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Evidence on the cusp between science, policy, and law

Communication | **Editorial** | Invited contribution | Perspective | Report | Review

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In his 2015 speech given in front of the Royal Society, the then President of the UK Supreme Court Lord Neuberger outlined a valuable parallel between Science and the Law. Both are systems produced by the human intellect, both are trying to identify laws *that work*—the former regarding natural phenomena, the latter human social behaviour—and ultimately to bring order into chaos [1]. One could generalise even further this parallelism to public policy and organisational decision-making. In these cases, procedures (and sometimes legislation) stand in for empirical rules, amending the aim to design a course of action *that works* towards a goal [2] or to deal with a problem or matter of concern [3]. If we accept that purpose is at the basis of policy-making, then we can see how the orderly pursuit of the expected policy outcomes clashes with the chaos of conflicting (political) interests and evidence. However, it is not trivial to assume that policy *has to* achieve a goal, as one can commonly observe the lack of linkage between 'goals, programs, decisions, and effects' [4] in the workings of government and the civil service.

In this Editorial, I will discuss evidence in three fundamental and increasingly interdependent domains of modern society—science, policy, and law—and some of the challenges arising when evidence needs to be included in real-world decision making. This is crucial, because a focus on evidence is beneficial for policy (and beyond), as it shifts the public discourse towards pragmatism [5] as opposed to polarisation. Increasing attention for (scientific) evidence in the policy making discourse is indeed one of two main goals of the *Cambridge Journal of Science & Policy*—the second being to build a platform that shares 'fresh' points of view at the science-policy interface from early-career researchers, students, and other contributors to a larger audience of academics, policy makers, and the general public.

In 1843 British philosopher John Stuart Mill argued on how fundamental evidence is for decision making across all aspects of society:

> [t]he business of the magistrate, of the military commander, of the navigator, of the physician, of the agriculturalist is merely to judge of evidence and act accordingly. [6]

However, practitioners within different fields apply specific sets of rules in order to evaluate evidence (and even the 'same' evidence) in their decision process. These 'rules of the game' can be as varied as the scientific method for a scientist or the codes of legal procedure for a practitioner of law. So—even though evidence is at the foundations for Science and the Law, and increasingly so for policy and business–it informs each of these

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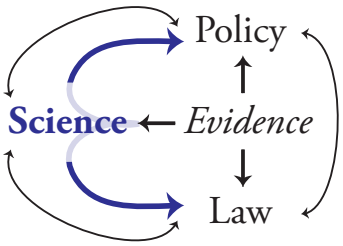

Figure 1: Evidence lies at the foundations of science, policy, and law—however definitions and procedures of partaking with it are only partially shared among the three. The three mutually influence each other: science informs and fosters change in both policy and the law through channelling its body of knowledge, law sets the legal boundaries for science and policy, policy can instruct the law via legislation and affects science via regulating its environment (funding, organisational requirements, and so on).

systems according to their peculiar features (Figure 1). However, one can find three general issues, that are shared any time evidence-informed decision making occurs: 1) *how much* evidence is available, 2) its quality level, and 3) how it interacts with the values of society, policy-makers, and so on.

The first aspect is not only about obtaining large volumes of high-quality evidence (either via data collection or pilot projects) in order to instruct decision-making [7]. One also needs to consider the concept of *bounded rationality*, which is borrowed from behavioural economics and much used in business and policy management [8]. Bounded rationality encompasses three crucial aspects of evidence-informed decision making: the limitations of time before taking a policy (or legal) decision; the fact that the available information might be partial and not conducive to an optimal decision—this, even if possible, can be evaluated only *post-hoc*; the difficulty of decision-makers to process or weight multiple streams of sometimes contradicting evidence, or even sets of coherent evidence, but in large quantities.

When one is collecting evidence to inform a decision, a second crucial challenge is to reflect on the quality of the data or information that have been collected. This is not a simple task. Firstly, there is no universally established definition of data quality, although a commonly used operative definition is the fitness of data for the intended use [9]. This definition feeds back into the previously discussed issue of bounded rationality, when it is not clear at deployment whether some data is fit for the intended use. Secondly, there is the question of how 'objective' the data is, with the further issue that the positivist assumption that 'out-of-the-box' objective evidence exists is challenged on multiple fronts [10]. Nonetheless, if we consider a dictionary definition of objectivity as lack of bias, obtaining evidence with limited bias is still fundamental to avoid what can be called 'policy-informed evidence' [11], that is the selection of the data supporting a policy already decided for and the exclusion of competing evidence. Thirdly, there's the explanatory power of evidence—*is the available evidence strong enough to inform a decision?* Here the differences between scientific, legal, and policy methodologies are the most difficult to reconcile, and this point goes hand in hand with the interaction between (scientific) evidence and values.

Harmonising empirical evidence and the values of policy-makers and the general society is the last crucial challenge. Decision making becomes 'political' [11], in the sense that it relates to the interactions between the stakeholders of the polity. This may entail, for example, the way different lines of evidence are weighted according to one's moral or ideological values before reaching a decision. Another issue is prioritisation: while in the sciences it is acceptable (if not desirable) not to reach a conclusion unless there is enough convincing data, this is often not the case in law and policy making. A policy maker needs to respond to the requests of the general public and a court needs to find the 'legal truth', e.g. whether for the Law some damage occurred after exposure to

given chemicals, even when the science is not set on the issue. A paradigmatic example is the 2017 ruling *W vs Sanofi Pasteur* where the Court of Justice of the European Union accepted that, in trials where science has not proven nor ruled out a causal connection between a claimed damage and vaccination, some types of evidence—such as those that a scientist would consider purely circumstantial—can be admitted in order to establish a (legal) causal link [12]. This decision, that the scientific community received with shock, has been described by legal scholars as 'measured' [12]: it makes it easier for plaintiffs to win their cases (that would be extremely difficult if the scientific method ought to be applied strictly) while keeping established scientific evidence at the centre of the process. The different expectations that society puts on science, law, and policy set the ground for much needed mediation, particularly when dealing with evidence. As Prof Dame Athene Donald writes in the Foreword to this volume, scientists interested in affecting policy ought to appreciate the different requirements of policy making, and find a method to communicate evidence in a way that works for them and for the issues at hand.

After talking about evidence in abstract terms, I have to engage here with the great challenge that the COVID-19 virus pandemic is presenting to societies worldwide in terms of the organisation of public healthcare, the necessity of keeping a steady supply and distribution of necessities—such as food, detergents, and protective personal equipment—and the need for government interventions in order to contain the infection rate. These unprecedented times highlight how scientific evidence and scientific advisors have a crucial role in guiding policy-makers in making the right decisions and at the right time; this is true not only in case of emergencies and epidemics, or for global menaces such as climate change, but in everyday policy decisions, too.

This first issue of the *Journal* is dedicated to the themes of sustainability and green policy. Climate change is the most critical challenge of the current generation, amidst the current pandemic and even more so in a post COVID-19 world. Pandemic-related restrictions on travel and economic activities is causing the global CO_2 emission levels to fall for the first time in decades [13], however the sharp rebound to 'normal' levels of emissions of CO_2 and pollutants after the lifting of lock-downs shows how thorough structural changes are necessary in order to limit global warming to 1.5°C above pre-industrial levels [14]. The contributions presented here describe a range of solutions to transition towards a sustainable way of doing business, managing resources, devising policies and regulations, and fostering growth and development via investments. I believe that these works will provide some thought-provoking contributions to the current discussion among scientists, policy-makers, and the general public about how our society can be sustainable in the near and long-term future.

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About the Author

Michele is a member of Gonville & Caius College and a PhD student at the Centre for Misfolding Diseases (Department of Chemistry). His research involves the systems biology and biophysics underlying neurodegenerative processes and ageing, with a focus on protein aggregation in Alzheimer's disease. Before coming to Cambridge, Michele received a Postgraduate Diploma in Biology from Scuola Normale Superiore and an MSc in Biology Applied to Biomedical Sciences from the University of Pisa. Michele is interested in the relationship between science and the law and how policy making might address the challenges arising from their interaction. He is among the founders of the *Cambridge Journal of Science and Policy* and he is editor-in-chief of its first volume.