Speaker’s manuscript, all Prizes

Title slide
In October each year, the award-winning institutions, which are responsible for the various Nobel Prizes, announce who will receive that year’s prizes.

Today you will learn more about the background of the Nobel Prize and who has been awarded the 2017 Nobel Prize.

Alfred Nobel
Alfred Nobel was born in Stockholm, Sweden on October 23, 1833. As a nine-year-old, he moved together with his older brothers and his mother to Saint Petersburg, the capital of Russia at that time. There his father Immanuel had started a factory.

In St. Petersburg, Alfred received a good education and dreamed of becoming a writer. Alfred’s father made him study natural sciences and technology instead, since he and his brothers were expected to take over the family’s factory.

Dynamite
Alfred Nobel, his father and his brother Emil tried to invent an explosive that was safer than pure nitroglycerine. It was very dangerous to use nitroglycerine as an explosive – so dangerous that Alfred’s brother Emil died in an explosives accident in 1864.

But Alfred finally succeeded in developing a method for producing nitroglycerine and a way to use it as an explosive.

He named his invention “Dynamite” in 1867. Dynamite was a comparatively safe explosive. It was in huge demand during the period of industrialisation, since there was so much construction work. By taking out patents on many of his ideas, Alfred earned a lot of money and started many factories around the world.

The will
Alfred Nobel died of a stroke on December 10, 1896. He had no children, so in his will he wrote that a large part of his fortune should be placed in a fund. The yearly interest on this fund would pay for a prize given to “those who, during the preceding year, shall have conferred the greatest benefit to mankind.”

According to the will, the prize would go to the most worthy candidate, “whether he be Scandinavian or not.”
Five Nobel Prizes and one Economics Prize

According to Alfred Nobel’s will, the prize would be divided into five categories: physics, chemistry, physiology or medicine, literature and peace. The first prize was awarded in 1901.

He also wrote who would select the Laureates. The physics and chemistry prize would be awarded by the Royal Academy of Sciences, the physiology or medicine prize by Karolinska Institutet, the literature prize by the Swedish Academy and the Peace Prize by a committee consisting of five persons elected by the Norwegian Parliament (Storting).

In the late 1960s, Sveriges Riksbank (Sweden’s central bank) established a prize in economic sciences in memory of Alfred Nobel. The economics prize is awarded at the same time as the Nobel Prize, as part of the same ceremony.

The Nobel Prize Award Ceremony

On December 10 each year, the Nobel Prize is presented. This year the Prize in each category consists of a medal, a diploma and nine million Swedish kronor – or over a million US dollars.

The Prize Award Ceremony is held at Stockholm Concert Hall for all categories except the Peace Prize, which is awarded in Oslo, Norway. After the actual Award Ceremony, there is an elegant Banquet in each city to honour the new Nobel Laureates.

The Nobel Prize in Physiology or Medicine

“...the person who shall have made the most important discovery within the domain of physiology or medicine.”

The Nobel Prize in Physiology or Medicine is thus awarded to people who have either made a discovery about how organisms work or have helped find a cure for a disease.

The 2017 Laureates

Jeffrey C. Hall, Michael Rosbash and Michael W. Young

For their discoveries of molecular mechanisms controlling the circadian rhythm

All life on earth is adapted to the rotation of our planet around its axle, since this gives rise to day and night. For many years we have known that living organisms adapt to the regular rhythm of the day. But how does this biological clock work? What actually controls the clockwork inside every cell of organisms?
The regular rhythm of the day
Laureates Hall, Rosbash and Young studied the genes that control our internal clock and explained how the clock works. Meanwhile they also identified what proteins these genes encode. All organisms thus have a kind of internal clock, which adapts and prepares all our biological functions to what is happening at different times of day and night. For example, this clock affects sleep, hormone levels, body temperature and metabolism.

The discoveries
To understand how our internal clock operates, the three researchers used fruit flies as an experimental tool in order to search for new genes.

Thanks to the discoveries made by the Laureates, today we know in great detail how the internal clock functions.

The benefits
These discoveries are part of physiology, which is the study of how living organisms function.

The discoveries behind the 2017 Nobel Prize in Physiology or Medicine create new potential to influence the biological clock. This is medically important, since an imbalance in our internal clock may increase the risk of various diseases. Both our physical and mental health are affected by this internal clock.

The knowledge provided by this discovery is beneficial in itself. Knowledge leads to advances in our society. This knowledge creates opportunities and is essential to the development of new medicines, for example.

The Nobel Prize in Chemistry
“...the person who shall have made the most important chemical discovery or improvement”.

Over the years, the Nobel Prize in Chemistry has been awarded for discoveries and improvements that have provided us with knowledge of the structure, creation and changes in various substances – what atoms and molecules look like, how and why they react with each other, and even how we can create new molecules.

The 2017 Laureates in Chemistry
The 2017 Chemistry Prize has been awarded to Jacques Dubochet, Joachim Frank and Richard Henderson “for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution”.

Put simply, they developed new ways of using special microscopes (electron microscopes) to find out how the molecules found in all living organisms look.
Studying biomolecules
All living things contain a huge number of different types of proteins. These proteins are very important components of the body, since they form the structure of all cells, transport different substances, regulate various reactions and defend us against bacteria, viruses and more. Protein molecules are very tiny and difficult to study. Their appearance also changes if they are not in some kind of liquid. We need to know how they look to understand how they function. This year’s Laureates in Chemistry have helped us do this.

Improved ways of using electron microscopes
The Laureates developed methods that now enable us to use electron microscopes to find out how protein molecules look. Before their discoveries, protein molecules burned up or dried out in electron microscopes. The Laureates developed a way to freeze proteins extremely fast and they used computer programmes that make it possible to take lots of two-dimensional images and merge them into sharp three-dimensional images.

Knowledge of bioprocesses
Now that there are better ways to find out how the molecules in the body look, we can better understand how they function. This will also enable us to improve our knowledge of why they sometimes fail to function as they should, which will help us to develop new medicines. The discoveries of this year’s Laureates in Chemistry have led to new methods for learning how biomolecules look, which are being used by many researchers around the world.

The Nobel Prize in Physics
“... the person who shall have made the most important discovery or invention within the field of physics.”

The Nobel Prize in Physics is thus awarded to people who have either made inventions or discoveries in this field.

The 2017 Laureates
The 2017 Nobel Prize in Physics was awarded to Rainer Weiss, Barry C. Barish and Kip S. Thorne “for decisive contributions to the LIGO detector and the observation of gravitational waves”

We have known about gravitational waves ever since Albert Einstein noted in his relativity theory that the length, breadth and depth of space is interrelated with time and that these four dimensions are affected by different masses. For many years, scientists have wanted to measure these gravitational waves. This year’s Nobel Prize in Physics rewards the scientists who were able to achieve this.
Gravitational waves

Early in the 20th century, Einstein calculated that gravitational waves must exist. Everything that has mass and changes its speed generates these waves. Gravitational waves move through space in a way similar to light or sound moving through the air, but gravitational waves are far weaker. It requires enormously large objects to generate a measurable gravitational wave.

The gravitational waves that were measured at LIGO/VIRGO arose 1.3 billion years ago, after two black holes rotated around each other faster and faster until they collided and formed a single black hole. On September 14, 2015 these waves arrived here on Earth.

The measurements

The measurements took place at two different measuring stations at different locations in the United States that are part of the LIGO research project. Scientists were later able to measure similar waves in the European project known as VIRGO.

The actual instruments consist of two four-kilometre-long tunnels that form an L on the ground. By shining a laser into the tunnels and then allowing the laser light to bounce off a mirror at each end, scientists can measure incredibly small changes in length between the two tunnels: the legs of the L. Changes in length that are not due to gravitational waves can be eliminated by comparing the results from the different measuring stations. The gravitational wave to be measured is the same regardless of where on the Earth it is measured, but other local vibrations are only noticed by one of the instruments.

The benefits

These measurements have enabled scientists to understand that Einstein was right about his descriptions of time and space. Gravitational waves had already been confirmed through observations of pulsars, but this was the first time that we were able to measure them directly.

Now we also have new opportunities to learn about black holes. These are very difficult to study, since they do not emit any measurable light. But they emit gravitational waves that tell us something about how black holes work. By making the LIGO/VIRGO instruments even more sensitive, we can also learn more about other astronomical objects such as pulsars and neutron stars.

The knowledge provided by this discovery is beneficial in itself. Knowledge leads to advances in our society. This knowledge creates opportunities and is essential to new inventions, for example.

The Nobel Prize in Literature

“the person who shall have produced in the field of literature the most outstanding work in an ideal direction”.

The Nobel Prize in Literature has mainly been awarded to authors who have written works of fiction – such as novels, short stories, poetry collections and theatrical plays. The Literature Prize has also been awarded to authors in other literary genres.

In 2016 the Prize went to a musician and songwriter, when Bob Dylan became the Laureate in Literature.
The 2017 Nobel Prize in Literature
This year’s Nobel Prize in Literature has been awarded to the British author Kazuo Ishiguro, “who, in novels of great emotional force, has uncovered the abyss beneath our illusory sense of connection with the world,” according to the Prize citation.

The Laureate
Kazuo Ishiguro was born in 1954 in Nagasaki, Japan. When he was five years old, he moved with his family to the United Kingdom, where he then grew up and later studied at university. Today Ishiguro lives in London, and since publishing his first book he has worked as a full-time writer. Kazuo Ishiguro is also a musician.

His literary works
According to the Prize citation, Ishiguro is receiving the Prize for his novels. And most of his literary works have been novels. But Ishiguro has also written film and television scripts, as well as short stories. He actually made his literary debut in 1981 as a writer of short stories. His work was included in an anthology – or collection – of texts by various new writers.

Ishiguro first book, entitled A Pale View of Hills, came out in 1982. It is set in Nagasaki a few years after the end of the Second World War, in other words around the time he himself was born.

Since his debut novel, Ishiguro has published seven more books. Among the best known as The Remains of the Day and Never Let Me Go, which were both turned into films. The film version of The Remains of the Day was nominated for eight Oscars.

Language and themes
Kasuo Ishiguro writes in different genres and likes to mix genres in the same book. His later novels include elements of fantasy. One example of this is The Buried Giant, who came out in 2015. It is about an elderly couple who go on a road trip through a bleak, gloomy landscape where monsters and demons lurk.

As for Ishiguro’s language, Sara Danius – Permanent Secretary of the Swedish Academy – says, “He writes a restrained, very careful and precise style. Style absolutely no drama, all happening between the lines.”

While Ishiguro’s novels are quite different from each other, there are themes that recur in many of his books. Examples of this are friendship and love, memory and identity, truth and lies.
The Nobel Peace Prize
“...to the person who shall have done the most or the best work for fraternity between nations, for the abolition or reduction of standing armies and for the holding and promotion of peace congresses”.

In 1901 the first Peace Prize was awarded to Henri Dunant, founder of the Red Cross. Right from the start, the Norwegian Nobel Committee thus adopted a broad interpretation of the peace concept; humanitarian work is also a way of promoting peace.

Important categories that have been rewarded are disarmament, mediation and work aimed at a better organised world. In recent decades, efforts to promote democracy, human rights and environmental work have also been rewarded.

The 2017 Nobel Peace Prize
This year’s Peace Prize has been awarded to the International Campaign to Abolish Nuclear Weapons (ICAN) “for its work to draw attention to the catastrophic humanitarian consequences of any use of nuclear weapons and for its ground-breaking efforts to achieve a treaty-based prohibition of such weapons”.

An international coalition
ICAN is an international coalition of non-governmental organisations. At present, the coalition consists of 468 organisations in 101 countries. Some organisations are small and local; others are large and international. Thirteen Swedish organisations belong to the coalition.

ICAN originated in Australia and officially launched its campaign in 2007. The goal of the campaign is a worldwide ban on nuclear weapons. ICAN’s head office is located in Geneva, Switzerland and its Executive Director is Beatrice Fihn, who comes from Sweden.

What are nuclear weapons?
There are two main types of nuclear weapons: atom bombs and hydrogen bombs. Both of these derive their power from nuclear reactions that occur inside the bomb.

The first main type is atom bombs. They are also called fission bombs, since their energy comes from fission, or splitting heavy atomic nuclei such as uranium. This is because when the nuclei of atoms are split, large quantities of energy are released. In an atom bomb, a chain reaction occurs: when an atomic nucleus is split, this releases nuclear particles which in turn split new atomic nuclei, and so on. Atom bombs have been used twice in war, in 1945 when the United States dropped bombs on the Japanese cities of Hiroshima and Nagasaki.

The second type of nuclear weapons is hydrogen bombs. They are also called thermonuclear bombs. Hydrogen bombs are mainly based on energy that is released by fusion, or bringing together light atomic nuclei into a heavier atomic nucleus – more specifically, turning hydrogen nuclei into helium nuclei. Today most nuclear weapons are hydrogen bombs that are based on different combinations of fission and fusion.
Nuclear-armed states
There are five official nuclear-armed states: The United States, Russia, the United Kingdom, France and China. These were the countries that had nuclear weapons when the Nuclear Non-Proliferation Treaty (NPT) went into effect in 1970. They were thus recognised as nuclear-armed states. According to the NPT, they are not allowed to spread nuclear weapons to other countries.

Since 1970 several other countries have obtained nuclear weapons: India, Pakistan, Israel and North Korea. These countries stand outside the non-proliferation treaty.

Today there are about 15,000 nuclear weapons in the world. More than 90% of them belong to the United States and Russia.

A historic agreement
ICAN works to achieve a world that is free of nuclear weapons. The coalition was also a driving force behind the historic Treaty on the Prohibition of Nuclear Weapons that was negotiated by the United Nations in the spring of 2017. Among other things, the treaty bans the development, manufacture, possession and use of nuclear weapons. So far, 53 countries have signed the treaty and three countries have ratified it. When 50 countries have ratified the treaty, it goes into effect and will be legally binding on the countries that are party to the treaty.

None of the nine nuclear-armed states have signed the treaty. ICAN is now focusing its work on persuading more countries to sign and ratify the treaty.

A 10-year struggle
According to the Norwegian Nobel Committee, which selects the Peace Prize Laureates, there is great danger because today some countries are modernising their nuclear arsenals. There is also a risk that other countries will try to develop their own nuclear arsenals. Nuclear weapons are a threat to humanity. This is why international treaties banning nuclear weapons are needed, in the same way are there are treaties that prohibit land mines and chemical weapons.

ICAN is receiving the Peace Prize ten years after launching its campaign, because it has given new vitality to the struggle for a world without nuclear weapons.

The Prize is being awarded on the basis of Alfred Nobel’s will, which specifies that among other things, the Peace Prize should go to those who have worked for “…the abolition or reduction of standing armies”.

Source of above sections on nuclear weapons: www.laromkarnvapen.se
The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel

Alfred Nobel was a leading industrialist and a successful inventor. At his death in 1896 he owned a total of 96 Nobel companies in 20 countries. At his death, Nobel was one of the richest people in Europe.

The will of Alfred Nobel did not include economics as one of the Prize categories. Instead Sveriges Riksbank – Sweden’s central bank – established the Prize in Economic Sciences in Memory of Alfred Nobel, with the help of a donation related to the bank’s 300th anniversary in 1968. The Prize was awarded for the first time in 1969.

The Prize is awarded to a person or persons who have produced works of outstanding importance in the field of economic sciences.

The 2017 Laureate

This year’s Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel has been awarded to Richard H. Thaler “for his contributions to behavioural economics.”

What affects people’s decisions?

Richard H. Thaler, who was born in 1945 in New Jersey, is Professor of Behavioural Science and Economics at the University of Chicago, where he has done research since 1995. Early in his career, Thaler developed an interest in what affects people’s economic decisions.

Traditional economic theory often assumes that people are rational: that they have a good overview of their situation and can make logical, carefully reasoned decisions about what they should do with their money.

Thaler has done many experiments where he has studied how people make economic decisions. His findings show that we are not always rational in our choices. The following are three examples of what affects us when we make decisions in various circumstances.

Mental accounting

In one of his studies, Thaler examined how taxi drivers make economic decisions with the help of what he calls “mental accounting”.

When it rains, more customers want to ride taxis and it is easier for drivers to earn a lot of money per hour. It would thus make the most sense to work more hours when it rains and to take time off when the weather is nice. But instead, the taxi drivers in Thaler’s study had a kind of unstated target amount for what they should earn every day. This meant that they drove shorter work shifts when there were lots of customers and longer shifts on days with few customers.

Setting up mental accounts thus affects our choices to a great extent; this applies not only to taxi rides but also to saving and spending. If we are saving for a long-term goal – such as a holiday trip – we are often unwilling to take money from our savings. This behaviour may lead us to pay more than we need to, just to avoid taking money out of our savings account.
Reasonable and fair
Perceptions about what is reasonable and fair also affect our decisions, Thaler’s studies have shown.

It turns out that we care about fairness, even if we lose out because of it. One example is the people who sell umbrellas on the street. It would be rational for them to raise the price sharply if it starts raining hard.

Research shows that if the seller does this, his umbrellas will still not sell – not because the price in itself is too high, but because consumers would rather get wet than reward the seller’s greed. These effects have been measured both in experiments and field studies.

Lack of self-control
Together with other economists, Thaler has also shown how lack of self-control affects our decisions. One example is how we think of sweets. Sweets may be perceived as good when we eat them, but we know that in the long term they are not good for our bodies. Still, we sometimes choose a short-term reward instead of a long-term one.

Mental accounting may be one way to avoid choosing a short-term reward, for example by deciding in advance that we will spend only a certain amount on sweets.

The benefits
Using large-scale experiments, where people make real choices that have real outcomes, Thaler shows how humans make decisions. His research findings indicate how our society can be organised better, so that those of us who are not always rational and far-sighted can make better decisions without thereby restricting everyone else’s freedom of choice.
Six new Prizes
Now we have gone through the 2017 Nobel Prizes. Here is a quick review of what was rewarded this year:

The Physiology or Medicine Prize is about the circadian rhythm. The discoveries that are being rewarded create new opportunities to influence our biological clock, which is important because an imbalanced internal clock may increase the risk of various diseases.

The Chemistry Prize is being awarded to researchers who have developed new ways of using special microscopes to find out how molecules found in all living things look. This also enables us to understand how these molecules work – and why they sometimes do not work as they should.

The Physics Prize is about gravitational waves. The Laureates receiving this prize have developed new instruments for measuring and observing gravitational waves. This, in turn, has given researchers new opportunities to learn more about black holes and other natural phenomena.

The Literature Prize is going to author Kazuo Ishiguro. He mainly writes novels about friendship, love, memory and identity – in a restrained style where a lot happens between the lines.

The Peace Prize is going to the International Campaign to Abolish Nuclear Weapons (ICAN), an organisation that has been struggling against nuclear weapons for the past decade. ICAN is trying to persuade the countries of the world to sign an agreement that completely bans such weapons.

The Economic Sciences Prize focuses on how we humans make decisions. In his research, this year’s Laureate shows how our society can be organised better, so that those of us who are not always rational can make better decisions without thereby restricting everyone else’s freedom of choice.

Final discussion
Discuss together with some classmates:

1. Which of this year’s Nobel Prizes do you think is the most exciting? Why?
2. What would you like to create or discover for the greatest benefit to mankind?