required to make a well-informed decision. Ultimately, whatever the process, there is no objective way to determine which discoveries "have conferred the greatest benefit on mankind." Yet, this is hardly sufficient grounds for abolishing the Prize altogether given that the Nobel Prize serves additional purposes.

The Nobel Prize and its effect on the public profile of science

As well as recognising and rewarding great discoveries, the Nobel Science Prizes serve to boost the public profile and knowledge of scientific endeavours. [10] In a world where media thrives on spectacle, the Nobel Prize ensures that, at least once a year, science is in the spotlight. By raising interest in science, the Prize may also indirectly boost funding for research. The effect that the Prize has on common knowledge of science is less clear. Whilst most people are aware that the Nobel Prize is a great honour for scientists, few would remember last year's recipients let alone what the Prize was awarded for. [1,10] The Nobel Prize no doubt plays a valuable role in boosting the public profile of science, but at the same time has been criticised for presenting a flawed representation of science.

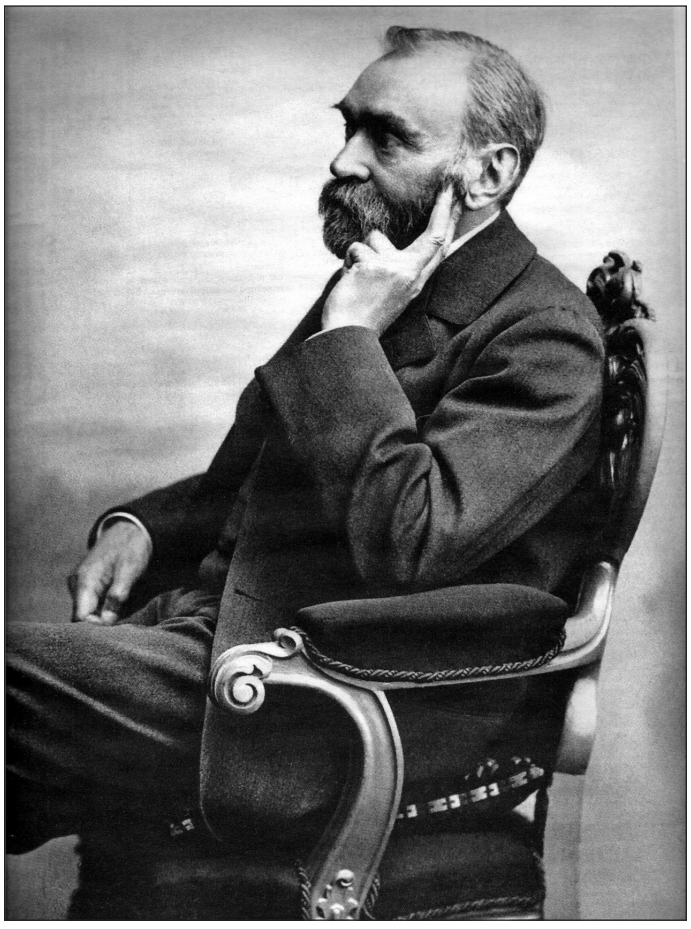
As the world's most prestigious scientific award, the Nobel Prize is often regarded as representative of what constitutes science. However, the disciplines recognised by the Nobel Prize were determined by Alfred Nobel and do not include important fields such as mathematics and biology. In 1968, the then relatively new field of economics managed to capture some of the limelight when the Bank of Sweden 'invented' a Prize in Economic Science in memory of Alfred Nobel. Since then the statutes of the Nobel Foundation have been modified to prevent the formation of any further Nobel awards. Disciplines such as mathematics have established their own awards to contend with the Nobel Prize. The Fields Medal, founded in 1924 by the International Congress of Mathematicians, has grown in popularity but remains overshadowed by the Nobel. It seems unreasonable to deny certain fields of science the recognition afforded by the Nobel Prize simply because Nobel chose not to include them in his will. In excluding some fields, Nobel may have unintentionally affected the public perception and recognition of those areas. This issue was raised in the recent open letter to the Nobel Foundation, with the signatories calling for the formation of two new Nobel Prizes in the areas of global environment and public health and a reform of the Medicine Prize to include all areas of biology. [2] The authors argue that these changes would allow the Nobel Prize to recognise important discoveries in new fields of research that do not fit well into the disciplines specified by Nobel. However, these suggestions were not welcomed by the Nobel Foundation, which maintains that no new prizes will be created. [11]

Recognition of individuals and the co-operative nature of science

Just as the Nobel Prize does not recognise all scientific disciplines, it is incapable of acknowledging all great scientists. Since the Nobel can be shared by no more than three people, a Prize is often awarded to only a few of the scientists involved in making a discovery. [1] Exactly who receives the Nobel Prize is often determined by subjective means and is frequently the cause of disputes and divisions within the scientific community.

An example of this includes the 1923 Nobel Prize for Medicine, long steeped in controversy. [1,12] The Prize, awarded for the discovery of insulin, recognised the work of Frederick Banting and John McLeod, but not that of co-workers Charles Best and J.B. Collip. As the Prize could not be shared by all four researchers, the Nobel Committee was forced to compare the contributions each made to the discovery of insulin. It was under McLeod's supervision and in his laboratory that the discovery was made. [10,13] However Banting refused to acknowledge McLeod as a co-discoverer. After all, it was Banting's idea for a new experiment that had led to the discovery, and McLeod was away in Scotland when Banting and his undergraduate assistant, Best, performed the first critical experiments. Whilst Collip, a biochemist, played an important role in purifying insulin for clinical trials, he was not involved in the initial isolation of the hormone. When Banting heard that he was to share a Nobel Prize with McLeod, he was furious. Persuaded not to reject the Prize, Banting instead acknowledged the work of Best and announced that he would share the cash award with him.

A similar scenario arose in 2003 when the Nobel Prize for Medicine was awarded to Paul Lauterbur and Peter Mansfield for the development of magnetic resonance imaging. Unrecognised was Raymond Damadian, who made the crucial discovery that normal and cancerous tissues have different proton relaxations, and first proposed an external nuclear magnetic resonance scan. [14] Damadian was so outraged



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that he placed several full page advertisements in leading American newspapers. [15] Entitled "The shameful wrong that must be righted" the advertisements asked readers to cut out a slip and send it to the Committee demanding that the truth be told. Of course, Damadian's efforts were in vain given that the Foundation's statutes state that "no appeals may be made against the decision of a Prize-awarding body."

The Foundation's exclusion of posthumous awards has also robbed some scientists of well-deserved recognition. For example, the 1962 Medicine Prize was awarded to James Watson, Francis Crick and Maurice Wilkins for their work on the structural propereties of DNA, whilst Rosalind Franklin (who performed critical x-ray crystallography experiments) was not recognised as she died in 1958. Since the fame of the Nobel Prize outlives its recipients, it seems unreasonable to exclude some scientists because they may not live to receive it in person.

Determining exactly who should receive the credit for great scientific discoveries will always be a difficult decision. Although scientific discoveries may have been made by independent individuals in Nobel's time, this is no longer the case. [1] Scientists now work in teams and networks with collaborations, conferences and research centres. [8] We have entered the world of 'big science' where research papers and grant applications are seldom submitted by a single author. Attributing scientific discoveries to individuals now makes as much sense as presenting a gold medal to just one member of an Olympic relay team.

For this reason, the Nobel Prize will always spark controversy and may be considered an anachronism. However, it is also worth considering that the value of the Nobel Prize lies in its exclusive nature, and may depreciate if the statutes were relaxed to recognise the contributions of more scientists.

Conclusions

The Nobel Prize, like any human institution, is flawed. Whilst the Prize has an important role in recognising scientific discoveries, the selection of Prize winners is largely subjective. The Nobel Prize also boosts the public profile of science but may give an inaccurate representation of what science is. Further, recognition of individual scientists seems outdated in the collaborative world of modern science. What then are we to do with the Nobel Prize? Though some may call for abolition, such an extreme measure is no more necessary than it is likely. Is a better model possible? Certainly a Prize allowing for recognition of research groups would be more consistent with the co-operative nature of science, but change is improbable in the well established Nobel Institution. So, we must learn to enjoy the Nobel Prize for what it is worth, remembering that it is not the be all and end all of science, but rather a celebration of some of science's greatest discoveries.

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