

Reimagining science

Narrative and science

Synthesis of the event held on 2 May 2019

Introduction

Reimagining science is an ambitious Royal Society programme trying to change people's perceptions of and engagement with science. This is a synthesis of the first event in the series which drew together different disciplinary insights to explore narrative, its relationship to the sciences and its roles in public life.

Its starting point was that artists, composers, writers and scientists themselves tell the same type of stories about their imagination and creation, that the cognitive and emotional are entangled in all creative work, and that literature and science are strongly wedded. During the day, participants also explored the functions that science and narrative may play in public debate, decision-making and in the lives and choices of individuals who would not usually consider themselves to be scientists or artists. The terms narrative and story are used interchangeably throughout.

The functions of narrative in public and private life

Multiple functions

Any narrative may be performing several functions. Discussions about narrative should seek to be clearer about which function(s) are being considered in any specific instance. A thread throughout the day was that stories may be necessary for understanding, for communication, and for enabling action; but they are also always incomplete, and may even be dangerous if taken too literally, or without recognition that there will be always be more than one story about the same thing.

Reality

In relation to reality, a story may be a 'conditional' or 'causal' explanation, and this aspect was explored further in the discussions of narratives' relationships to science. Stories can of course, be normative and value-laden, implicitly or explicitly.

Identity

Narrative helps to form individual and collective identities. In this way, narratives help create the social capital associated with social movements ranging from Extinction Rebellion to the anti-vaccination movement. In this context, they can be described as enabling 'disruptive cohesion'.

Dominance

A powerful narrative can be very persuasive to an individual or group. The story may be inspiring and may enable action, drawing people in and allowing them thoughtfully to engage with questions concerning their own agency.

However, the narrative's power and influence means that if it becomes too dominant or associated with a dominant group, it can be difficult for alternative stories to emerge or spread, or for alternative voices to be heard. In this sense, a narrative might be considered to be 'too powerful' and to be operating in a way that is unaccountable compared with the checks and balances on some other forms of knowledge, learning or insight.

Simulations

Some narratives can be considered to operate as simulations; creating alternative stories about the past, present or future, and with different degrees of signalling about their realism. A computer simulation is not necessarily a narrative, but without a narrative there is the problem of not truly understanding what is going on. Scientists are faced with having to find *that* causative story: explanations force scientists into narrative.

Science fiction

Science fiction plays an important role in mediating the relationship between science and society. As Asimov said, “today’s science fiction is tomorrow’s science fact”. These stories – along with those offered by speculative fiction, where storytellers play with notions of different physical and social settings – contribute to personal and public debate by extending the range of accounts available. As science fiction proliferated during the 20th century, it is possible to consider today’s configuration of science and technology in society through the lenses of past fiction. Today’s science fiction can be explored for insights into the expectations and fears of different groups about the future implications of science.

Narratives about science and scientists

Scientific method

The discussion explored the relationships between science and stories. One argument was that the scientific method is fundamentally *not* narrative in its structure. In so far as there are literary parallels, the practice of science may have more in common with poetry, dealing with simultaneous layers of meanings, the use of metaphor, and with the scientists’ attention moving backwards and forwards in time and across the spatial dimensions of the system under study. For some of those present, notions of rhyme and rhythm resonated with their sense of the creative, intuitive or imaginative approaches to aspects of scientific exploration or problem-solving.

Despite the potentially non-narrative structure of the scientific method, scientists are still telling stories to make sense of the world. Narrative is one pathway to understanding and it is fundamental to the communication of that understanding. Humans make sense of the world by observing patterns and correlations. As part of their process, the scientist imposes a story to enable explanation and prediction. In this sense, scientists aim for a coherent description of the universe, while knowing that that explanation will change over time.

Communicating scientific knowledge

If, as discussed, scientists are telling stories to make sense of the world, then those scientific narratives need to display consistency, coherence and credibility (rather like legal narratives). Another way of putting this is that they need to be tellable. From one viewpoint, the notions of scientific facts, in the sense of facts that are fully independent of any narrative context, and of neutral stories, are oxymoronic. The word fact, which we often think of as some kind of eternal truth, comes from a legal term that is to do with the thing that was done or the action that had a consequence.

Complex systems

Some systems in nature are so complex, that it is not clear whether stories relating to them can be told in a way that really reflects what happens. Much, if not all, of what scientists study can be described as complex systems; however, participants suggested this might be said of genetics and cosmology in particular.

Multiple interpretations

Some argued that a scientific truth taken on its own terms may be singular, at least for the specific time and context in which it is placed. However, a scientific description may be non-unique, because different disciplines will create different stories. A biologist and a chemist may look down the same microscope and record separate things.

Looking more widely, there are many sources of knowledge, and different kinds of knowledge. For example, the practice of economics rests on ‘socially constructed numbers’. One role of stories is to reduce complexity and dimensionality. It is also about finding ways to integrate accounts of emotion in order better to understand the system under question, and so to have better informed debates about it.

Constraints

Narrative is a pathway to understanding, but also a constraint on it. For example, the requirement for agency in narrative encourages anthropomorphism and anthropocentricity (noting that each human life is the quintessentially linear narrative with a beginning and an end). This in turn is likely to shape the questions researchers ask, and the ways in which they pursue their answers.

Stories about scientists, such as those reinforcing the archetype of the lone hero or ignored genius, may perpetuate a limited range of types of behaviour. They may also be more attractive to some groups than others and hence influence who does or does not decide to practice professional science.

Forests

One participant offered an example of competing and co-existing narratives about a particular forest in Africa. The first was a 'disruption of harmony narrative', under which ignorant locals would overexploit the forest with severe consequences for the environment. Ecologists, botanists and other environmental scientists would arrive to explain deforestation and lobby for strict environmental controls. The second viewed the 'landscape as a social institution'. Forests grew up around villages as a result of tree planting for crops, shade and lookout posts. Anthropologists would listen to the stories of local villagers and farmers about how the landscape has been shaped over time. 'The third God made the Earth, but we made it fertile' narrative focused on soil. Traditionally, women and children would throw household waste over forests and planted trees which, over the decades, caused deep, black, fertile soils to build up.

Each of these narratives were created, not by individuals but by different sorts of teams and alliances. Each group (whether of scientists, local women, anthropologists and so on) is shaped by their position of power, social context and commitment to the area and to their profession. Each narrative sets out a 'pre-hypothesis' which has the potential for research and action to unwittingly confirm a pre-existing mindset.

Creating, informing and listening to narratives

Any story may be heard or understood differently by different individuals or groups. Their interpretations may be influenced by many factors in addition to the content of the story such as the context, the storyteller, the medium and their own characteristics as members of an audience. In thinking about how a story may move beyond the personal space, it may be helpful to consider the following.

Wilful narratives

First, any strategic narrative (that is, a narrative created with the intent to affect the world) must deal with other 'wilful' narratives. These might be competing strategic narratives intentionally created by other actors, or narratives that audiences associate with the matter at hand but which were not part of the worldview of the original storyteller.

Side audiences

Any but the most private narrative will always be heard by side audiences. These are people who are not the intended or primary audience and therefore, especially if the narrative has deliberately been shaped for the primary audience, it may not be so suitably shaped for the others. For example, a scientist communicating to a public group may find that other scientists object to their use of simplified terms.

Lived experience

There is an unavoidable tension between a listener's lived experience, and the storyteller's preferred narrative. Uncertainty in science does not imply doubt as it does in everyday use and this is often interpreted differently in the public sphere than in the scientific community. When

scientists make statements about scientific knowledge, such as the effects of climate change or the characteristics of a medical intervention, many listeners will mediate their attention to the story through their own experience of weather or of illness.

Power and persuasion

It is important to consider the relative power or authority of the storytellers, audiences and subjects of the narrative: who says it, who hears it and who believes it?

The will to change always needs more than science: it needs mobilizing stories. In social and political worlds, narratives are generally more powerful than facts; at least powerful in the sense that they engage, that they are persuasive and that they lend agency in ways that facts alone can never do. Powerful narratives adhere to much deeper seated cultural myths. They are rooted in a particular understanding and interpretation of the world and are inherently, inevitably, political.

The question of how people respond to narratives or facts has a great deal to do with how people identify themselves. Stories are much more powerful when they are told by someone who is seen culturally to be authoritative.

Risk and emergency

Risks and emergencies present a particular type of context for narratives about science. In these circumstances actors tend to search for a single 'true' story, in order to create the consensus that will enable rapid action. While sometimes necessary, given that it is always possible to tell multiple stories about any complex system, the selection of a single truth will inevitably reflect the relative power or influence of competing storytellers. One implication of this inevitability is that, in some circumstances, collective decision-making

may be better informed by focussing away from the (largely scientific) detail of what might happen, towards (combined scientific and value-based) accounts of the potential impacts of plausible actions and responses. One comment was that, in this context, it was interesting to ask why public debate tends to equate rigour with avoiding false positives at the expense of avoiding false negatives, when to weigh judgement in this way could be argued to be providing a value-based rather than a scientific framing.

EXAMPLE 3

Climate change

An illustration of the multiple stories inhabiting major science and policy concerns is that of climate change. Whilst good communication is not necessarily a binary choice, stories about climate change can be seen to mobilise public and political action or to help develop an understanding of the science.

In social, political and cultural terms, climate change narratives range from the UN IPCC's story based on a notion of the 'heroic' progress of science, to Extinction Rebellion's understandings of World War Two mobilisation. Language about a Green New Deal appeals to recollections of President Roosevelt's major social moments in 20th century USA, whilst the Catholic Church has appealed to accounts of human redemption. Indigenous peoples can tell the story of colonialism as the story of climate change, libertarians might see climate change as a liberal conspiracy, and others tell climate change as something that is soluble, through the silver bullet of technology and the Promethean myth of technological mastery to solve the crisis.

Each story has a relation to the science but also has a deeper myth at its heart. In the context of climate change, and for most people, these narratives are more powerful (in the sense of motivating action) than the facts (alone). A further illustration briefly mentioned was the way in which scientists established the concept of a nuclear winter, which was then an important part of informing public debate to create a consensus to curb nuclear weapons.

Concluding speculations

With a general sense during the day that stories are imperfect or incomplete as a way of understanding the world, but also essential and powerful, the underlying message seemed to be that each individual should use their own stories as wisely as they can and pay careful attention to those of others.

Here is a very subjective collection of potential ideas and questions to help set future agendas amongst those with an interest in narrative and science, and perhaps to inform the next phase of the *Reimagining science* programme.

- Does over-reliance on narratives available in the English language influence which scientific questions are considered, and by whom? Does anthropomorphism restrict the range of available narratives and hence limit new thinking (and, if it does, can humans ever do anything about it)?
- What are the new narratives of disruptive cohesion that might help both enable scientists to have confidence and to be bold intellectually, while also addressing potential avenues of enquiry and potential people who may be excluded by current narratives of what it means to be a scientist?
- Can insights based on recognising the existence of multiple narratives help work on complex systems move further, faster? What does the presence of the multiple narratives mean for those involved with risks and emergencies?
- While the distinctions between fiction and non-fiction were not extensively discussed, it might be worth further considering the ways in which fiction is related to imagination and creativity amongst those practicing science, and to public engagements with matters of science where the limitations imposed by lived experience may matter hugely.

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