Philosophy of Medicine

Philosophical Perspectives on COVID-19

Abstracts

The Case for Ecological Medicine in a Post-COVID-19 World

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Throughout most of its history, Western medicine has been characterized by a mechanistic understanding of both the human body and the disease, complemented since the 20th century by a techno-scientific vision of cure that has practically reduced it to the consumption of medicines produced by the pharmaceutical industry. The social and economic importance of the production and distribution of vaccines in the fight against CVID-19 is proof that this paradigm is still in very good shape.

However, against this mechanistic medicine voices are being raised that claim the importance of including the environment as a crucial factor in the definition and treatment of disease and of understanding bodies as complex biological systems. Those who have taken this perspective the furthest are the advocates of environmental medicine, conservation medicine or ecological medicine. For the latter, the health of Earth's ecosystem is the foundation of all health. And nothing illustrates this better than the deep link between the emergence and spread of COVID-19 and the deforestation and spread of industrial agriculture and animal husbandry, which favored the zoonosis that gave rise to today's global pandemic.

In conclusion, if we want to prevent present and future diseases, the question of health must go hand in hand with the old ethical-political question of how we should relate to other living beings. Both ethics and medicine need today to radically question anthropocentrism, to put an end to any Promethean fantasy of control (whether of disease or territory) and to assume the existence of interdependencies and eco-dependencies that define us as limited, fragile and finite beings within complex systems. In the era of the Sixth Great Extinction and of global ecologic crisis there is no better vaccine than the defence of healthy ecosystems.

Death-related Parameters in Epidemiological Models of COVID-19: A Philosophical Issue

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In this paper we unpack some of the roles that non-epistemic factors might have in the making of epidemiological models of COVID-19, first by a zoom-in on the definition of death due to COVID-19, then with a bird's-eye view on different parameters that can be incorporated into predictive epidemiological models. Specifically, the definition of a death due to COVID-19 rests on a choice, the choice of positively evaluating the goal of fostering public health through disease prevention and treatment, over the goal of preserving the

epistemic and biomedical soundness of a causal inference about the underlying cause of death. In its turn, this definition figures as a component of death-related parameters, such as infection fatality ratio and case fatality ratio. Death-related parameters, however, collectively represent only one option, as other measures may optionally be considered when modeling, such as potential years of life lost. Choosing between different parameters in epidemiological modeling does not depend on facts only, but also on goals and value assumptions, that is on non-epistemic factors.

Arguing that non-epistemic factors play a key role not only in determining what counts as a death due to COVID-19 but also in realizing the epidemiological models of the current pandemic, we do not mean to claim that such mortality data and epidemiological models are flawed, unreliable, useless or non-purely scientific. Philosophers of science have recently provided convincing accounts of the role of values in science. Rather, we want to highlight that the interplay of facts and values must be made explicit to the general public and the two components must be carefully separated and evaluated independently. Whereas facts can only be acknowledged, values and goal-related choices may and should be rationally discussed on practical and ethical grounds.

How to Handle Reasonable disagreement: The Case of Covid-19

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As the novel coronavirus disease (COVID-19) continues to spread around the world, the public faces the challenge of a rapid and far-reaching spread of information related to the virus, that is often false or misleading. Science communication can play a key role in the fight against misinformation. However, the attempt to counter coronavirus misinformation by providing (access to) more accurate information is prevented by the uncertainties surrounding the coronavirus pandemic. We are facing an extremely 'wicked problem' (Rittel and Webber 1973), which means that there is no definite formulation or explanation of it. This paper discusses the recent debate between John P. Ioannidis and Nassim N. Taleb about the COVID-19 forecasts and the measures we should take to prevent and/or control SARS-CoV-2 transmission, with the aim, first, to shed light on some ethical and policy issues emerging in science (communication) in times of crises and, second, to explain what distinguishes a 'reasonable disagreement' that may arise in the context of a properly functioning science from misinformation or dissemination of false news. The Ioannidis – Taleb debate gives rise to two distinct (types of) questions relating to science communication (Elliott 2017), as it is argued: a) How should we talk about the coronavirus pandemic? What language should we use for the transmission of scientific information? and b) What should we say? We call them the How-question and the What-question. We discuss both of these questions in the first part of this paper, while attempting to reconstruct the arguments provided by the two scientists. The uncertainty inherent in clinical and epidemiological research seems to dictate different policy decisions, which nevertheless is obscured in this context: the figurative language used in both texts seems to constrain scientific reasoning, as we show. However, the main aim of this paper is, drawing on the Ioannidis – Taleb debate, to highlight the features of a reasonable scientific disagreement, a task that, in the second part of the paper, is related to the question of how much transparency is needed to ensure the legitimacy of the values involved in decision-making.

Does Covid-19 Affect Public Reason?

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Political liberals hold that state coercion is legitimate only if it is publicly justified. Are government imposed lockdowns aimed at mitigating the spread of COVID-19 publicly justified?

Apparently, the answer depends on which of the two competing models of public reason we choose to apply. On the consensus model, a policy is publicly justified iff it is preferable on the balance of reasons that all citizens may reasonably be expected to accept. On the convergence model, a policy is publicly justified iff it is preferable to each citizen on the balance of their own reasons, regardless of whether or not these reasons are reasonably acceptable to others.

I will argue that lockdowns are not publicly justified under the convergence model, because some citizens categorically reject them on the grounds of their religious or philosophical beliefs about which restrictions of individual freedom are compatible with human dignity. However, under the consensus model these objections are invalid, because reasons derived directly from deeply controversial comprehensive religious and philosophical doctrines are not reasonably acceptable to all. Thus, the rationale for lockdowns is strong enough to make them at least pro tanto publicly justified under the consensus model — when hospitals are on the verge of being overwhelmed, a mandatory lockdown becomes the only life-saving policy alternative.

I will contend on these grounds that, instead of predicating the justifiability of lockdowns on the philosophical choice between the two models of public reason, we should do the opposite. Namely, we should predicate the philosophical choice between the two models on the fact that only one of them allows to justify lockdowns. COVID-19 pandemic is a precedent-setting event that cannot be ignored when we form our views about the limits of reasonable pluralism in democratic deliberation. In this sense, COVID-19 affects public reason.

Pandemics and the Precautionary Principle

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When policy-makers are faced with non-negligible threats of exceptionally grave harm, they should take proportionate precautions even when the science is subject to on-going investigation and dispute. Ideas of this type have often been cited in relation to COVID-19. Yet in designing a framework for applying this "precautionary principle" to real decisions, we face several challenges: the challenge of providing consistent guidance, the challenge of showing what is distinctively "precautionary" about this approach in relation to cost-benefit analysis, and the challenge of blocking policy-makers from basing policy on whatever speculative claims happen to support their agendas.

I will present a framework for applying the precautionary principle that can overcome these challenges. It is based on three threat conditions (Gravity, Evidence and CBA-override) and six proportionality conditions (Rights-compatibility, Reasonable compensation, Consistency, Sufficiency, Non-excessiveness, and Efficiency). I will then discuss the implications of this framework for the COVID-19 pandemic and for future pandemics.

Many of the measures initially taken in response to COVID-19 can be justified within this framework as proportionate precautions. Examples include border closures, compulsory mask wearing (allowing medical exemptions) and compulsory social distancing. It is much less clear that school closures can be justified as proportionate. This is because there is a problem of consistency created by the grave harms inflicted on children by school closures.

In relation to future pandemics, measures that have been taken up to now to reduce the risk of zoonotic transmission of new pathogens (such as H5N1) fall well short of proportionality. A step change is needed in how we think about proportionality in this context. Measures that might once have been seen as excessive, such as banning all trade in wildlife for any purpose, ending all subsidy of intensive animal farming, and incentivizing changes in diet, can now be seen as proportionate.

Expressive Generics in Scientific Communication

BOWKER, Mark (University College Dublin)

Generic generalisations like 'Young children do not transmit the virus' can be distinguished from explicit generalisations like 'Young children never transmit the virus.' Generics are prevalent within scientific communication. While generics avoid the need for complex statistical generalisations, their simplicity risks miscommunication. Daniel Koch of the Federal Office of Public Health in Switzerland said, for example, that "young children…do not transmit the [SARS-CoV-2] virus". While this generic may have been intended to convey that children do not *generally* transmit the virus, it was interpreted by some media outlets to mean that children *cannot* transmit the virus. The analysis of generics is not only interesting from a theoretical perspective, therefore, but important for developing strategies to improve scientific communication.

The standard view of generics takes them to have compositionally-determined truth-conditions, just like explicitly-quantified generalisations, thanks to the presence of an implicit operator *Gen*. On this view, it is difficult to see why they are prone to misinterpretation. I argue that generics should are not primarily *descriptive*, but rather they are primarily *expressive*. The generic above does not contextually express a unique propositional content, e.g., 'Young children do not normally transmit the virus', but rather serve to express the speaker's association between a kind and a property; in this case, the kind *young children* and the property of *not transmitting the virus*. I explain how this expressive function allows generics to communicate propositional contents but argue that propositional communication through generics is precarious, due to differences between the speaker's and their audience's view of the contextually-available common ground of the conversation.

The Impact of COVID-19: The Vulnerabilities of Women in a Global Pandemic

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There is strong evidence that the impacts of COVID-19 have deepened existing social-inequalities (United Nations Entity for Gender Equality and the Empowerment of Women 2020). Already-existing vulnerabilities of women due to economic disruption, intimate partner violence, carer responsibilities and restricted health care access were exacerbated in 2020. Scholars considering previous pandemics found that women's needs go unseen, unheard and unmet in a crisis response, because they are not adequately represented in decision-making processes. Including women at higher levels of decision-making around COVID-19 global responses, it is suggested, may ameliorate the destructive impact on women (Wenham et al. 2020).

This paper argues that it is not enough to simply ensure equal representation at decision-making forums. The 2020 global pandemic has exposed a deeper philosophical problem at the heart of the Western liberal democratic system: the methodological individualism that has shaped an account of autonomy and political agency that ignores the importance of inter-personal relationships. Feminist philosophers reject what they refer to as an 'atomistic' nature of the self and the value of autonomy that emerges from this account. They see this account as itself embedded in social relations in which the self-sufficiency held up as a neutral model, is actually the ideal of the self-sufficient man. The global pandemic has revealed our deep reliance as a society on previously under-recognised contributors: carers, teachers, hospitality and health-care workers. These are very citizens who are often disempowered in narratives of political agency. This paper considers three theories of feminist 'relational autonomy' as an alternative to the traditional liberal account, and tests

each in terms of its capacity to re-empower women's agency during the pandemic recovery process.

Grief Justice and The Role of Medicine After Covid

CHOLBI, Michael (University of Edinburgh)

The Covid-19 pandemic upset many societal norms, chief among these norms surrounding grief and bereavement. The highly infectious nature of the coronavirus often precluded family members and loved ones from being physically proximate as patients succumbed to the illness. In addition, the pandemic inhibited faith communities' ability to participate in their prescribed funerary rituals (e.g., Islamic practices of washing and enshrouding). Pandemic social distancing regulations precluded large communal funerals such as the New Orleans 'jazz funeral' and forced many mourners to grieve at a distance via 'Zoom funerals.' The rapidity and sheer number of Covid deaths also stressed the physical infrastructure for handling the dead. Both private funeral homes and public coroners' offices reported being overwhelmed by the demand for storing and treating corpses. As a result, shocking images of Covid victims' corpses being stacked in refrigerated compartments or in the open air, were sadly common in the news media. That Covid resulted in deaths that frequently did not conform to social expectations for a 'good death' further only compounded the traumatic nature of grief during the pandemic.

Traditionally, medical practitioners are given limited training in addressing grief, much of it voluntary (Sikstrom et al.) The disruptions in grief experience caused by the pandemic underscore the need for greater training in this area, and in particular, its conceptualization in terms of clinical ethics rather than 'patient care'. Patients have a right to be grieved and their family members a right to grieve, I argue, a right the honouring of which depends not only medical professionals with direct responsibility for handling the dead (coroners, mortuary officials, etc.) but on care and treatment choices made by clinical personnel too. Consideration of *grief justice* should thus play a more prominent role in how medicine engages with dying patients and those who care about them.

Google Trends Associated with Lockdown Levels in South Africa During 2020

COMBRINK, Herkulaas (University of the Free State, South Africa)

The introduction of a new disease burden brought by COVID-19 on the healthcare system in 2020 complicated public decision making to related to mitigating the spread of this new disease. In South Africa, several lockdown measures were implemented, assuming to reduce the rate of SARS-CoV-2 transmission. Although, there is controversy surrounding the effectiveness of lockdown levels in Sub-Saharan Africa and how exactly hard economic lockdowns reduce disease transmission in South Africa, public information seeking behaviour in response to the announcement of various lockdown levels in South Africa is currently still poorly understood. The need to interrogate the information seeking behaviour of South Africans during the different Lockdown levels of 2020, gives a snapshot of what people deemed important and provide additional insight into the public perceptions and reactions related to the official addresses by the South African President, Cyril Ramaphosa, and public healthcare specialists. Understanding these insights have the potential to fundamentally change the way in which public healthcare specialists' approach risk communication strategies for any public disease as well as provide insight into the level of transparency required by the public when it comes to official decision making for public good. Google, as a widely used information seeking platform in South Africa, was explored by using Google Trends to assess the information seeking behaviour of South Africans during the various lockdown levels of 2020. Prior to the trend analysis, and exploratory data analysis was employed to identify the themes related to public interest from an online public

forum. The findings of this study reveal that 85% of South Africans across the various provinces looked for the same content during the different lockdown levels, with the public perception during surrounding Lockdown Level 5 containing the most official trust, and Lockdown level 1, the least.

COVID Panic, and the Ethical & Epistemic Roles of Pharmacy: The Case of Hydroxychloroquine

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In responding to the COVIDC pandemic, pharmacists held an important role, one that has often been underdiscussed for its ethical importance. Standard clinical practice for pharmacists require them to be a "last line" of review. As New York scrambled to develop policies and procedures in response to COVID outbreaks during the spring and summer of 2020, traditional pharmacy practice provides lifesaving decisions. Standard practice is to review that medications are appropriate for diagnosed conditions. In addition, pharmacists became a nexus for hidden, protective rationing decisions: maintaining the drug supply of hydroxychloroquine for patients needing it for chronic care, rather filling it for COVID treatment (which was based more on emotional than scientific basis). As such, embracing standard practices – although not new—was an important feature of ethical responses to the COVID pandemic.

To make this argument, I briefly outline the case study of a junior pharmacist in the early days of the COVID response, in upstate New York. He was asked to review an atypical prescription for hydroxychloroquine and azithromycin, as recently discussed by others, including President Trump. I argue that the pharmacist was correct to not fill the prescription for hydroxychloroquine. First, this was beyond the scope of practice of the prescribing physician. Second, the drug was intended (upon consultation) for off-label us as a possible COVID treatment. Here, I clarify how pharmacists play an important epistemic role in balancing known health benefits with possible off-label uses, and the ethical and lived importance of such clinical judgments. Finally, I clarify how pharmacists played an underdiscussed agent role in maintaining public health and its goals during the heightened political moment of the global COVID pandemic.

On Hype and Pandemic Science: Toward a Looping Account

DIMARCO, Marina (Department of History and Philosophy of Science, University of Pittsburgh) and Helen Zhao (Department of Philosophy, Columbia University)

In the context of pandemic science, hype, or the exaggeration of scientific findings, can pose a threat to science communication. Hype can distort the interpretation of scientific results as findings travel (LaCroix et al. 2020, Caulfield 2018, Intemann 2020). COVID-19 has made the stakes of such distortion abundantly clear. Fraudulent claims about the treatment effects of malaria drugs have achieved wide circulation and policy influence before being retracted (Joseph 2020). Media coverage has foregrounded sex-specific treatments including vaccine regimens (Mandavilli 2020), notwithstanding their weak warrants.

According to a standard explanation of hype, exaggerated claims receive undue uptake because non-expert audiences lack the skills or information with which to properly interpret expert findings (Bubela et al. 2009). There is a deficit in audience knowledge. This 'deficit model' has led some philosophers to argue that transparency is not always a positive norm of science communication (e.g. John 2018).

In this paper, we argue that the deficit model is not well-suited to explain hype in the context of COVID-19 research. We reject the deficit model on two grounds. First, drawing on Intemann (2020), we argue that the deficit model mistakenly and myopically conceives the

aim of science communication as merely the transfer of true beliefs from experts to non-experts. Second, drawing on the example of sex differences research on COVID-19 morbidity, we show that the deficit model obscures the role of hype in *producing* deficits of knowledge among non-expert and expert audiences. We propose an alternative 'looping model' of hype-related distortion. Exaggeration of scientific findings is incentivized by background biases, and hype generates the conditions for further uptake of exaggerated claims. Our account is better positioned than the deficit model to diagnose both the causes and harms of hype, especially in the fast-paced context of pandemic science.

The Fundamental Importance of Pathogen Origination in Public Health Policy Making

EDOUT, Merav (University of Johannesburg)

'Disease etiology' is typically split into two main categories: 'illness causation' - those extrinsic events prior to infection that initiate the second kind of etiological process - and 'pathomechanisms'. Pathomechanisms are those intrinsic physiological causal mechanisms that result in the symptoms of disease (Broadbent and Smart, 2020:5). In the context of the Covid-19 pandemic, the primary mode of illness causation is the transmission of the virus between infected individuals and those in close proximity to them, and the pathomechanisms are the biological processes resulting from the contraction of SARS-Cov-2, that may accumulate to form Covid-19 symptoms.

These disease explanations are crucial in assessing the manifestations of disease in the patient. However, this paper is concerned with the causal contributions made prior to illness causation. My aim is to investigate the causal factors present in the formation of the contagion itself. I will refer to this causal explanation as 'Pathogen Origination'. Pathogen origination is the causal process that forms the pathogen responsible. These causal processes often contain environmental components, but they are not restricted to environmental factors or zoonotic enablers. Rather, they comprise any causal contribution to the inception of a pathogen that results in disease.

Acknowledging pathogen origination as a causal factor in the emergence of pathogens (and therefore, disease) holds significant potential for public health policy. Integrating pathogen origination into public health policy involves the identification and control of environments that enable the conditions for pathogen origination.

Covid-19 has brought with it unprecedented challenges, and governments and public health professionals have had to act quickly to prevent the spread of the disease using extreme measures that sorely effect economic activity and other health programmes. Vaccines have had to be developed and distributed at a rate never seen before. But alongside the lessons we learn about social distancing, treatments, and vaccine development, we must learn our lessons regarding pathogen origination. This could potentially save many more lives.

From Prosperity to Rest: COVID-19 and a New Worldview

FRAHM-ARP, Maria (University of Johannesburg)

In South Africa about 75% of the population claim to be practicing Christians, and one of the fastest growing Christian movements is Prophetic Pentecostal Christianity (PPC). In these churches prophet-leaders claim that they can deliver people from witchcraft and the demons of poverty, addiction, and illness. If people pay them enough money, and have enough faith, wonderfully miracles of wealthy and happy will follow this deliverance. This paper explores one PPC, Rabboni Christian Ministries, which during COVID has become a mega international online church. The prophet-leader of this church Lesego Daniel has radically changed the theology and worldview of this church. The focus is no longer on wealth and prosperity, but that part of the Christian journey includes suffering. He has declared 2021

the 'Year of Rest' and in so doing the staggering unemployment rates in South Africa have been reframed as a jubilee year, or year of rest ordained by God. Daniel is drawing on the Old Testament commandment God gave the Israelites that every fifty years everyone should rest and not work for a whole year to honor God. By declaring 2021 a year of rest, Daniel has reframed COVID, poverty, and unemployment not as a challenge and disaster, which his prayers have failed to heal, but as a God-given opportunity for all people to rest. This paper uses discourse analysis to examine sermons, testimonies, and prayers to analyze how this discourse of being 'at rest' is understood by followers and changing their worldviews of COVID-19 and themselves.

Scientific Disagreements, Fast Science and Higher-Order Evidence

FRIEDMAN, Daniel Cserhalmi (Stanford University) and Dunja Šešelja (TU Eindhoven)

Scientific disagreements are commonly considered an important catalyst of scientific progress (Solomon, 2006, Longino, 2002). But what happens if scientists disagree while society is depending on them for quick yet reliable results? In this paper we aim to provide a normative account for how scientists facing a disagreement in the context of 'fast science' should handle it, and how policy makers should evaluate it. Starting from an argumentative, pragma-dialectic account of scientific controversies (Donato Rodríguez and Bonilla, 2013), we argue for the importance of 'higher-order evidence' (HOE), which has largely been neglected in previous discussions on scientific disagreements and controversies.

In contrast to first-order evidence (FOE), which is provided in support of, or against the truth of a proposition, HOE is, roughly, evidence about evidence, i.e. evidence for or against the truth of a proposition about the first-order evidence (Dorst, 2020, Whiting, 2020). For instance, while an experimental result is a kind of FOE for a certain scientific hypothesis, evidence showing that some of my peers disagree with me on this result (on its accuracy, significance, interpretation, etc.) serves as HOE, which may undermine the force I took our FOE to have and therefore decrease my confidence in the given hypothesis.

Following Rodriguez & Zamora Bonilla's view of scientific controversies in terms of a 'game of giving and asking for reasons', we show how HOE plays an essential role in the specification of argumentation rules that underlie scientific disagreements and their resolution. We illustrate our point with a recent disagreement on the aerosol transmission of COVID-19 virus (e.g. Jayaweera et al., 2020, Lewis, 2020) and provide guidelines for how legitimate HOE in this and similar cases is acquired.

Who Is the Biological Patient in the COVID-19 Pandemic?

FRIEDMAN, Yael (University of Oslo)

In biomedical contexts, patients are typically viewed as individual organisms, and their health maintenance is perceived as one of medicine's main goals. In the context of Public Health, Epidemiology, and One Health Medicine the focus is shifted from the health of individual organisms to the health of populations, ecosystems, and the biosphere. I argue that a health state is attributed to an agent, and therefore, medicine should establish wider categories of patients than the individual organism— like population, ecosystem, and biosphere—which are currently not clearly defined. One possible reason is that the medical field is still holding a dichotomic understanding of the organism-environment model. I suggest a new dynamic model of the 'living-being and its exteriority'. It distinguishes between different potential biological patients and their different environments (exteriorities), which can be seen both as part of the patient and as external to it, depending on the time and medical context. The model allows a more precise examination of different biological patients who are affected by COVID-19 and systematically reveal inequalities between them regarding care, research, and resources. The model allows seeing a population

not only as a normative construct but also as a biological patient and compares it with other populations and individuals based on the same biomedical criteria. Utilizing it requires precision regarding who is considered a population patient, and who is left out. Through the model, COVID-19, a disease with a strong zoonotic relation, can be understood in a broader ecological scope, seeing ecosystems and the biosphere as patients —and not only as an external cause that affects human health – can change how they are perceived. It bears the potential to draw more attention to their maladies and recovery processes, which is currently lacking, and extend the idea of epistemic injustice in healthcare beyond the individual patient.

Three Questions about COVID-19 Epidemic Models

FULLER, Jonathan (University of Pittsburgh)

I will explore three questions about COVID-19 epidemic models: what kinds of predictions do they make, are they causal models, and do different kinds of epidemic models represent the same phenomena? I will not provide fully satisfying answers to these questions but will offer some preliminary directions for philosophy of medicine.

First, what kinds of predictions do epidemic models make? A standard distinction is often drawn between epidemic model forecasts and epidemic model projections. Model forecasts are unconditional predictions ('2 million people will die'), while model projections are conditional predictions ('2 million people will die if no anticontagion policies are implemented'). Epidemiologists accept that some models make forecasts while others make projections. However, given that modeling predictions are always conditional on assumptions, there is reason to deny that the distinction should be drawn at the level of the model itself.

Second, are epidemic models causal models? Here I will focus on compartment models. These models are sometimes described as 'mechanistic'. Moreover, modelers sometimes manipulate model parameters to predict the effect of implementing particular policies. On the other hand, they are dynamical models, and some philosophers question whether dynamical models are mechanistic models. However, on manipulationist theories of causation, there is no principled reason why dynamical compartment models cannot be causal.

Finally, do different kinds of epidemic models represent the same phenomena? Do microsimulation models and compartment models represent the same causes? The epidemiologist Geoffrey Rose argued that the causes of cases are different than the causes of incidence, and plausibly microsimulation models represent the former while compartment models represent the latter. I will provide an explanationist reinterpretation of Rose's principle that makes room for the conclusion that these models represent the same causes at different levels of explanation.

Four Types of Uncertainty Facing the Translation of Science into COVID-19 Policy Measures

HAUSWALD, Rico (TU Dresden)

From the beginning of the pandemic, policymakers around the globe have claimed to "just follow the science" when implementing measures such as general lockdowns. However, the "translation" of science into such measures is affected by various uncertainties, the extent of which has often been underestimated. In this paper, I focus on four particularly challenging types of uncertainty. By comparing measures against the coronavirus pandemic to other policy measures – measures related to climate change, the MMR vaccine, etc. –, I argue that these uncertainties are significantly higher in the case of the former than the latter.
I propose a model according to which scientific communities, not individual experts, are the

primary epistemic authorities. When deferring to a scientific community, laypeople typically use certain (broadly sociological) facts about this community – e.g., the fact that its members have achieved a consensus regarding a certain proposition – as indicators of the truth of the corresponding propositions. When it comes to many propositions relevant to COVID-19, however, there are no consensuses yet among virologists, epidemiologists, or other relevant expert groups. Although there are other potentially truth-indicative facts (e.g., the fact that a simple majority of a community's members believe that a certain proposition is true), the "truth-indicative power" of these other facts is typically much lower than that of a scientific consensus. This is the first type of uncertainty. The second type concerns the determination of the truth-indicative facts themselves. It is far from clear – especially in episodes of what has been called "fast science" – how one can determine with any degree of certainty whether there is in fact a majority of members of a particular scientific community who believe a certain proposition relevant to COVID-19. When it comes to far-reaching measures like lockdowns, there is a third, higher-order type of uncertainty that results from the fact that lockdowns can have various medical, economic, or social consequences that were not even thought of at the outset. In other words, it is not even completely clear which propositions are relevant and which questions should be asked (and to whom). Fourth, there is something I call "normative uncertainty". Given the fact that policies cannot, in principle, be justified by scientific facts alone, norms and values inevitably enter the decision-making process. However, it is often unclear which values and norms are relevant and how they should be weighed against one another.

Lessons from COVID: Utilitarian in Theory and Egoist in Practice

JOAKIM, Sahar (St. Louis Community College, Meramec)

If perceived threat to oneself implies a greater rate of individual compliance with recommendations from authorities, is it ethical to exaggerate threat to increase compliance? Few would vote to arm the government with the use of manipulation as a tool to control the people. Yet privately and on a smaller scare, we do this. Parents to their children, for example, and teachers to their students, we exaggerate threat to steal compliance. There is a mismatch, therefore, between what we believe in theory and our actual practices. In theory, it would not be ethical to use manipulated data to manipulate people. But why not? Doing so would be best for the greatest number of humans. This is foundational for utilitarianism which many praise—in theory. Few admit to a preference for personal advantage when the good of the people is at stake. Many argue against Glaucon's praise of injustice grounded in ethical egoism and instead cheer for utilitarian policies. Yet outrage arose when Italy distributed scarce medical resources based on utilitarianism. Is it unethical to set, as policy, an upper-age limit on eligibility for life-saving ventilators? In other news, many Americans argued that the government should not be able to impose face mask or social distance orders for the greater good of the masses, that to do so would infringe on personal liberty. What happened to valuing utilitarian justice for all? It turns out, or so I argue, based on actual reactions during today's pandemic, that we are utilitarian in theory and egoist in practice. If correct, this conclusion teaches us about human nature. Primitive, intrinsic, or instinctual reactions are unaffected by data gathered by medical scientists and people will in practice ignore recommendations from authorities when it is individually advantageous. We are ethical egoists in practice.

Testimony, rationality, and Vaccine Hesitancy

JOHN, Stephen (University of Cambridge)

In the Covid-19 case, as in many other cases, scientific experts agree that a class of vaccines are both effective and safe, and, yet, many people refuse to take the vaccine. In this paper, I focus on one class of such cases: the "vaccine hesitant", those who know the scientific

consensus on efficacy and safety, have no principled objection to vaccination, but still refuse to accept that the vaccine is safe. (As opposed to, say, those who have religious or ethical objections). Such vaccine hesitancy appears like an irrational failure to defer to testimony. The main part of the paper consists of sketching three ways in which such (apparent) failures to defer to expert testimony might be rendered rational: on the basis of inductive evidence of government failure (building on work by Leech and Furman); on the basis of reference class concerns (building on work by Goldenberg); and on inductive risk grounds (combining work by O'Connor and Weatherall and work by John). In the final section of the paper, I build a surprising conclusion from these claims: that, to a certain extent, the success of vaccination programmes turns on keeping people ignorant. This conclusion is, I suggest, less surprising when we recognise that there is a gap between the broadly solidaristic reasons we want people to get vaccinated and the broadly individualistic claims we make about safety and efficacy; as older work by Kavka shows, maintaining public ignorance is often an effective strategy for ensuring prudence and solidarity coincide. The conclusion draws out some more practical implications of the general argument that vaccine hesitancy can be rational.

Trust and global R&D in the Context of a Pandemic

KATZ, Rachel (University of Western Ontario), Ross E.G. Upshur (University of Toronto), and Maxwell J. Smith (University of Western Ontario)

Over the past year, much has been written about trust and public health measures during emergencies. Less has been written about the importance of trust in research and development, e.g. in relation to therapeutics and vaccines, and questions remain about how R&D can be made trustworthy during a pandemic. Many of these questions can be answered – at least in part – by examining responses to previous epidemics. In this paper, we evaluate the importance of the development and maintenance of trust during the research, development and distribution of therapeutics and vaccines during the COVID-19 pandemic. Without trust, collaboration is less possible, and over the last year, collaboration has proven to be an essential tool for managing and curbing the COVID-19 pandemic. Initiatives such as COVAX are promising, but without considering the lessons learned from previous epidemics, these programs may repeat previous failures.

In this paper we examine the value and role of global health ethics to illustrate why the development of trust is of paramount importance to R&D during a pandemic. We draw on the successes and shortcomings of the strategies employed during the West African Ebola outbreak of 2014-2016. We first provide an overview of the ways that trust was developed and employed to help curb the Ebola epidemic, highlighting successful initiatives and where failures were encountered. Following this, we analyze the WHO's blueprint for therapeutics, diagnostics, and vaccines for COVID-19 and identify several areas of R&D for epidemics and pandemics that must work to enhance trustworthiness during the inter-pandemic period so as to be prepared for the next outbreak.

In Defence of The Oddsmaker View of Science—Lessons from COVID-19 modelling

KENNA, Aaron (Institute for the History and Philosophy of Science and Technology, University of Toronto)

Researchers developing COVID-19 models must negotiate an onerous scientific landscape to provide answers where often none exist, with a degree of certainty which can't be guaranteed. To compound matters, epidemiologists and COVID-19 modellers increasingly find themselves having to play the role of scientist, risk communicator, policy adviser, and public health decisionmaker. Early in the course of the COVID-19 pandemic, policymakers began to demand that epidemiological models answer questions about what would happen

next, when, and how society should respond. These were questions which modellers (i) were in no position to answer and (ii) had no business trying to answer.

Regarding (i), epidemiological models were (are) treated by policymakers and the public as producing predictive forecasts (akin to weather forecasts) of the most probable evolution of the pandemic. Epidemiological models, however, can only provide scenario analyses. Scenario analyses project portfolios of what-ifs: sets of non-discountable possibilities of the evolution of the pandemic given plausible parameterisations and assumptions. I argue that confusing predictions and projections, and ignoring the roles each can play in science policy advice, drives many of the perceived failures of COVID-19 modelling and the actual failures of policy actions based thereupon.

Regarding (ii), the trend of epidemiologists and COVID-19 modellers simultaneously taking on the role of scientist, policy adviser, and public health decision-maker distorts the division of labour appropriate for a democratic society between the production of scientific results (the scientist), expert policy adviser (i.e., the scientist or modeller), and the democratic decision-maker (i.e., the public health policymaker). The latter requires the making of non-epistemic value judgements which scientists and modellers are neither personally nor institutionally well-equipped to make. Rather, the epidemiologist's and modeller's brief is the production of evaluations of scientific evidence for the purposes of supporting structured decisions by public and private stakeholders in the relevant science.

In the context of COVID-19 modelling, I argue that this division of labour should burden the epidemiologist and modellers with the responsibility of putting 'skin in the game,' so to speak, before producing evaluations of scientific evidence which potentially impose substantial risks upon society. In practice, I contend that this demand to hold epidemiologists and modellers accountable for their projections can best be met by requiring those who issue portfolio projections to assign probabilities to the sets of non-discountable possibilities, such that they be required to accept a bet offered on the other side of the implied odds. Otherwise, I argue, the measures of uncertainty surrounding COVID-19 projections are idle theoretical calculations with merely an hypothetical or passing relationship to the real world.

Diagnostic Justice and Testing for Covid-19

KENNEDY, Ashley (Florida Atlantic University) and Bryan Cwik (Portland State University)

Diagnostic testing can be used for many purposes, including testing to facilitate the clinical care of individual patients, testing as an inclusion criterion for clinical trial participation, and both passive and active surveillance testing of the general population in order to facilitate public health outcomes, such as the containment or mitigation of an infectious disease. As such, diagnostic testing presents us with ethical questions that are, in part, already addressed in the literatures on clinical care as well as clinical research (such as the rights of patients to refuse testing or treatment in the clinical setting or the rights of participants in randomized controlled trials to withdraw from the trial at any time). However, diagnostic testing, for the purpose of disease surveillance also raises ethical issues that we do not encounter in these settings, and thus have not been much discussed. In this paper we will be concerned with the similarities and differences between the ethical considerations in these three domains: clinical care, clinical research, and public health, as they relate to diagnostic testing specifically. Via an examination of the COVID-19 case we will show how an appeal to the concept of diagnostic justice helps us to make sense of the, at times, competing ethical considerations in these three domains.

The Role of Expertise in Policy Decision-Making

LAKOTA-BALDWIN, Zak (University of Cambridge)

Expert scientific advice has featured prominently in the COVID-19 pandemic, serving as the basis for policy decisions which have dramatically affected the lives of millions. In this paper I analyse the precise role of expertise in these decisions, and assess whether it is normatively appropriate. I focus on the Scientific Advisory Group for Emergencies (SAGE), the expert body most closely involved in UK COVID-19 policy. Although the government is not obliged to follow SAGE's advice, this group holds a position of great influence, as the body responsible for framing the problems and presenting policy options.

In Section 1 of the paper, I show how SAGE uses this position to advocate for a particular kind of response to COVID-19, and I argue that this is an improper use of expertise given the trade-offs involved in policies such as lockdown and the range of competing values that must be accounted for. I suggest that we should want SAGE to act more like an "Honest Broker", with a commitment to expanding (or at least clarifying) the scope of choice available to decisionmakers.

In Section 2, I show how the manifold sources of uncertainty involved in COVID-19 can make it difficult for SAGE to expand the scope of choice without compromising the utility and intelligibility of its advice, and I argue that non-epistemic value judgements form an unavoidable part of this process.

Finally, Section 3 considers the argument that greater transparency might mitigate concerns about the value-ladenness of SAGE advice. I argue that transparency is not a fix on its own, and suggest that it could be exploited to generate mistrust in scientific expertise. Nonetheless, I conclude that SAGE should still be more open about its value commitments in order to foster a better atmosphere for good-faith debates about trade-offs in COVID-19 policies.

COVID-19 Public Health Consciousness and the Technogenetic Posthuman Body

LAMOLA, M. John (Institute of Intelligent Systems, University of Johannesburg)

The pandemic nature of the spread of SARS-Cov-2 and the historical scale with which societies, globally, have responded to it, coincidental with the maturation and proliferation of technologies of the information age, has heightened the public's curiosity and knowledge of how the human body is vulnerable to pathogens and a variety of correlated ailments. I posit that this disease-consciousness and the concomitant reckoning with mortality, amounts to what I introduce as 'covid-angst'. This universal reckoning with the fragility of the human biological constitution has repositioned interest in the transhumanist goal of a human body that can technologically be rendered resistant to disease, and eventually attain immortality. Within the philosophic topography of this transhumanist vision, I alert of the technological advances in biomedical Artificial Intelligence that are geared towards the attainment of this posthuman body. The branching of Artificial Intelligence science from the Internet of Things (IoT) to the Internet of the Body (IoB) as fuelled by covid-angst is enunciated, and the ramifications of this technoscientific advance are normatively reviewed.

Against Myopic Expertise: Epistemic Pluralism in Public Health Policy

LOHSE, Simon (University of Luebeck) and Karim Bschir (University of St. Gallen)

In this talk, we will use the case of the COVID-19 pandemic to contribute to philosophical discussions on evidence-based public health policy. We will address the issue of epistemic pluralism in policy-making through the lens of Paul Feyerabend's philosophy of science and

explore the question to what extent and in what ways evidence-based policy can and should be pluralistic. Our goal is to show that addressing the issue of *insufficient epistemic pluralism* as well as the practical challenges associated with pluralism is essential for improving evidence-based public health policy.

We will begin by discussing key aspects in the public reaction to the policy measures taken during the COVID-19 pandemic in Europe. In particular, we will highlight two main lines of criticism that have been brought forward against the ways in which science has informed and influenced policy-making. We will show that – although this is rarely made explicit in the public debate – both lines of criticism are pointing at a lack of epistemic pluralism. While the first line of criticism highlights a lack of pluralism within science itself (especially epidemiology-centric policy advice), the other line points at a lack of pluralism regarding the involvement of non-scientific perspectives.

In the second part of the talk, we will lay out the core features of Feyerabend's pluralism, which is unique in the sense that it discusses the implications of a pluralistic philosophy of science for questions related to the role of scientific expertise in society and science-based policy making. We will then apply Feyerabend-inspired arguments to the scientifically informed policies that were implemented during the COVID19 pandemic. This will allow not only to highlight the problems associated with a lack of pluralism and the benefits of pluralism in science-based policy, but also to discuss the practical challenges associated with implementing more pluralism in policy-making.

Lessons from Iceland: Experts, Democracy & COVID-19

MAGNÚSSON, Victor Karl (Munich Center for Mathematical Philosophy)

In Iceland, public approval for the government's response to the COVID-19 pandemic is high, especially when it comes to the roles of top scientists and civil servants such as the Chief Epidemiologist or the Director of Health. However, some of the measures taken to achieve lower infection rates, protect the infrastructure of the health system and prevent loss of life have had negative consequences elsewhere. Liberties have been curtailed, unemployment has spiked, and domestic violence increased. How does one evaluate the validity of such difficult trade-offs? A good place to start would be to examine how exactly such decisions were made and justified. In this talk, I will address these issues for the Icelandic case by drawing on research I conducted at the University of Iceland during the summer of 2020. My research group's project, "Philosophical Challenges in Pandemic Times", was funded by the Icelandic Research Council. In-depth interviews were conducted with major players in the response to the COVID-19 pandemic, including the Prime Minister of Iceland, the Minister for Health, the Director of Health, the Chief Epidemiologist and the CEO of the biotech company deCODE Genetics. I will draw on this research in order to explain how decisions were made in response to the COVID-19 pandemic in Iceland. In particular, I will focus on the status of experts in the pandemic response, their relationship with government officials, and the public. After presenting a descriptive analysis of this relationship, I will evaluate it in light of Matthew Bennet's (2020) distinction between epistemic trust and recommendation trust. One of the interesting things about the Icelandic case is that the scientists and civil servants were the ones to deliver news of government measures to the public, instead of elected politicians. Within Bennet's framework – the public was asked to show the *same* group both epistemic trust and recommendation trust. I'll discuss why that seemed to work in Iceland during COVID-19 but also argue that this situation is not desirable outside of a crisis. This relates to interesting philosophical questions about *moral expertise* and why one might favor democracy over technocracy.

If We Do Nothing: Pandemic Models and Lessons on Counterfactuals and Underdeterminism

MERCURI, Mathew (McMaster University/University of Toronto)

Epidemiologists and clinical researchers often rely on counterfactual reasoning when making causal claims about the effect of an intervention or exposure. As one can argue there is never a true counterfactual condition, researchers construct a scenario (e.g. a "control" group) that might approximate what would happen had the intervention or exposure not been present. Ideally, the control group will be defined by the researcher through a procedure that ensures balance with the experimental group on all relevant factors except the intervention or exposure of interest, with random allocation considered the most reliable method. Where this is not possible, researchers will employ other methods in hopes to eliminate as many alternative explanations as possible.

The recent coronavirus pandemic has created several challenges for researchers seeking to estimate the effect of interventions aimed at reducing transmission, caseloads, hospitalization, and deaths from the virus. One particular challenge is a lack of control over setting counterfactual conditions. As a results, several causal claims rely on simulated controls that are constructed through several assumptions related to contacts, transmissibility of the virus, susceptibility of the host, etc., or through assessments of similarity of (primarily) demographics between populations taking different approaches. This paper will examine two cases showing different approaches to construct counterfactual conditions taken by researchers in their effort to determine the effect of "lockdowns" as a method to mitigate transmission of coronavirus. The first case examines the use of mathematical modelling that has become the lynchpin of informing government response. The second is the case of Sweden, where strict lockdowns were not mandated in the same way as in other jurisdiction. I will show how in both cases, researchers did not conform to their own standards in meeting a threshold for making causal claims. I will also highlight how such causal claims appealed to *a priori* assumptions and expectations of the value of lockdowns that relied on reasoning through mechanisms. In other words, the data did not speak for itself - a claim that has often been invoked by governments and scientists when discussing the benefit of lockdown in public forums.

Social Justice as Discursive Frame for the COVID-19 Vaccine in Online News Reports in South Africa (July 2020–March 2021)

MOODLEY, Prevan (University of Johannesburg)

The discovery, manufacture, and availability of a COVID-19 vaccine—as a global bioethical field of competition and imbalance—was expected to foreground social justice as a news topic in countries where the vaccine was not developed or made easily available. 'Vaccine apartheid' was even a used to describe this new global social problem. South Africa—the country most affected by COVID-19 in Africa and which did not manufacture a vaccine—therefore planned phased distribution, leading to debates about social justice and whether different sectors of its population would have access to the (expensive) vaccine that needed to be bought either from countries where it was manufactured, or from Big Pharma in wealthy nations in the industrialized North.

Presupposing social justice as a frame, this study investigated the problem of vaccine availability as portrayed in South African online news reports that were dated from the time of the publishing of the availability of Phase I/II clinical trial data until two months after vaccines arrived in South Africa early in 2021. Using the search terms "COVID", "South Africa", "vaccine", and "social justice", online news reports were sourced from six selected websites available in South Africa. Five sites were national (www.news24.com,

www.timeslive.co.za, www.iol.co.za, www.sowetanlive.co.za, www.citizen.co.za), whereas one (www.aljazeera.com) was of international origin.

Multimodal discourse analysis was used to analyze not just linguistic codes but also images and content in publicly available texts embedded in the reports. This close reading involved two interpretive processes: (1) to identify the actors and (potential) vaccine recipients who were able to construct, define, and contest group prioritization and accessibility; and (2) to identify (related) discourses about vaccine availability. The discursive framings, including those of deservingness, risk, and prioritization, were interpreted within contemporary philosophies of social justice and bioethics.

Pandemic Modelling, Good and Bad

NORTHCOTT, Robert (Birkbeck, University of London)

What kind of epidemiological modelling succeeds, and what kind doesn't? Drawing on recent philosophy of science, I look in detail at two contrasting cases from the Covid pandemic. The first case is the influential model developed by Neil Ferguson and colleagues at Imperial College, London. Its dire predictions – 500,000 deaths in the UK in the absence of policy intervention – are credited with persuading the UK government to impose a national lockdown in March 2020 (a reversal of its previous policy). The Imperial model was carefully calibrated to UK conditions. Yet it suffers from serious epistemic weaknesses, above all lack of any empirical confirmation. No other route to justification works either. I conclude that the model's predictions, including the headline one of 500,000 deaths, carry no weight. The underlying problem is that crucial causal relations are highly contextual, but that the model – because designed to apply across many contexts – is too blunt an instrument to reflect this adequately.

How, then, should modelling be done instead? I illustrate with the paper that first estimated the transmissibility of the so-called British variant, written in December 2020 by Nicholas Davies and colleagues at the London School of Hygiene and Tropical Medicine. This paper's models were much more contextual and empirically constrained, and its results were accordingly much more convincing. Similar positive remarks apply to many other studies, including some with no formal models at all.

There is great heterogeneity across epidemics. It turns out that underlying causal relations are not stable enough for one-size-fits-all models to be useful. A different modelling strategy is required, one that is less ambitious and more patient.

Mental Health during COVID-19: Public Health Measures and Lived Realities

POPA, Elena (Asian University for Women)

This paper investigates mental health in the context of the COVID-19 pandemic from a philosophical perspective. While early in the pandemic worries regarding the deterioration of mental health have been raised, recent research showed that economic hardship or pre-existing vulnerabilities such as a history of mental illness or feeling lonely pose a greater problem than the pandemic itself (McBride et al. 2020; Fancourt et al. 2021; Shevlin et al. 2021; Zavlis et al. 2021). This psychiatric research has implications consistent with broader concerns on science and policy in the context of COVID-19 where the epidemiological perspective has been emphasized at the expense of other sources of evidence (Lohse & Bschir 2020). Furthermore, guidelines regarding mental health during the pandemic by WHO have also been criticized for their focus on individual responses, while leaving out social or economic issues that people may face (Burgess 2020).

Using this background I will argue that the case of mental health during the COVID-19 pandemic shows a gap between public health measures and lived realities which particularly affects the most vulnerable groups. While the context of the pandemic has specific features, the neglect of social and economic factors in mental illness is an older issue in psychiatry (Mills & Fernando 2014). Another issue, yet to be explored in psychiatric research, is that this gap is likely to be wider for contexts outside the Global North. This is due to both the pandemic measures that have largely been modeled on Global North context (Broadbent & Smart 2020) as well as on previous conceptualizations of mental health removed from the local context (Cox & Web 2015). To address this gap, public health policies taking a global scope should pay closer attention to the local conditions and relevant social and economic factors.

Andrew Feenberg and The Distorted Democratization of Technology: Covid-19 and the Case of Hydroxychloroquine

SIKKA, Tina (Newcastle University)

In this talk I examine the contentious Covid therapeutic, hydroxychloroquine, using Andrew Feenberg's theory of technological democratization. I explore whether the use of this experimental medicine is suitable, fit for, or reflective of a process of technological democratization in a manner that is similar to that of HIV/AIDS medicines and trials. In answering this, I draw on Feenberg's technological democratization thesis and extend his conception of care, bodily integrity, and communication in medicine using a reconstructed concept of care as expressed by feminist ethics. My central argument is that technological democratization of Covid-19 treatments and the underlying science has been made extremely difficult because hydroxychloroquine has become emblematic of polarized and polarizing political battles. In doing so, I articulate a model of 'distorted technological democratization' to explain this phenomenon.

Risk in the Time of COVID: Balancing Risk and Lives in the Pursuit of a COVID Vaccine

SMITH, Anthony P. (Snow College, University of Utah)

Developing multiple COVID vaccines in less than twelve months has been an extraordinary feat. The speed with which these vaccines were developed raises questions about the risks that both using and testing includes. However, questions about risk and medical testing are nothing new.

The U.S. Code of Federal Regulations and the Declaration of Helsinki tell us that the risks of medical testing are justified when the risks are reasonable or when the potential benefits outweigh the risks, respectively. Despite the similarities here, these proposals are not identical. Is it enough that the rewards outweigh the risks, or must it be that the risks and rewards of medical research are reasonable? If it is the latter, then what counts as a reasonable balance of risk and potential rewards. If it is the former, then how do we know when the rewards outweigh the risks. Which ever way we are inclined to go, we are left with a puzzle.

COVID vaccine testing provides an interesting test case to probe when, where, and why certain kinds of risks are acceptable. Aggressive testing entails creating risks for test subjects as well as missing potential side effects, including vaccine enhancement, that less aggressive testing scheme might catch. Failing to push a vaccine forward entails increased social distancing, isolation, and the loses to life and well-being that they entail. As such, COVID vaccine testing is risky, lots of potential problems with high potential rewards. What I propose here is that what is reasonable depends on the kinds of risk attitudes we ought to have in these cases. This, then, turns on how we ought to prioritize risk versus rewards to

appropriately set these attitudes. Looking at researching a COVID vaccine helps see how such risks and rewards might be properly managed and prioritized.

Should Equity Be Sacrificed in The Name of Speed in The Rollout of Covid-19 Vaccines?

SMITH, Maxwell J. (Western University)

The twin aims of public health are to promote overall population health and reduce health inequities. It is often not possible to promote these aims simultaneously, which leads to trade-offs. These trade-offs are salient in the distribution of COVID-19 vaccines. As the bioethicist on Ontario's COVID-19 Vaccine Distribution Task Force and member of WHO's Ethics and COVID-19 Working Group, it has been apparent that many have been willing to eschew concerns of inequity and unfairness when confronted with pressures to get "vaccines in arms" as quickly as possible. For example, even with stated commitments to equity, fairness, and allocating vaccines on the basis of risk, many have proposed allocation schemes that proceed strictly on the basis of age despite sometimes similar or greater risks experienced among younger populations who are clinically extremely vulnerable (e.g., patients on dialysis), disadvantaged populations living in congregate living settings (e.g., homeless shelters), and Black, Indigenous, and other racialized populations who have tended to experience a disproportionately greater burden of COVID-19. Others have argued that prioritization itself is antithetical to rapid administration of vaccines, and so should be abandoned altogether.

This paper explores whether it is ethically tolerable to compromise equity and fairness when commitments to these values increase logistical complexity, sow confusion among the public about vaccine rollout, and slow vaccine rollout. My previous scholarship has explored whether, and the extent to which, public health decision-making is, and ought to be, more utilitarian in the context of public health emergencies. Given that the competing aims of speed and equity represent well-trodden debates concerning utilitarianism and fairness, this paper will also use COVID-19 vaccine distribution as a case example to examine whether decision-making in the context of public health emergencies ought to be more utilitarian by prioritizing its aim of reducing overall population-level morbidity and mortality.

Should We Use EBM or EBM+ When Evaluating Evidence for the Effectiveness Of Covid-19 Therapies?

SOLOMON, Miriam (Temple University)

Classic evidence-based medicine (EBM) uses evidence from association studies alone (observational or randomized controlled trials) to assess the effectiveness of a therapeutic intervention. EBM+ (see ebmplus.org) *also* assesses the evidence we have for disease and drug mechanisms in coming to an overall decision about the evidence for the effectiveness of an intervention. EBM+ traces its basic insight to the Russo-Williamson thesis (2007), which argued that we need both evidence of effectiveness and "mechanistic evidence" (= evidence of mechanisms) for knowledge of causality.

Aronson et. al (2020) argue, specifically, that "coronavirus research is best situated within the EBM+ evaluation framework." They argue that because "it may not be possible to carry out large extended trials to test the effects of an intervention," assessing mechanistic evidence is especially important. This makes it sound as though mechanistic evidence can even take the place of some association studies.

I will argue that, over the past year of clinical trials with experimental therapies for Covid-19, the EBM framework has been much more appropriate than the EBM+ framework for assessment of the promise of new therapies. If we look at the rise (and sometimes fall) of

interest in experimental therapies such as hydroxychloroquine, famotidine, remdesivir and other antivirals, corticosteroids, convalescent plasma, and monoclonal antibodies, we find that *all* have been developed and proposed in part because of what we know about their possible mechanisms of action. For example, famotidine, a heartburn drug, was shown *in vitro* to be capable of inhibiting an enzyme necessary for Covid-19 replication. So, there is evidence for how famotidine might work to treat Covid-19. However, such "mechanistic evidence" does not provide evidence for the effectiveness of famotidine. Rather, the effectiveness of famotidine should be investigated in high-quality clinical trials. So far, these trials have not shown famotidine to be effective.

Our understanding of mechanisms is typically gained from *in vitro* and *in vivo* animal studies. These do not model the full complexity of the human organism. There is long experience with many translational failures when going from lab to human. This is why EBM is so important, and why evidence for mechanisms cannot replace or even reduce the need for evidence for effectiveness.

COVID-19 and the Harm Principle: The Case of Mask Wearing

STEEL, Daniel (University of British Columbia)

This presentation considers mask wearing mandates in connection with the Harm Principle (HP), according to which the state may only restrict individual freedom to prevent harm to others. Mask mandates may seem straightforwardly justifiable given HP because they aim to reduce the spread of disease and thereby prevent third party harms. However, HP is ambiguous. Given a *narrow* interpretation, HP asserts that the state can only restrict *x*'s freedom to prevent *x* from harming others. On a *broad* interpretation, HP asserts that the state may only restrict individual freedom to prevent harm to others, where who caused that harm is immaterial. Both interpretations of HP prohibit state paternalism, but the narrow interpretation also prohibits state sponsored restrictions of individual freedom to achieve social benefits. I argue that the broad HP can support mask mandates, while the narrow HP cannot. That is because an unmasked person without COVID-19 poses no infection risk to others. Thus, the narrow HP could only justify mask mandates for people who have COVID-19, not mandates that apply generally. Yet it is impossible to know at every moment who is infected and who is not. Thus, only mask mandates that restrict the freedom of some individuals who pose no threat to others are feasible and effective. These observations suggest that the narrow HP is unsuitable as a basis of public health ethics, a result that is of interest as some appear to suggest the narrow HP as a foundational principle in this context (Upshur 2002). Furthermore, I suggest that both interpretations of HP are problematic because they fail to elucidate trade-offs among freedoms, such as the freedom not to wear a mask versus freedom from the risk of contracting COVID-19. I suggest Rawls' (1973) equal liberty principle as superior option for liberals in this context.

Epistemology and Modelling

STREICHER, Piet (University of Johannesburg)

Humans describe things we don't know by referring to things we know. This is referred to as an analogy. We identify patterns in things and then describe these patterns by referring to similar patterns in things we know well. Analogies offer a partial explanation and always break down at some point. Analogies serve as models for reality.

When it comes to things we cannot see such as protons, electrons and atoms, we understand these things exclusively via analogies and models. Today we cannot imagine doing chemistry without the periodic table and the diagrams of electrons orbiting protons and neutrons. These models allow us to understand the relationships between these building blocks of all matter.

Similarly, religious language is full of analogies. There is always a danger that a specific analogy is reified (objectified) to such an extent that people start living inside the model and then lose touch with reality. The scientific world is not immune to this risk. It is critical that we understand the limitations of models and not rely exclusively on a single model. The use of "sanity checks" are necessary to check whether the answer provided by a complex model can possibly be true.

In this paper, the limitations of the SIR model will be discussed. These include the model assumptions such as binary susceptibility, binary infectiousness and pan-mixing. In the real world, both susceptibility and infectiousness lies along a broad spectrum. A number of "sanity checks" for the SIR model are proposed.

The primary purpose of a model should be to represent reality. It should not be used as a tool to manage the behaviour of people. To ensure trust in scientific models, models should be presented in parallel with actual measurements on a regular basis. This will guard against extreme forms of the cautionary principle.

A Possible Framework for Uncovering the Ethical Framing of Public Health Policies,

VECCHI, Davide (Centro de Filosofia das Ciências, Departamento de História e Filosofia das Ciências, Faculdade de Ciências, Universidade de Lisboa) and Giorgio Airoldi (Department of Logic, History and Philosophy of Science, UNED, Madrid)

In our opinion, one pivotal lesson stemming from the current pandemic crisis concerns the need for a more transparent public debate regarding the ethical framing of public health policies in the light of a limited but constantly growing evidential basis. This relative epistemic ignorance has necessarily transpired to the political and societal debate: as a consequence, the crucial trade-off between the costs and benefits of non-pharmaceutical interventions on public health, the economy, society and democracy has been mostly addressed in a fragmented fashion, often leading to governments' decisions that appear idiosyncratic or even erratic to citizens. In this talk, we illustrate an analytic framework tailored to clarify the ethical rationale of the various public health strategies for epidemics management. First, we classify the possible public health targets (e.g., eradication, effective management) in terms of infection rate R. Secondly, we show how different strategies (e.g. local suppression, containment, mitigation) might, individually or in combination, achieve these targets. We shall focus on population-immunity strategies and characterise, in particular, the so-called "herd-immunity" variant. In this context, we shall frame the immunity debate by discussing the mismatch between the original conception of herd immunity and its contemporary version, by suggesting how population immunity can be pursued through a calibrated and evolving mix of pharmaceutical and non-pharmaceutical interventions (e.g., vaccination, natural exposure of the population to infection, targeted non-pharmaceutical interventions) and, finally, by identifying the possible ethical rationale of herd-immunity strategies. We shall argue that the proposed analytic framework has the potential to partially clarify the ethical framing of public health policies and, as a consequence, to facilitate the terms of the public debate in the context of health emergencies.

Reasonable Precautions? Exploring the Complexity of Duties to Avoid Causing Harm in a Pandemic

WEST-ORAM, Peter (Brighton and Sussex Medical School)

While there is disagreement about the precise nature of our obligations to other people, a duty to avoid causing harm to others may seem, prima facie, relatively straightforward and uncontroversial. However, throughout the COVID-19 pandemic there has been extensive opposition to requirements and recommendations to engage in behaviours, such as mask

wearing and social distancing, intended to limit the spread of infection. Such restrictions, it has been argued, impose excessive constraints on personal freedom, cause significant economic damage, and lead to other serious health problems, such as anxiety and depression. The duty to avoid causing harm to others is not therefore, as simple as may initially be thought, both because the existence and importance of such a duty may be questioned, and because choosing policies which minimise certain harms may lead to the imposition of others. The complexity of these questions is exacerbated further by the range of ways in which "avoiding causing harm" may be interpreted. On the surface, a duty to avoid causing harm might be seen to require only that we refrain from actively vicious or violent acts. However, the COVID-19 pandemic has highlighted the fact that harm can be inflicted on other persons unknowingly, merely by being in the same room as them while infectious. In this paper, I examine the complexity of the duty to avoid causing harm to others with reference to Henry Shue's tripartite model of duties. In doing so, I argue that the obligation to avoid causing harm is complex and demanding, and that failures to fulfil it by actively mitigating the risks we pose to other people can lead to further significant harms, as well as additional duties which may be virtually impossible to fulfil.

When is Lockdown Justified?

WHITE, Lucie, Mathias Frisch, and Philippe van Basshuysen (Leibniz University Hannover)

The decision of many governments worldwide to institute stringent restrictions on their respective populaces at the outset of the COVID-19 pandemic, when available evidence concerning the harms and benefits of these policies was highly uncertain, has been subject to scrutiny on several fronts. We will return to the situation in which we found ourselves in March 2020, in an attempt to sketch the conditions under which the implementation of "lockdowns" might be justifiable, particularly on the basis of highly uncertain evidence. We aim to address three questions. First, **how much evidence do we need** to restrict constituents' freedom in this way? Here, we will draw from work in "emergency ethics" to suggest that the normal epistemic and ethical standards to which policy-makers must be held in a liberal democracy do not straightforwardly apply in emergency situations. We will suggest that the situation in March 2020, in virtue of meeting the criteria of potential significant *harm* and *urgency*, qualified as an emergency situation in this sense. We will then address the question: **what kind of evidence did we have** – looking particularly at the evidence provided by much-criticized mathematical models (such as the model from the Imperial College London, which had a significant effect on policy responses to the pandemic in the UK and US). We will suggest that models of this sort can be important pieces of evidence, even when they can't provide us with precise predictions. Finally, we ask: **was this evidence sufficient**? Focusing on the UK, we will review the evidence available at the time and make a case that it sufficed to justify the implemented restrictions under the emergency circumstances of a pandemic. We hope that these preliminary considerations will enable us to begin thinking about the general conditions under which such extreme policies can be justified.

How to Think About the Immune System in Times of Covid-19 and Beyond: Why Stronger Isn't Always Better and Other Misleading Metaphors

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In light of the worldwide pandemic crisis, both the wider public as well as researchers from other domains are operating with immunological terms and concepts which are also the scholarly focus of philosophy of immunology (Pradeu 2020; Swiatczak and Tauber 2020). |

We propose to think of the immune system in terms of three key features: contextuality, regulation and trade-offs.

Contextuality concerns both the compartmental nature of the immune system and its environment at large including microorganisms, many of which are pathogenic only under certain circumstances.

Regulation pertains to the fact that (feedback) mechanisms ensure that the immune response is neither too vigorous, nor too permissive, but just right for the given task. Dysregulation is often at the heart of pathology, including in COVID-19.
Given the sheer complexity of the immune system, trade-offs are to be expected: e.g. a specific HLA allele confers resistance against certain pathogens but leaves the host susceptible to another, or in risk of developing an autoimmune disease.

Unfortunately, the discourse on the immune system is often riddled with metaphors that give rise to intuitions that are, to a large extent, misguided. The idea that one's immune system is somewhere on the continuum between weak and strong is a misconception. It is based on the assumption that the immune system is primarily a defense mechanism against anything foreign or harmful which does not take into account a variety of other processes in which the immune system is involved. This neglects the fact that the immune response which is optimal for an organism under certain conditions is something very specific, context-dependent, and heavily regulated by (feedback) mechanisms. Neglecting the three key features noted above contributes to missing on the fundamental principles of the immune system and gives rise to misleading metaphors which abound in immunology. Instead, we show that often the immune system works counterintuitively.