# 'The Limits of the Numerical'

**INTRODUCTION TO THE PROJECT**

This project explores one of the most pressing sets of questions for modern social science and its relation to policy. What is the effect of the pervasive introduction of numerically-based quantification into all aspects of social evaluation? When does the use of numbers work against the very values they are introduced to support, promote or capture? How do numbers as a system of evaluation clash with social values which cannot be so quantified?

The project has a large intellectual scope and an excitingly novel structure.

I.    **Its intellectual scope** covers three main strands of social policy: education, climate change, healthcare. In education the project focuses on how systems of league tables, IQ measures, exam results lead to a dangerously oversimplified instrumentalization and an increasing gap between the values of a liberal education and the means of evaluating it. In climate change, we investigate how natural capital is evaluated, and how the numerical understanding of climate change is to be mediated to a public. In healthcare, we analyse the impact of QALYs, the numerical, comparative system of allocating resources within the British National Health Service, now under threat from changes in government policy, to question the tension between social understandings of a good life and a just political order and the quantification of healthcare resource modelling.

These three areas of empirical research share a far-reaching set of questions about the under-appreciated tension between numerical quantification as a form of evaluation and moral, social and political judgments of value in the formation of social policy.

II.   Each of these **three strands of research** will be conducted by a team of two post-docs, a PI, with a co-PI, and an academic advisory board. Each team will be located in a major research university – Chicago, Cambridge, Santa Barbara, California. The teams will come together for a month on four occasions to run shared seminars, and early career research workshops. Research will be developed and conducted in a collaborative manner, both within each strand and between the different strands. This model offers the rare possibility of bringing together detailed academic research in a broad, interdisciplinary, international framework. The project is co-funded, and has received support from each institution.

The results of the work will be publications and colloquia aimed not just at academics but also at policy makers. The project aims to change the manner in which policy makers conceptualize and rely on numerical evaluation.

This project is aimed at the central real-life problem of how value is constructed between social science and public policy, and what the effect of this idea of value is on real life, with a pressing relevance for current government policy.

**1. THE RESEARCH QUESTION OF THE PROJECT**

The project is designed so that these three strands are integrated to create a single intellectual plan for the whole project. Thus the project as a whole has a single overarching question that motivates its different strands. The **PROJECT RESEARCH QUESTION** has **three parts**:

I.    What are the effects on a system of social policy when numerical quantification and evaluation is introduced into that system?

**II.** How does the use of numerical evaluation exclude, trivialize or distort other systems of political, moral and social evaluation?

**III.** What are the political and moral consequences of this shift towards numerical evaluation?

## 2. THEORY AND METHODOLOGY (ALL THREE CENTRES)

The research questions will be explored in the three areas of education, climate change and healthcare, because these are the areas where social science, policy, and the gritty world of politics interact with intense urgency. There are no arenas where citizens and their behaviour are more implicated in social policy. Our central question faces a pressing and real-life problem full on.

**I.** The first part of our central question starts from the fact that numerical evaluation is introduced into a system of social policy. It is introduced for good reasons to do with epistemic rigour, comparability across different jurisdictions, and the tractability of mathematical figuration for modelling and formalization. However, as the term "introduced" stresses, the introduction of any particular scheme of quantification, indeed quantification at all, is neither inevitable nor natural. Therefore, we want to explore why regulators seek to quantify, how these reasons shape the tools they use, and how these tools might misrepresent the things they purport to measure. Such work will draw both on existing analyses of the drive to quantification (Porter, 1996 Power, 1999) and on work on the uses, nature and meanings of measurement in the social sciences (Alexandrova, 2012).

But, on the other hand, we also stress 'system'. A common ground between such diverse intellectual traditions as Chicago school "law and economics" (Lucas, 1976) and "social constructivist" analyses of psychiatric categorisation (Hacking, 1998) is that the introduction of quantitative tools can have unintended, sometimes perverse, effects on complex systems. It is crucial that the object of analysis here combines institutional frameworks, decision-making bodies, normative discourse, planning agencies, authority figures and those who are in the system as patients, citizens, pupils as well as teachers, doctors, scientists, politicians. What is needed is an integrated analysis that moves beyond questions of policy or philosophy to stress the interaction of the different elements of the system. In analysing these interactions, we will draw on a wide variety of tools, most notably work in network theory, systems analysis, and the anthropology of institutions (Yearley, 2004). As the response to Latour and Woolgar's analysis of the science lab reveals, such a process is likely to reveal the interconnections that the system's smooth running needs to keep obscure (Latour and Woolgar 1986). This work is important not only because of the consequences to patients or pupils, say, of introducing numerical evaluation, but also because it reveals the consequences of quantification for policy makers and practitioners (and their vested interests) within the systems.

**II.** The second part of our central question draws out an issue that is often obscured both in theory and in practice. There is, of course, a well-known and well-developed set of philosophical debates on the nature of value and evaluation, not only in ethics and political philosophy following Rawls' seminal work (Rawls, 1971), but (relevantly to this project) in epistemology (Zagzebski 1996; Williamson 2000; Steup ed 2001; Pritchard 2005; Alston 2005). While these abstract discussions will, of course, inform our analysis, we hope to focus on a less commonly debated question. In a democratic, pluralist society, there is bound to be widespread disagreement over which values we should seek to promote, how they should be balanced and so on. When we choose to use a particular quantitative metric to assess and guide policy, we risk downplaying, trivialising or simply ignoring value considerations which the particular metric does not measure, and which, perhaps, could never be quantified at all. Numbers can be used to ignore, trivialize, and

distort other systems and ideals of evaluation; and the different rhetorical and political strategies of this process within a system demand further discussion.

This part of the question involves two approaches: on the one hand, it involves some theoretical, philosophical questions about whether all values are commensurable (Peterson, 2013) and on how to balance competing value systems in democracies (Fisch and Benbaji 2011); on the other, there are empirical test-cases to be explored of actual policy consequences of particular quantative tools. We shall look at how regulative systems use numbers rather than other systems of evaluation within a set of test-cases. This work will build on important work analysing the relationship between different forms of expertise (Wynne, 1996). A fascinating phenomenon in the history of science is "Kuhn-loss", where a new paradigm cannot answer problems or questions which a superseded paradigm could resolve (Post, 1971). Systems of quantification seem to face an analogous problem: similar to a Kuhnian paradigm, any system of quantification will soon seem "obvious" and "natural" to those who use it, but, in fact, any such system will only be an incomplete approach to messy reality. Test cases will allow us to identify the features of such processes, while philosophical work will allow us to place these studies within a broader perspective.

III.     The first part of the project looks at the often aggressive effects of introducing quantification, including their unexpected costs; the second looks at a very particular kind of cost of quantification, the distortion or downplaying of incommensurable values; the third, which will be dominant in the last part of the project, aims at a more constructive goal: the theoretical and practical possibilities of change. In this context, we hope to address at least two issues. First, if some systems of quantification are necessary for the smooth or just functioning of modern societies, what makes for a good system (or set of systems) of quantification (Nord, 1999)? In answering this question, our aim is not so much to adjudicate disputes between competing approaches, but, drawing on sociological and philosophical work (for example, Daniels, 2008), to suggest how they might be adjudicated. Second, more broadly, given the limits to quantification, what alternative ways of decision-making might we adopt, and how might these alternative approaches draw on or relate to quantitative metrics? Again, this task involves not only analysis of the rich philosophical literature on such topics as the relationship between abstract philosophing and policy needs (Wolff, 2011), but a close analysis of the successes and failures of alternative systems of governance and policy-making.

Finally, the project needs to be integrally comparatist as well as interdisciplinary and collaborative. To this end, we have deliberately chosen three different Anglophone jurisdictions where systems of public health, public/private education and attitudes and institutions of climate change are different but interrelated. We believe that the three strands together tell importantly comparative stories that allow a far richer picture to emerge than any one study could reveal. So, the local politics of education contrast with the global politics of climate change. The personal and national politics of health care contrast with the personal and national politics of education, not least in terms of visible results: an education for life is not viewed in the same light as an operation to save a life. The aim of this project is that its final outputs should have a potentially significant impact in policy arenas, both within and beyond our chosen jurisdictions.

## 3. INTERDISCIPLINARITY OF THE PROJECT

One of the most exciting aspects of the project is not just its novel structure but also its insistent requirement of a new methodological approach to the problems. Social science relies on the success of the numerical and we will need to turn the tools of social science towards their own processes and bring to bear on them both a rigorous philosophical and critical theoretical method. At the same time, while it would be premature to overdetermine

the form or results of the research, it is clear that each strand of the project must be based on detailed empirical research.

## I.  Test cases

Although the final aim of the project is work that is both general and has policy implications, we will also develop and explore twelve detailed test cases over three years, four from each jurisdiction (UK, Chicago, California), chosen collaboratively by the team members. The initial research will also require preliminary collection of the relevant data, and the evaluation of competing test-cases. These test-cases will be discussed in the four meetings, providing a tight and manageable focus for the group discussions.

Each test-case will require at least:

(a) a historical account of the introduction of numerical evaluation into a system.

(b) The contextualized rationale and explicit arguments for such introduction.

(c) the effects of such numerical evaluation, as perceived by actors and publicly, and as possible to determine by research.

(d) the potential for change within the schemes of evaluation.

(e) the policy implications of the research.

## II.  Analyses

Each strand must also develop a critical and historical analytical model in order to formulate and investigate the broader issues. Each strand will have its own requirements, but in coming together certain approaches must also be shared. This will require at least:

(a) a critical understanding of how such metrics affect such institutional and discursive systems: here recent history and sociology of science with its interest in network theory, system theory, and the role of automation in everyday life (Latour, Schaffer, Siskin and Warner, Castells) provide an initial approach to understanding the impact on a system of an introduction of numerical metrics.

(b) an anthropologically-inflected analysis of how numerical metrics change places of work: the analysis needs an anthropological understanding of social process to explore changes of behaviour and the relation between public discourse, normativity and behaviour within a community (Mackenzie 2008).

(c) a philosophical understanding of the interplay between the normative work of a normative system and the role of evaluation (feedback systems) within ethics. The question of competing value systems needs the clarifications of a philosophically trained analysis. Here, we start from the post-positivist resurgence of normative ethics, which already contains a small, but rich, literature on the relationship between meta-ethics and policy tools (Anderson, 1995). Furthermore, we hope to build on recent work in the philosophy of science which questions the possibility of value-free science (Douglas, 2009).

(d) The combination of anthropology, history of science, critical theory, philosophy and social science is an interdisciplinary goal rarely achieved. This is for good reason: members of different disciplines use different

methodologies and vocabularies. However, we believe that the structure of the project and the methodology proposed make this goal achievable, by creating time and space for informed and mutually respectful discussion. Furthermore, the success of recent projects, most notably Brown's work combining sociology of science with normative political theory (Brown, 2009), and the growing field of "ordinary ethics", which combines anthropological insight with meta-ethical debate (Lambek, 2010), suggest the time is ripe for such inter-disciplinary work. Note, furthermore, that a project which investigates the importance of a plurality of tools of assessment will naturally lend itself to use of a plurality of methodological tools and approaches.

## RESEARCH PROPOSAL FOR <u>PROJECT STRAND 2</u> AT CRASSH

## I.  THE RESEARCH BACKGROUND FOR STRAND 2

This strand takes a historical, anthropological and philosophical approach to the question of how quantification affects systems by looking at the example of QALYs in the British Public Health system. The historical perspective is necessary for two purposes: first, to understand and contextualize the arguments that successfully established QALYs as the prime means of evaluating resource decisions; second, to understand the overall shift in the institutional practices over time from before the adoption of QALYs to their current dominance. The anthropological perspective also has two lines of enquiry. First, it will explore the effect of the introduction of QALYs on the actors within the institution; second, it will investigate the interface between the institution and its social context, and how this is affected by the use of QALYs. Finally, there is a double angle to the philosophical enquiry, too. On the one hand, through an analysis of the principle and functioning of QALYs we wish to broach the central question of the overall project, namely, how quantification, especially numerical quantification, alters normative social systems. On the other, we wish to map out the anxious terrain between ethical judgment and quantified evaluation in health care as part of social policy with an eye to articulating broader concerns about how quantification can distort or ignore important value considerations. It should be immediately evident that these three areas of enquiry overlap significantly. It is also the case that although there is a bibliography on each of these topics, not only is there much still to be done on each question discretely, but also there is no research group that is looking at this crucial and, in our judgment, integrated set of questions, either within a single jurisdiction or transnationally. Furthermore, although there has been much collaborative work between philosophers and economists on ways of improving particular tools of quantification, there is far less work on the fundamental problem of why and whether to quantify at all. Indeed, we claim that it is only through such a collaborative, interdisciplinary combination of empirical historical analysis, with a detailed account of changing networks of actor interaction, and with a philosophical appreciation of the complex normative tensions involved, that anything like an adequate approach to the central concerns of modern society regarding quantification, as exemplified by the case of QALYS, can be articulated and addressed.

In health care, the UK has led the world in basing allocation of scarce resources on quantitative economic models. From its inception, the National Institute of Health and Clinical Excellence (NICE) has assessed novel interventions in terms of Quality-Adjusted-Life-Years (QALYs). This has allowed for a "rational" model for allocating scarce resources: broadly, if an intervention costs less than £20,000 per QALY produced, it should be funded; if the intervention costs more than £30,000 per QALY, then it should not be funded; if an intervention costs between £20,000 and £30,000 then further deliberation is required before a funding choice is made (NICE, 2013). This model for rationing resources has been extremely controversial, and, perhaps as a result, there has been a steady accumulation of exceptions to the broad framework (Steinbrook, 2008). More fundamental changes might well be afoot. The highly contested UK government reforms to the National Health Service – currently opposed by the British Medical Association – will shrink NICE's role to that of a technical advisory body, as local physicians and clinical commissioning groups come to play a central

role in deciding which health interventions get funded. At the same time, however, QALYs continue to be used in UK policy-making; for example, by the newly founded "Public Health England", which has a remit to consider determinants of health outside the provision of healthcare.

In general terms, no one would deny that health care is a foundational element in contemporary society's sense of itself and its notion of crisis as much as of well-being, and thus it is a key battleground of social policy. But the moment for a re-evaluation of the general question of the effects of quantification and specifically the role of QALYs could not be more timely. The first generation of QALYs are being re-considered from at least two directions: on the one hand, health care economists and policy makers, while insisting on their continuing usefulness, are refining and extending the models utilized; on the other hand, ethicists are beginning to put pressure on QALYs as an adequate response to the need for judgment within health care policy. This is a prime moment to make a telling contribution to an on-going debate, as well as to use this particular debate as the focus for more wide-ranging reflection.

Apart from official guidelines and reports, the academic literature on these issues can be separated into three main areas. First, there is technical literature, setting out variations of QALY-based assessment, typically in response to specific concerns (for example, Nord, 1999; Devlin, Tsuchiya, Buckingham and Tilling, 2011; Edlin, Tsuchiya and Dolan, 2012). Second, there is a philosophical literature, relating debates over QALY-based allocation to questions about distributive justice and the conceptualization of well-being (Daniels, 2008; Harris, 2005; Hausman, 2006), and a move towards reinvigorating questions of ethics with regard to the process of evaluation (Tabuteau and Morelle 2010, Leonard 2008). Third, there is a more diffuse literature in the history and sociology of medicine, studying the emergence and use of QALY-based measures as a part of more general trends in medical research and practice, most notably the rise of evidence-based medicine, and broader trends towards quantification, and the subsequent devaluing of other forms of knowledge (Asmore, Mulkay and Pinch, 1989; Coulter, 2002; Timmermanns and Berg, 2003). We believe that by combining historical, anthropological and philosophical perspective we can ask a set of interrelated questions which will significantly illuminate, integrate and advance the current debates, not so much at the level of specific detail (should we prefer QALYS or DALYs), but at the more fundamental level of articulating the costs and benefits of quantifying at all.

The Cambridge team will be led by Stephen John who is one of very few academics in the country to have a position specifically in the philosophy of public health, and who has already published on the uses and limits of Cost-Benefit-Analysis in environmental and healthcare contexts (John, 2010; John, forthcoming). He will be joined by Anna Alexandrova, a philosopher whose work is dedicated to integrating perspectives from philosophy of science and moral philosophy on the notion of happiness as an element in public social policy (Alexandrova 2012). They will be assisted by two newly appointed post-doctoral fellows, one in history/history of science and the other in anthropology/social science. This team of four cutting edge researchers will be advised by a board of directors made up of Huw Price (philosophy); Tony Lawson (economics); Ash Amin (social science); Simon Goldhill (director of CRASSH, historian, and expert in interdisciplinary project management). The CRASSH management board also takes an overview of each of the centre's major projects, and this includes the sociologist of medicine, Sarah Franklin, the anthropologist, Caroline Humphrey, and the philosopher, Tim Crane. Cambridge University has recently established a Strategic Network in Public Health specifically to interlink the university's different medical research areas with local, national and international public health professionals: the network provides a forum to help us bring relevant scholars and professionals together for our project's seminars and colloquia. Together with the Centre for Science and Policy, with which CRASSH collaborates closely, we will be working to integrate policy makers into the project from the start.

## II. THE RESEARCH QUESTIONS FOR STRAND 2

There are three areas of questions for strand 2, which correspond roughly to the project's historical, anthropological and philosophical bases. Each area will be conducted primarily by one of the research team, but the development of the research questions, the interrelation of the research questions, and the production of at least some of the final documents will be an actively shared collaboration, under the direction of the advisory board.

**Research Question [1]**

What is the history of the introduction of QALYs?

This element of the project will be conducted primarily by the first appointed post-doctoral fellow who will have an expertise in history, history of science, history of medicine, under the direction of Stephen John, Ash Amin, Tony Lawson and Simon Goldhill, and within the framework of Cambridge's world-class Department of History and Philosophy of Science. It is a striking fact that despite an ongoing technical literature produced largely within the health care economics community, which evaluates the modelling of QALYs (e.g. Steinbrook, Nord, Devlin et al, Edlin et al.), there is as yet no adequate, contextualized, broad history of how QALYs were introduced and what the impact of their introduction has been on health care systems, either for Britain or in a wider comparative perspective. This history will provide a necessary empirical basis for the project's work. It must be stressed how novel such a history should prove to be. The interplay between institutions, ideology and science has been tellingly analysed by a string of scholars from Foucault's work on psychology and hospitalization, to Palombo, Pelliteri, Verdeber and Fine who have shown the connection between hospital architecture and social process. Yet it is extremely rare to find a significant account of the introduction of a system of evaluation that views it fully as a historical event, with its social, political and philosophical implications, as well as a huge impact on policy and decision making. To this end, the researcher will need to draw on the history of science, history of institutions and history of public health, and will need to investigate (1) what QALYs are and what they actually measure, and what the arguments were that were successfully made for their adoption and what the opposition was; (2) how QALYS have been used and what the processes of qualification have been, and how this has changed as a result of political and other pressures across time; (3) how the introduction of QALYs should be understood within a broad history of medicine as social policy; (4) what the impact of decentralizing such decision making may be. The history of the introduction of QALYs opens a new perspective on what sort of history is needed for modern institutional processes and will provide a portrayal of a major process in modern social policy that will be of great interest and use across a series of fields. For our project, it is crucial to have a fully articulated account of how a particular form of numerical quantification became the dominant model of evaluation in healthcare decisions within a particular jurisdictions, and how it changed the social and medical practices of the institution, particularly given that NICE's work has been used both as a model for other nations and as a warning of the dangers of "socialized medicine".

**Research Question [2]**

How do QALYs change the processes of health care?

The historical research of the first research question will be complemented by a different kind of analysis that is of equal significance. Although there is a growing literature from within the history and sociology of medicine that has studied the emergence and use of QALY-based measures as a part of more general trends in medical research and practice, most notably the rise of evidence-based medicine, and broader trends towards quantification, and the subsequent devaluing of other forms of knowledge (eg Asmore, Mulkay and Pinch; Coultay; Timmermanns and Berg), there is no detailed account of how the introduction of QALYs has changed the behavior of the actors within the hospital system, or the relationship between the hospital and a broader society. Using actor network theory, and an anthropological expertise in analysing group dynamics with regard to normative and regulatory systems, this will be the first detailed study at the level of actor behavior and public perception of the impact of QALYs. This element of the project will be primarily conducted by the second appointed post-doctoral fellow, under the guidance of and in collaboration with Stephen John and Ash Amin; and utilizing, along with the advisory board of the project, the unique facilities for integrating such research into professional environments provided by the University's Strategic Network in Public Health. Since QALYs are often regarded as a means to remove personal judgment from decision-making processes, this strand of the project will be a way of reinvigorating the

question of how such a tendency towards quantification changes social interaction, with obvious relevance to broader claims for the merits of "Evidence-Based Policy-Making". This element of the project will be broaching, then, three topics. (1) How does the introduction of QALYs change the behaviour, social practices, strategic actions of stakeholders in public health – doctors, patients, families? (2) How has the introduction of QALYs been perceived in a broad public discourse? (This topic will overlap closely with the work of Research Question 1.) (3) What are the broad social and political conclusions to be drawn about the introduction of QALYs from these first two topics?

**Research Question [3]**

<u>What arer the philosophical underpinnings, implications and limitations of QALYs as a mode of evaluation?</u>

The third strand of the project will look most broadly at the philosophical implications of the introduction of QALYs, and will be conducted primarily by Stephen John in conjunction with Anna Alexandrova, under the guidance of Huw Price and Tony Lawson. The broadly utilitarian modelling of QALYs has been challenged in multiple ways. Interventions which have the greatest overall benefit do not necessarily benefit those who are least well-off, thereby conflicting with John Rawls' influential account of social justice (Daniels). Does utility maximization misrepresent communal concerns and fears (Wolff)? Can "equity weighting" adequately modify QALYs' distributive algorithm (Edlin, Tsuchiya and Dolan)? Can the relative judgment embodied in financial thresholds resist being reified as absolute measures (McCabe, Claxton and Culyer, Porter)? We wish first to ask a broader question which is too commonly obscured by such detailed analysis of the success or limitations of specific modelling of QALYs, namely, (1) can moral and social concerns be quantified numerically without loss? What have been the consequences of the quantification enacted by QALYs on the normative, regulatory, and decision-making capacity of the health system? This first general question will lead inevitably to a second more detailed set of issues. (2) Complementing the work of health care scholars such as Tabuteau and Leonard, lawyers such as Laude, and social theorists such as Porter, as well as Anderson's philosophically informed critique of quantification in environmental contexts, we will interrogate what QALYs measure, whether the translation of relative concerns into numerically quantified financial thresholds influences how NICE functions, and, thus, what the place of ethics is and can be within the financial modelling of QALYs. In turn, this will provide a broader framework for assessing debates over which particular ways of quantifying health should be adopted. More generally, it is clear enough that decisions about resource distribution must be taken and that they have to be taken with regard to broad social and political issues of justice, on the one hand, and, on the other, ethical issues concerning happiness, well-being and longevity. (3): the insistent question remains: how should quantification be used in a society characterized by multiple value systems, not all of which can be translated into numerical form?

**III. CONCLUSION for STRAND 2**

This project is focused on Britain – only by such a delimitation is it feasible for four scholars to make significant inroads in three years. It is integral to this project, however, that it is also internationally collaborative, and that the interaction between Cambridge and the Chicago and Toronto groups will be mutually informative; that the methodological and substantive issues will be shared; and that active debate between the groups will sharpen the problems and solutions of each team. It must be underlined how rare an opportunity it is for such a collaboration to be established.

The case-study of the use of QALYs in healthcare provides a unique opportunity for a team of young researchers to investigate a set of exciting questions – about the quantification of values such as equity; about the quantification of our lived experience; and about the public life of numbers. Furthermore, as well as the intellectual interest of such a project, it occurs at a crucial transitional juncture in the development of the UK healthcare system where its results can be expected to have wide interest. It offers a chance to explore how different methodological approaches can and must be combined to produce a nuanced

and sophisticated acount of such a complex social process, and to explore how history, anthropology and philosophy can join to have an impact on the thinking of policy.

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