

## **RAMESES WORKING PAPERS**

### THE RELEVANCE OF REALISM IN THE PANDEMIC

The spread of severe acute respiratory syndrome coronavirus has thrown the world into crisis. Public health responses have been prolific, but the success of these interventions is uneven. As ever, we need to know what works for whom in what circumstances and in what respects. Realist approaches have been devised to answer this question and this working paper series is designed to promote this cause.

*The series offers immediate readership and has no formal refereeing process. They are working papers in the sense that they are intended to raise hypotheses leading to more productive evidence. They may be developed (or indeed withdrawn), they may go on to be published in journals and books. Above all, they are attempts to provoke dialogue in the realist community and beyond.*



## THE RELEVANCE OF REALISM IN THE PANDEMIC

**Working Paper 1: The Coronavirus Response: Known Knowns, Known Unknowns, Unknown Unknowns**

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The paper makes use an infamous remark of Donald Rumsfeld on the unpredictability of policy choices as a forewarning on the perils that lay ahead in devising the coronavirus response. It was written in Feb 2020, ahead of the actual policy choices made and implemented in the UK. The authors' guesswork on the challenges of lockdown do not, of course, match the complexities of the real thing. But that is the whole point – the policy response to the virus always involves guesswork and unknow unknowns always lurk in wait. In the end we are often left with 'muddling through'.

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# The Coronavirus Response: Known Knowns, Known Unknowns, Unknown Unknowns

There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we now know we don't know. But there are also unknown unknowns. These are things we do not know we don't know. Donald Rumsfeld, Former United States Secretary of Defence, 2002.

## Introduction

Rumsfeld's remark led to considerable ridicule at the time as well as the 2003 'foot in mouth award' from the Campaign for Plain English. Yet in our opinion it is an inadvertent masterpiece of methodology for it provides a succinct benchmark against which all social and public policy should be tested. It warns us that all interventions will be imperfect and fallible: some of the underlying ideas will work as expected, some will misfire because they were imperfect, and some challenges will crop up that were never contemplated. It provides a rather daunting template with which to evaluate national responses to the covid-19 outbreak, but it is a challenge that should not be ducked. This paper begins this task by considering some details of the UK Government's response in England, which is of course is almost identical to the other UK jurisdictions and similar in many respects to action plans worldwide.

Consider next the nature of public health interventions and programmes. Essentially, they attempt to marry the clinical understanding of a disease with the public's health beliefs. They rely on people to make them happen. They offer resources, surveillance and sometimes legislation but the main mechanism of action consists of advice to the public. The extent to which such an intervention will work thus depends on the accuracy of the shared information, its actionability from the perspective of practitioners and, crucially, the public reaction to the underlying ideas. Such interventions work through long implementation chains as the underlying ideas, known as 'programme theories', are considered and reconsidered (1). And, as with all social interventions, the overall impact is generally mixed. Public health programmes do not provide panaceas. They work under *particular* applications, in *particular* contexts, for *particular* groups, in *particular* respects, over *particular* durations. The great challenge is to identify these contingencies and to maximise effectiveness across every 'particular'.

## The Covid-19 Response

The public health response to Covid-19 consists of a massive suite of multi-measure, multi-agency, multi-national interventions, each component of which is fragile. The challenges in respect of design, implementation and evaluation are thus unprecedented. The task is represented in miniature in Figure 1. Three sequences are depicted. The upper chain identifies key stakeholders in the passage of the programme theories from policy makers to the public. The middle chain represents the welter of decisions that need to be made in the implementation of a *single* measure (scores of separate sequences would be needed to convey the entire response). The lower chain represents different level of confidence that might be placed in each decision and reflects the shift from the well-considered to the uncertain to the unanticipated (depicted using the Rumsfeld terminology).

**Figure 1 about here**

It is the complexity of the decision cascades (middle sequence) that represents the greatest challenge to the effectiveness of pandemic control. Each measure begins with a decision on the broad strategy to be employed and further judgements follow on the many, many steps required to disseminate and implement that desideratum. These action plans are dynamic, one assumption triggers another and then another. They become learning sequences. Ambiguities in the directives become apparent and need to be clarified. Implementation problems arise and need to be solved. Each solution confronts fresh challenges and further adjustments need to be considered and put in place. The middle section of Fig 1 attempts to represent and number the zig-zag of decisions made as the intended measure is 'realised and refitted' during implementation. Let us consider just four examples, which are catalogued in Box 1.

### **Box 1 about here**

Hopefully these four examples suffice to show how rapidly decisions permutate in enacting any measure, how some options go unconsidered initially, and how the cumulative set of judgements remain incomplete and conjectural. Note that these decision cascades keep cascading and that the above descriptions cover only a few elements that are apparent at the time of writing [Feb 2020]. Note also that we cover a mere four action plans and the full coronavirus response involves potential clinical innovations as well as the constant adaptation of provision for social care, mental health, disabled people, protective equipment, hygiene measures, public transport, delaying and reshaping remaining NHS provision, domestic abuse centres, homelessness and addictions, funeral arrangements and many, many others. The most obvious example in this respect is the need to design responses to the economic implications of every judgement call made in each sub-strategy. There is not a single decision in the above catalogue of measures that does not have a cost.

Note finally that each action plan will bleed across into several other measures (not depicted in Fig 1). Much of this cross-contamination between the different pathways will generate unanticipated consequences. Increased self-isolation led Netflix to reduce streaming quality. The closure of pubs, coffee bars, leisure outlets led people to congregate elsewhere in public parks and pavement cafes. The attempt to provide privileged supermarket access to the elderly and to NHS key workers generated an unwelcome cocktail of close contact. Redundancies in some areas of the economy generated vacancies in others (e.g. 'fulfilment centres'). Advising people to 'stay at home' creates fresh problems of loneliness, domestic abuse and for shared care. And so on.

We arrive at the key point in all this, namely that the complex, adapting, interacting decision sequences illustrated here give witness to the very nature of public health programmes. The coronavirus response *is* the sum-total of a thousand such micro conjectures.

### **Implications**

The national coronavirus response should be understood, in the terminology of complexity theory, as a 'complex adaptive system' (2). What then are the implications for its development? What might we expect about its roll-out? No one can predict, of course, but three initial considerations are worth mooting:

*1. The implementation chains cannot be fully controlled by the policy architects.* They are under constant challenge: i) from the media and its predilections and ii) by the public in its everyday

decision-making. Consider this onslaught from the UK *Daily Mail* (23 March, 2020). 'How the world is responding to coronavirus. Towns in lockdown, mass gatherings banned and increasing border checks to battle the pandemic ... But Boris Johnson declines to stop UK sporting events and says closing schools could make the crisis WORSE'. Add a few similar headlines on the 'exponential surge in death rates', 'the hidden terror that stalks our streets' and 'health service workers – lambs to the slaughter' and it is not difficult to see how pressure built for the abandonment of this particular plan.

The public response to directives is rarely submissive. Formal sociological surveys on the popular understanding of the virus are underway (3) but, for now, daily television Vox Pop interviews provide some vivid examples of the chaos of interpretations. To return to the examples of sporting fixtures, the final UK event with a 'mass gathering' was a Rugby League match featuring the Castleford Tigers. An intrepid local BBC reporter was on hand to see how spectators justified attendance, paraphrased variously as follows: 'There have been very few cases around here', 'It's just pot luck; if you get it you get it', 'There won't be another match for months, I had to come'. This is a wretched sampling frame of course, absent from the reportage is another variation, which even at this early stage might go something like: 'you wouldn't catch me going, I'm scared to death'.

The public mood may be wayward but is not to be trifled with. There are many other examples of people 'voting with their feet'. Schools, for instance, came under severe pressure to close well before the formal announcement because of high numbers of staff and student absentees who had followed earlier advice to stay at home. Official advice to avoid panic buying yet again induces buying frenzies. Folk wisdom and policy logic rarely sit in perfect harmony.

2. *The effectiveness of all component measures is heavily context dependant.* Every edict, every single piece of advice on virus control can be expected to meet with a capricious response, varying with the circumstances of the recipients. Best practice in policymaking involves targeting the right intervention in the right context. For instance, the Wuhan 'lockdown' is generally regarded as one of the more successful as well as one of the more aggressive responses to the virus – with, for example, officials directly policing outings to one family member every two days to buy necessities. There have been many admiring calls to imitate such a system worldwide. But its success depends in considerable part on context, namely the levels of discipline that pervade everyday day life in China (4). Many institutions remain from the 'central control' era such as the *Central Commission for Discipline Inspection* which is tasked with enforcing Communist Party rules and regulations. There are also modern, rather more informal control initiatives such as the 'social credit surveillance system', which provide a publicly accessible record of the honesty and credibility of individuals, officials and businesses. In contexts without this collective discipline quarantine measures need to be approached with much more subtlety. For better or (quite possibly) worse, the rest of the world may not be so acquiescent.

At the local and individual level context still plays a vital part in enabling the uptake of advice. One of the more obvious examples is the injunction to 'work from home, where possible'. The very possibility, of course, depends on the nature of work undertaken, a point amusingly satirised in the journalist Marina Hyde's vision that, 'Manchester United are working from home' (Guardian, 18 March). Home working also requires adequate computer facilities and good connections with HQ, a requirement made more difficult with the rush to buy equipment and the eventual closure of electrical retailers. There is little space here to mention the countless contextual constraints on the

uptake of other interventions. Consider, for instance, 'age' and the struggle to teach, say, a 2-year-old as opposed to a 4-year-old the basic rules of social distancing. One of the most neglected contexts is the passage of 'time' – early enthusiasm for a measure may soon collapse. Notorious in this respect are 'nudge initiatives', which are remarkably short-lived (5). How many people still handwash to the double rendition of *Happy Birthday to You*?

*3. Model-building provides a limited practical guide to policymaking.* Much of the UK coronavirus response is said 'to be led by the science'. The science in question is the Imperial College report on the impact of non-pharmaceutical interventions to reduce Covid-19 mortality and healthcare demand (6). Model building works by making assumptions about person to person transmission rates and disease incubation rates and then estimating how these 'attack rates' operate in different demographic settings (households, schools, workplaces, community). Data on these dynamics is fed in from earlier studies of the virus in other countries. Estimates of how different interventions might modify the disease transmission rates are then simulated. For instance, the model for an intervention involving the closure of schools and universities assumes: 'The closure of all schools, 25% of universities remain open. Household contact rates for student families increase by 50% during closure. Contacts in the community increase by 25% during closure'. The model for social distancing those over 70 assumes: 'Reduce contacts by 50% in the workplace, increase household contacts by 25% and reduce other contacts by 75%. Assume 75% compliance with the policy.'

These assumptions are then loaded into a model and outcomes for different interventions can be simulated and compared. An example is Figure 2, reproduced from Ferguson et al (6). This examines a particular outcome, critical care bed provision needed over time, mapped according to which prevention strategy is put into place. The results are dramatic, different interventions produce significant shifts in both peak capacity requirements and a delay in timing of necessary provision.

### **Figure 2 about here**

This analysis most certainly influenced UK government policy – to what extent was that justified? The standard critique of simulation modelling is that the veracity of the predicted outcome depends entirely on the accuracy of the basic inputs. And these inputs are based on 'assumptions' or, to put it another way 'best guesses'. In the above examples we are already able to note gaps between assumption and actuality. For instance, school closures are only partial and do not apply to 'all schools' because of the aforementioned issues of mandated provision for the children of critical workers and vulnerable children. The assumptions on 'compliance rates' for the various interventions are 'known unknowns' and no more than the authors' best guesses. The upshot, in the words of an eminent British statistician, is that 'All models are wrong, but some are useful.' (7).

The main problem from the perspective of this paper is that the Imperial outcome modelling takes on a spurious certainty because it misrepresents the nature of the potential interventions, which as we have attempted to show are based on a maelstrom of complex decisions which mutate over time and under a variety of contextual forces. The strength of simulation modelling lies in its ability to demonstrate outcome differences between 'major strategies' or 'broad currents' of public policy. The Imperial model is thus rightly celebrated for pointing UK policy towards 'suppression' rather than 'mitigation'. But simulations at a greater level of granularity are much more fragile. Consider for instance the recommendation: 'Stopping mass gatherings is predicted to have relatively little impact

(results not shown) because the contact-time at such events is relatively small compared to the time spent at home, in schools or workplaces and in other community locations such as bars and restaurants' (6). This injunction was followed for a while but set aside rapidly as political pressures mounted and other 'assumptions' took over.

Finally, we note a welcome piece of wisdom in the final paragraph of the Imperial research on the perils of looking into the future: 'However, we emphasise that is not at all certain that suppression will succeed long term; no public health intervention with such disruptive effects on society has been previously attempted for such a long duration of time. How populations and societies will respond remains unclear' (6).

## **Conclusion**

So how should policymakers respond to the unprecedented challenge of covid-19? This pandemic is new but it is not the first and it certainly is not first time governments have faced complex, uncharted and evolving crises. Political and administrative scientists have studied government decision making under conditions of duress for many a year and what transpires is thread running back to a 1959 paper by Charles Lindblom, with the unprepossessing title: 'The science of muddling through' (8). What this body of work suggests is the avoidance of big ideas, siren voices and misplaced certainty and its replacement by a 'continuous mutual adjustment'. It argues that major decision process 'are characterised by novelty, complexity and open-endedness, by the fact the organization usually begins with little understanding of the decision situation it faces or the route to its solution, and only a vague idea of what that solution might be and how it might be evaluated when it is developed. Only by groping through a recursive discontinuous process involving many different steps and a host of dynamic factors over a considerable period of time is a final choice made' (9).

What might this injunction look like in designing and managing the coronavirus response? What should be attempted is the coordination of an uncoordinated system of ideas. This begins with policymakers recognising the totality of their action plans and mapping out in detail the hypothesised decision sequences that might realise them (in the manner of Figure1 and Box1). This process is known as 'concept mapping' or 'logic modelling' (1). Officials and practitioners are then responsible for implementing these programme theories but also for providing feedback on their fragility and error, via the removal of ambiguity in prematurely announced plans, revision in the light of unanticipated setbacks, and correction when mistakes are made. And then of course there is the public, the crucial partners in the implementation process. Whilst their behaviour will never be predictable it is important to recognise that their actions are responses to ideas and, accordingly, that explanations of plans might succeed better than directives or nudges. And what is needed in this respect is endless public repetition of the soundest ideas, careful and open correction when schemes have misfired or become outdated, and, above all, constant clarification of how a particular action plan should be adapted to particular circumstances.

There is a logic and a science to muddling through but also an inevitable limitation. As Rumsfeld might put it: we need to make busy converting scores of known unknowns into known knowns – but

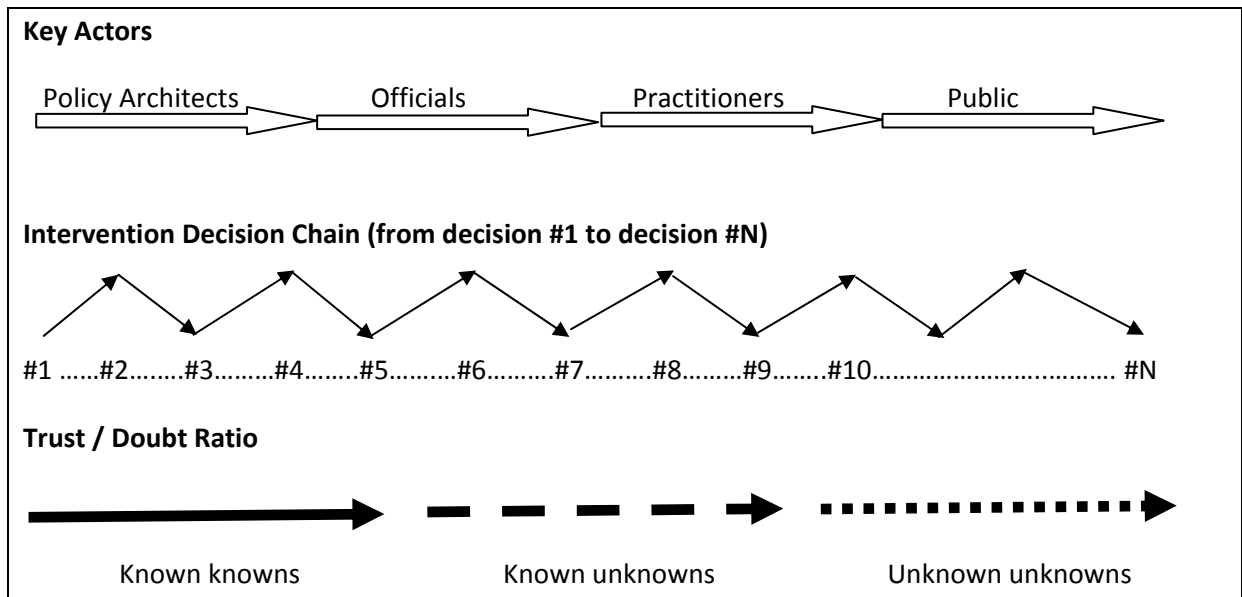
in the last analysis it is necessary to acknowledge that our best laid plans lie in peril from unknown unknowns.

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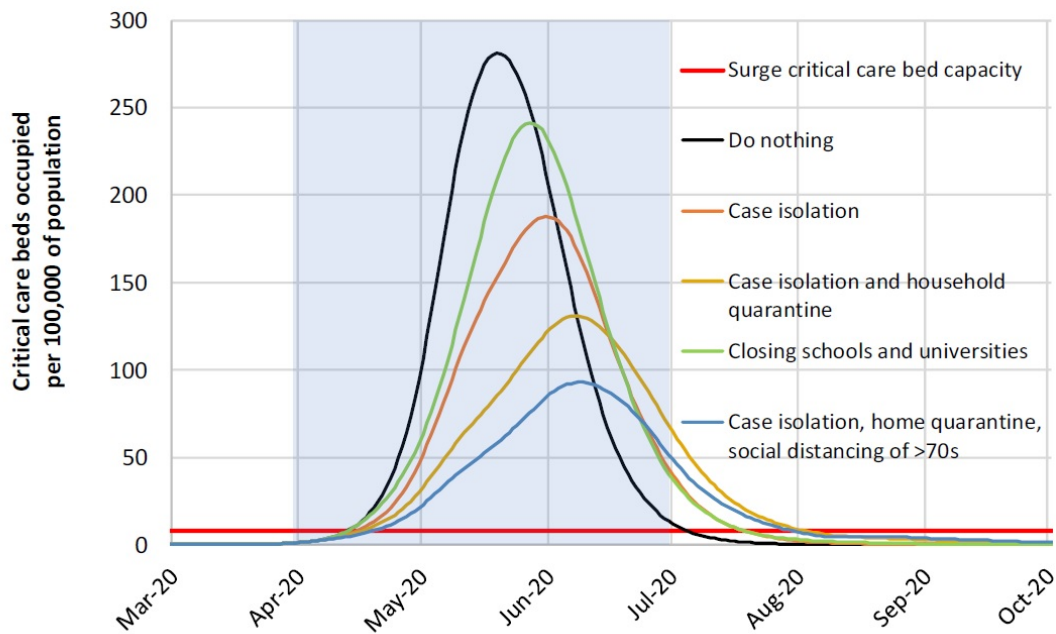
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Figure 1: The Coronavirus Response Cascade



**Figure 2: Modelling Scenarios**



**Figure 2: Mitigation strategy scenarios for GB showing critical care (ICU) bed requirements. The black line shows the unmitigated epidemic. The green line shows a mitigation strategy incorporating closure of schools and universities; orange line shows case isolation; yellow line shows case isolation and household quarantine; and the blue line shows case isolation, home quarantine and social distancing of those aged over 70. The blue shading shows the 3-month period in which these interventions are assumed to remain in place.**

### Box 1: Critical questions facing action plans

*Action plan - more ventilators to deal with critical cases.* Decision cascade: i) how many are needed, ii) with what availability, iii) from whom, iv) at what cost, v) in what timeframe? Further decisions then depend on vi) how the supply chains cope, vii) in the face of enormous international demand and viii) lack of UK manufacturing capacity. Once stock is ordered, further decisions are required on their ix) technical specification and on their x) testing, xi) compatibility with other equipment and xii) licensing. Decision then follow on where the machines will be located – xiii) is there enough capacity within intensive care units or will additional housing need to be xiv) created or xv) converted? Just as important are staffing matters, xvi) who will staff and operate them, what are xvii) the requisite skill levels and xviii) urgent training requirements? And still the really difficult questions remain: xix) will the overall additional provision keep pace with the increasing need and xx) how will patients be rationed for treatment if ventilators supply remains suboptimal?

*Action plan – school closure to decrease social interaction.* Decision cascade: – i) when is the optimal time for closure, ii) will closure increase or decrease the circulation of virus carriers, iii) which schools should be closed, iv) should this include, for example, boarding schools, v) should compulsory closure stretch to further education, higher education and apprenticeships? Should some schooling remain for vi) ‘vulnerable children’ and for vii) the children of ‘critical workers’ and viii) what form should this provision take? how and by whom are these ‘exempted worker’ categories ix) defined, agreed, invited and monitored? x) what levels of residual staffing are required and xi) how will staff be recruited? xii) will those responsible for at-risk children, with traditionally poor levels of attendance, fall into line with new arrangements? xiii) will there be ‘gaming’ for places? xiv) should provision cover school holidays? xv) who is mandated to manage and provide the residual service? xvi) what levels of cover are required and xvii) should the remaining provision operate in every schools or be pooled? xix) how and xx) by whom will arrangements be agreed and managed between schools under different jurisdictions (private schools, academies and local authority controlled schools)?

*Action plan – mass testing to track and trace disease carriers.* Decision cascade: i) which testing kits are available in what time frame, ii) what are their relative strengths, iii) what are the respective costs, iv) when is the optimal time for testing, v) where (the community or hospital), vi) by whom (healthcare staff or home testing), vii) what is the respective accuracy rate of home and lab tests, viii) what are the comparative sensitivity rates (false negative results?). Crucially, ix) who should be selected for testing and, x) on what basis and, xi) by whom. Moving to further technicalities, xii) would the national network of laboratories and their staff keep pace with the huge increase in demand, xiii) what are the validated verification protocols for use in all laboratory settings, xiv) how reliable is the interpretation of result in terms of expertise and managing uncertainties, xv) how easily can samples be contaminated, xvi) how and when is the performance of reagents, particularly control materials, monitored for quality. Still, difficult questions remain: xvii) what is the best use of testing data within the overall response, xviii) is it possible or useful to trace all the contacts of an infected person with a widespread pandemic, xix) how would tracking operate in terms of communication systems and data protection?

*Action plan - social distancing to assist the suppression strategy.* Decision cascade: i) what is defined as social distancing?, ii) how does it differ to ‘self-isolation’ or ‘shielding’?, iii) who should undergo social distancing?, iv) who gets to decide whom should undergo social distancing? v) on what basis is such a decision made?, vi) is it compulsory or voluntary?, vii) if it is compulsory, how (if at all) is it enforced?, viii) if it is voluntary, what levels of compliance might be expected? ix) what types of messages, how often repeated, in which media would optimise voluntary response? We then move on to x) the practicalities of social distancing - how does it work in everyday encounters?, xi) do these means for social distancing apply in all situations (e.g. home, work, shopping, exercise)?, xii) when are there exceptions?, xiii) who decides if an exception applies?, xiv) how do families socially distance if one of them is unwell?, xv) how do you know if it is working? Finally we move on to questions that are even more challenging, xiv) when do you need to make social distancing compulsory?, xvi) who will enforce it?, xvii) what rules, regulations and powers will they have to do so?, xviii) if fines are involved, how much should these be? xix) what exceptions (if any) will apply, to whom and on what basis? But by far the most difficult question remains, xx) when should social distancing be stopped?