GeKnoWMe

Call for Entries

Concept Submission deadline 23:59 on 8th October 2018

The Accessible Genetic Consortium – GeKnoWme, together with the ESRC Festival of Social Science, are delighted to announce this art competition on the theme of genetics. This competition is designed to create a conversation about genetics in a visual way.

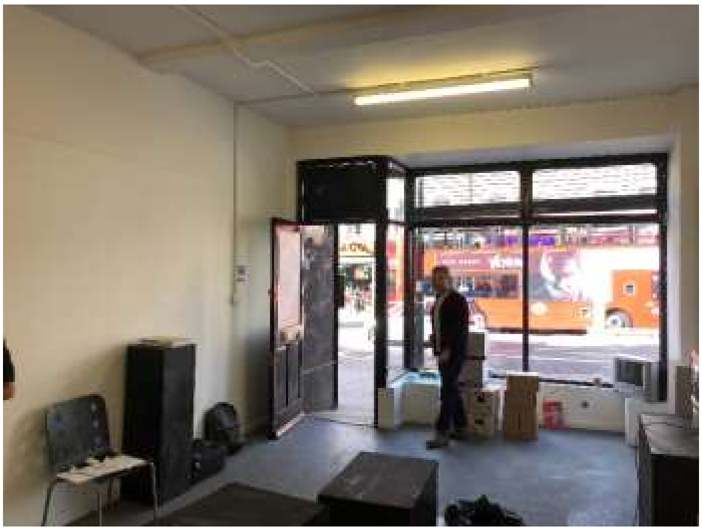
Genetic research is starting to have an increasing impact in medicine and healthcare management. The NHS will soon start conducting genetic testing as routinely as other blood tests. Genetic research is also being conducted in other areas, including education, psychology, sociology and law. Outside of the medical context the implications of genetic research become even more complicated, and it is in these settings that there are no clear mechanisms for explaining these complexities to the people they will affect. For this reason, there need to be conscientious efforts to better engage and interest people with genetics through events such as GeKnoWme.

To engage with genetics in a meaningful way, action and support is required from every member of society. Art can be a catalyst for change. This competition is themed around three fundamental concepts of genetics:

- Mendel and more
- Many Genes, small effects
- Genes and Environment Interact

If entrants would like to discuss this event or any of these topics further they should contact Robert Chapman (r.chapman@gold.ac.uk) to arrange a meeting (in person, skype or over the phone).

The space, 310 New Cross Road



Award

Six concepts will be selected to develop. Those chosen will be informed on 10th October, and awarded £50 to produce their work.

How to apply

A completed copy of the application form should be submitted to Robert Chapman by 23:59 on 8th October r.chapman@gold.ac.uk

Hard copies will not be accepted.

The application form asks for:

- Name of applicant(s) and contact details
- An explanation of your interest in this project
- An explanation of the proposed artwork, its context, what it seeks to achieve and which topic(s) you are responding to
- A description of what you will produce, and how
- Details of equipment requirements associated with the display of the proposed artwork

If relevant, artists may also include up to 5 digital representations of previous work.

Jury

A jury of TAGC (The Accessible Genetics Consortium) members will evaluate applications for inclusion in the event.

Selection criteria

Concepts will be judged on the following criteria:

- How well does the piece address the topic(s) chosen?
- How challenging or stimulating would the completed artwork be in terms of encouraging new conversation and thought about these issues?
- How creative is the approach?
- Is the science behind the concept just and sound?

Prizes

There will be two prizes awarded for this event.

Expert prize £100

Professor Yulia Kovas, an international expert in genetics and science communication, will select the pieces which best communicates the scientific topic(s) it is intended to.

Publics' prize £100

Attendees to the event will be asked to vote for the piece they most enjoyed during their visit.

Erasmus

TAGC is working on international efforts to engage people with genetic research. Inclusion in this exhibition can be used towards an application for inclusion on an Erasmus scheme being run with Tomsk State University in Russia.

Eligibility and conditions

The competition is open to members of students of Goldsmiths, University of London. You may enter as groups or as individuals.

Entrants should consider the size of the exhibition space and the constraints detailed below, and all artwork would need to be accompanied by a short explanation that will also be displayed.

Art cannot hang from the ceiling in the exhibition space so all work must be suitable for display on a plinth or a wall. Performance pieces are unfortunately not eligible for this competition. Sound-based pieces will be considered for inclusion in the exhibition in a secondary space.

Acceptable sizes: For ease of transportation and display all 3D work must be no bigger than 1.5x1.5x1.5m, and 2D work must be no bigger than 1.5x1.5m.

An image of the exhibition space, 310 New Cross Road, can be found on the next page. Many excellent exhibitions regularly run in this space and attending these would allow entrants to see the space for themselves.

Upon completion of the final works, representatives from TAGC will perform a final approval process. Each independently reserves the right to refuse to display specific works and this decision will be at the organisation's discretion.

You can read the full terms and conditions below.

Contact

Please send any questions to Robert Chapman, r.chapman@gold.ac.uk, and he will get back to you as soon as possible.

Mendel and more

Gregor Mendel was a 19th century monk who discovered how genetic information is passed from parents to children. For each trait, such as eye colour, blood type, height and personality traits, each child inherits some genetic information from their mother, and some from their father. The information from one parent may dominate over that of another parent. To really understand this we need to look a bit closer at the experiments Mendel conducted.

Mendel did much of his research with pea plants. He noticed that:

- Some plants had green peas, even when they were bred from plants with yellow peas
- Some plants with yellow peas only ever produced offspring with yellow peas, although there would sometimes be plants with green peas in future generations
- Breeding from plants with green peas never produced plants with yellow peas

He concluded that pea colour (yellow or green) was determined by just one point of information in DNA, with each new plant getting one instruction for pea colour from their father, and another instruction from their mother. If both parents passed down information to make yellow peas then the offspring would have yellow peas. If one parent passed down information to make yellow peas, and the other provided information to make green peas, the plant would make yellow peas but be a carrier for green peas (meaning that it might then have offspring of its own with green peas, if bred with another plant that either had green peas or was also a carrier). Only if a plant received instructions to make green peas from both parents, would it make green peas.

All this is explained really well in this video.

Rather than the information from parents being mixed together, Mendel concluded that one set of instructions took dominance over the other set. In the case of Mendel's peas, yellow is dominant and green is recessive.

In simple organisms, like pea plants, many traits are influenced in this way. In more complex organisms, like humans, most traits (except for some rare diseases) aren't influenced by just one piece of DNA information, but by many different pieces of information.

Let's think about eye colour in humans. If eye colour was influenced by just one piece of genetic information we would expect everybody in the world to have one of two eye colours (let's say blue and brown). We would also expect to see more of the dominant eye colour (let's say brown), than of the recessive colour (blue). Two blue eyed parents would only ever have blue eyed babies. Brown eyed parents would have mostly brown eyed babies, but might occasionally have a baby with blue eyes -if they were both carriers for blue eyes.

But eye colour in humans is much more varied than just blue and brown. There are different shades of blue and brown. Some brown eyes are so dark they appear black, some blue are so light they almost seem white. There are also green and grey eyes, and any combination of these colours. All with different patterns. At the best current estimate, eye colour is influenced by as many as 16 different bits of information from parental DNA.

Ironically, eye colour is often chosen as a way of explaining Mendel's principles in high school science lessons by talking only about blue and brown eyes. Research has suggested that understanding genetic influences on traits in such a binary, on/off, dominant/recessive way can lead people to misunderstand and over estimate the influence of genes in complex traits.

Understanding that all human traits are influenced by multiple pieces of information coded into our DNA, rather than being caused by just one piece of information, is essential to understanding how genes influence (rather than determine) who we are.

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Many Genes, Small Effects

As all complex human traits are influenced by lots of different genes (pieces of DNA encoded information) – see Mendel and More – each gene tends to have a very tiny influence on a trait. Even though some genes have been found to be associated with human traits, at best these can explain only about 1% of variation in that trait. It is much more common for genes to have even smaller influences.

Twins studies are very useful for looking at the relative influences of genes and environments in what makes each of us different and unique. By looking at certain traits in twins', scientists have found that genetic influences account for between 40% and 80% of trait differences seen in any given population.

Now that we are able to look directly at the genome, scientists are starting to make use of an exciting new technique called Genome-wide Polygenic Scoring (GPS). To do this, they look for the thousands of genes most associated with a particular trait and then sum these together to give a GPS. This GPS can then be used to make predictions about other traits. One such GPS (EduYears) has recently been used to predict school achievement. Students with the highest EduYears score typically achieved one whole grade higher than students with the lowest EduYears score. These predictions will never be perfect as the environment is so important, but they do help us understand the relationship between our genomes and who we are. As our DNA does not change, these GPS scores can theoretically be tested as soon as we are born.

Genes have tiny and cumulative effects. Even though we have gene editing technology available now, changing just one gene is very unlikely to have an impact on the trait we want to improve or correct. We also don't know very much at all about how genes actually influence complex traits, so changing just one gene may impact a whole variety of traits other than the one we are interested in. Far better to look at improving people's environments, rather than tinkering with their genomes. Using GPS scores could really help with this.

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Genes and Environments interact

Genes do not exert their influences in a bubble, unaffected by the world around them. They interact with the environment. Imagine this, you were born into a musical family. Your father is a concert pianist and your mother composes jingles for TV adverts. Her parents both played in an orchestra and his parents were jazz musicians. The traits that make them great musicians: perfect pitch, rhythm, creativity, physical dexterity, determination etc. are likely to be passed on to you. In part, these traits will be passed on genetically through the DNA information your parents pass down, but they will also be passed down through the environment. Your home will be full of music, books about music, instruments to try, conversation about music etc. You will inherit music both genetically and environmentally.

Imagine now that you were adopted at a very young age and your adoptive parents had no particular musical ability or interest. You grew up in a home with no music, or books about music, or instruments to try, but you still got all the genetic gifts of great musical ability from your biological parents. It may be that those gifts never get to flourish, or are directed elsewhere, maybe into poetry or creative writing. However, there is a good chance your environment will respond to your genetic musical ability. A teacher at school may notice that you sing very well in assembly and suggest you join the choir. Your enjoyment of music and strong sense of rhythm may make you turn saucepans into a drum kit or ask your parents for a guitar.

Even when genes exert an influence on a trait they need an environment in which to flourish. Knowing that genes are very important for a trait does not mean that environments aren't. Indeed, some diseases which are highly genetic can be controlled by entirely environmental means. It is not a case of Nature vs Nurture, or Genes vs Environments. It is Nature and Nurture always working together that makes us who we are.

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