

**The global AI ethics of COVID-19 recovery:
Narrative review and Personalist Social Contract
ethical analysis of AI-driven optimization of public
health effectiveness and social equities**

**La ética global de la IA en la recuperación del
COVID-19: revisión narrativa y análisis ético del
Contrato Social Personalista de la optimización
de la eficacia de la salud pública y la equidad
social impulsada por la IA**

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<https://doi.org/10.36105/mye.2022v33n2.02>

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Reception: October 15, 2021. Acceptance: December 07, 2021.

Abstract

COVID-19 continues to exact not only a devastating cost both clinically and financially on the global human community, but it also illuminates the structural social inequities and technical ineffectiveness in governments and health systems globally still struggling to respond and recover from this historic crisis. This manuscript seeks to provide the first narrative review-informed ethical analysis of artificial intelligence (AI) countermeasures with the realistic potential to accelerate and force-multiply the countermeasures for improved pre-, intra-, and post-pandemic management optimizing public health outcomes without sacrificing social equity. By beginning with the human person in the metaphysically and anthropologically grounded ethical system of the Personalist Social Contract in a style that is concise and accessible, this manuscript therefore seeks for a broad audience to unite science and ethics, developed and developing nations, market and non-market based economies, and religiously affiliated and non-affiliated belief systems in the shared vision of a healthier and fairer future for every patient and population.

Keywords: AI ethics, COVID-19, health equities, global bioethics, pluralism.

1. Clinical, cost and inequity toll of COVID-19

The COVID-19 pandemic caused by SARS-CoV2 alarmingly spread to over 77.2 million people globally and claimed the lives of nearly 1.7 million people by December 21, 2020 (1), while costing \$28 trillion globally in lost output over the subsequent 5 years (2). COVID transmission has continued to surge despite even extreme measures in the first pandemic months including lockdowns affecting up to 90% of the global population, which the United Nations (UN) World Economic Situation and Prospects mid-2020 report high-

lighted as primarily driving the initial year \$8.5 trillion cost and 10 year extreme poverty growth by 164.3 million people or double the current COVID case totals (3, 4).

The pandemic's growing socioeconomic and racial disparities are increasingly clear. The World Bank has identified COVID-19 restrictions as a major contributor in the current inflicting disproportionate clinical and financial harm on the principally non-White low and middle income nations (5). Even in high income nations like the United States (US), COVID-19 restrictions and related lockdowns may cause significantly greater morbidity and mortality on racial minorities including Black and Hispanic versus White populations amid societal structural inequities (6). Such disparities include only 37% of US jobs are able to be done completely online and usually are higher-paying positions (7) filled by White workers, leaving non-White workers amid lockdowns to face greater likelihoods of losing jobs, health insurance, housing and food security, and their social networks (8).

Though COVID survival rates may exceed 99.7% (based on global median corrected COVID-19 infection fatality rate based detailed by the World Health Organization Bulletin) (9), the current lack of effective therapeutic-based pharmaceutical interventions for hospitalized COVID-19 cases as of December 2020 (10) (aside from the less than 3% absolute risk reduction with dexamethasone, of which lower income health systems and nations have greater difficulty in stably securing sufficient doses) (11) places urgent importance on effective public health countermeasures –both preventive pharmaceutical and non-pharmaceutical interventions– for harm mitigation in COVID-19 and related future pandemics.

This paper briefly reviews how the limited medical and public health pandemic countermeasures may be accelerated by artificial intelligence (AI) paired with adequate ethical guidelines, effective and respectful of our pluralistic globalized world, to save lives and societal equity.

2. Limited public health countermeasures for COVID-19

Amid the early pandemic uncertainty and rising death rate, over 90 nations imposed lockdowns affecting nearly 4 billion people or half the global population by March 2020 (12). The stated hope supporting the above was that the improved technology and communication internationally could overturn the last century of broadly accepted public health principles advising against indiscriminate lockdowns which have demonstrated no historical success supporting the net benefit of such aggressive countermeasures, including the RAND study authorized by the United States Department of Health and Human Services under President Obama for the biologically related pandemic influenza (13) and for COVID-19 per the recent WHO assessment (14). Since the early days of the virus, there is further growing worldwide caution regarding justification for lockdowns as the most dominant non-pharmaceutical countermeasures to the point that the WHO recommended more «targeted interventions» (15). Recent American Medical Association and John Hopkins University-supported debates featured advocates for a global return to the historic standard of focused protections for pandemic responsiveness, which would promote respect for the autonomy of the majority of the global population to continue their lives without lockdowns (thus continuing the needed economic and resource production for the following) concurrent with particular precautions for higher risk elderly and immunocompromised populations including reduced contact, improved sanitation, and early vaccination when available (16, 17).

The improved technical effectiveness and authorization streamlining of the global medical community has made early vaccination more feasible as the US Food and Drug Administration (FDA) issued Emergency Use Authorizations (EUAs) for two COVID-19 vaccines (Pfizer and Moderna) following two phase 3 multi-center randomized placebo-controlled trials together including 65,793 hu-

man subjects in the same year COVID-19 became a pandemic (18, 19). Both vaccines had their designs identified two months before it was even declared a pandemic, including Moderna which completed its final vaccine design two days after the virus' sequenced genome was released online and three weeks before the first COVID lockdown in China's Wuhan region (20, 21). This process was in parallel with multiple vaccines in various stages of development, authorization, and production globally including with the United Kingdom, Russia, and China. India's Serum Institute, which produced nearly 2 billion vaccines annually pre- COVID-19, in early 2021 began producing AstraZeneca COVID-19 immunizations for richer Western nations after it exceeded its quota for developed nations amid India's decades-long dominance in cost and time efficient massive scale inoculation production to the point of producing already half of the world's vaccines; this dominance was leveraged in March 2021 as the richer nations of the United States, Japan, and Australia committed nearly \$200 million to boost global COVID-19 vaccines to one billion including for developing nations (22). This historic level of safety, efficacy, and speed from development to production to post-authorization distribution for these vaccines according to the above studies prompt the question if more prompt roll-out of these vaccines through streamlined population-level studies earlier on in this and future pandemics can produce greater net benefit for patients and nations compared to lockdowns and related measures. Drawing on this growing optimism, the 2021 Summit for the Group of Seven (G7), or the planet's largest advanced economies, signed the Carbis Bay Health Declaration which replaced lockdowns as the main pandemic countermeasure in favor of accelerated vaccine development, approval, production, and distribution. Though despite the above optimism for immunization, it should be noted that traditional global resistance and access disparities create technical and cultural challenges to widespread inoculation, fueled by both scientific and philoso-

phical barriers (23). Artificial intelligence (AI) thus has been proposed as a unique tool to slice through the above gridlock in effective and equitable COVID-19 responses locally and internationally to enhance the net benefit of these countermeasures.

3. Current and future promise of pandemic AI

AI may be uniquely suited to helping solve this global crisis and above related challenges through the science and ethics to unite diverse stakeholders and belief systems in effective and equitable shared action according to three main considerations, which are both locally personalized and culturally sensitive: a) pandemic prevention; b) countermeasure application, and c) political cooperation.

a) AI pandemic prevention

History and public health make clear that a pandemic is best beaten if it can be prevented. And AI has already demonstrated its historical novel role in doing just that in real-time. Nine days before the World Health Organization (WHO) even produced the first warning of what would become the pandemic-potential COVID-19 emergence, the Canadian analytics firm, BlueDot, used their real-time AI platform (which continuously analyzes global news, social media, and other various sources) to warn their clients of a Chinese flu-like pneumonia outbreak (later discovered to be SARS-CoV2) and subsequently published the world's first known scientific paper on COVID-19 by accurately predicting international spread critical to its eventual pandemic development (24). Subsequent AI work in machine learning (ML) has demonstrated that accurate real-time prediction of pandemic development may be possible to guide more informed public policy by accurately understanding the precise patterns of endemic to epidemic to pandemic spread and thus allow more rapid and targeted global response to prevent such fu-

ture pandemics or at least adequately prepare populations to sufficiently deal with their arrival (25).

b) AI countermeasure application

With COVID raging across 2020 national borders, the University of Oxford's RECOVERY trial with its unique adaptive platform trial design broke through a decades-long scientific deadlock by demonstrating that rigorous and reliable randomized results can be quickly generated and integrated immediately back into clinical practice to save more lives in real-time (rather than the traditional years-long waiting periods for such trials to produce often failed results) (10). AI is analytically what such pioneering trial designs are methodologically –AI allows much more rapid–, generalizable, and personalizable results than traditional statistics and analytics particularly in COVID drug and vaccine development (26). AI even pre-COVID has shown increasing promise and concrete results accelerating treatment development by rapidly running large simulated studies using real and diverse patient data to quickly identify the most promising interventions to be subsequently confirmed in clinical trials (27). AI may therefore uniquely boost population confidence in effective vaccines such as with the above Pfizer and Moderna products by providing pre-trial proof-of-concept for both safety and efficacy to thus allow historically swift population-level platform trials to quickly reduce the catastrophic clinical and cost toll of such pandemics.

c) AI political cooperation

AI by its nature belongs to no nation. As the most decentralized and democratic technology humanity has ever known, it provides novel means to accelerate global political and local convergence on the pandemic prevention, clinical, and public health countermeasures to effectively and equitably reduce the inevitable return of fu-

ture pandemics. This nuanced scientific element of AI lends itself therefore to a similarly monumentally significant ethical aspect –it can unite diverse peoples in a shared end for the benefit of the person and populations simultaneously. In our world more often divided rather than united by pharmaceutical companies versus payors, democratic versus communistic political states, capitalistic versus socialist economies, religiously affiliated versus non-affiliated belief systems, metaphysically based classical versus non-metaphysically based modern ethics, AI can exponentiate the best (and worst) in humanity through the actions of the many (and the few). Yet while the worst atrocities in our shared history typically are perpetrated by the powerful few, AI allows a decentralized power in global politics to maximize the hope and promise of the many to tilt the scales of our global human family in favor of protecting the common good and the individual person's good without choosing one over the other. Without finding common philosophical ground, there can be no shared political response to such pandemics which defy national and local political divisions. The further technical necessity of effective and accurate AI, namely real-time large-scale data, require often global coordination and collaboration among diverse stakeholders with various cultures and belief systems which AI facilitates convergence and streamlining to deliver on the needed AI deliverables. It is a science whose realization requires philosophical unification.

Thus AI uniquely may bolster not only the shared scientific convergence as noted above but also ethical convergence by accelerating shared values and subsequent practical guidelines and best practices. Nearly every state globally is united in the largest political organization in human history, the UN, which explicitly is rooted in the philosophical foundation of human dignity with resultant rights and duties as articulated in the 1948 *UN Declaration of Human Rights* (UDHR) (28). This metaphysically grounded natural law-based ethical system formally defined by Monlezun *et al.* (29, 30, 31), as the Personalist Social Contract (PSC) serves as the basis of

the human rights-based international law system assented by the near entire world through the UN. And practically, the PSC is the only known global bioethical model that facilitates convergence of the world's diverse belief systems (both religiously unaffiliated including the predominant religiously non-affiliated modern secular liberalism and religiously affiliated, including in alphabetical order, Buddhism, Christianity, Confucianism, Daoism, Hinduism, Islam, Judaism, and folk religions) with which over 99% of people identify globally (32). This is in contrast to the Kantian and related post-European Enlightenment-based modern ethical systems that practically exclude 84% of the world's population largely due to the more populous religiously affiliated systems prioritizing metaphysical primary principles (i.e., the divine origin of being including human beings which thus cannot be subordinate to the constructs of modern ethical systems such as the Kantian categorical imperatives, utilitarianism's utility principle, or the Rawlsian social contract as the ultimate ethical standards and arbiters of disagreements among peoples and belief systems) (29). Rather, the PSC empowers a robust convergence by superseding the distinction of religious and non-religious, drawing on the pluralistic strengths of modern philosophy (such as with the Rawlsian social contract attempting to defend a political conception of justice uniting even secular belief systems without metaphysical assumptions), and integrates these strengths with those of classical philosophy (such as with a Thomistic-Aristotelian metaphysics allowing a more substantive and thus sustainable pluralistic convergence through a transcendent defense of the reality of the human person not only universal across all peoples but also intrinsic to diverse belief systems, while still accounting for the unique lived experience of each person). The PSC attempts to accomplish the above while still providing clear ethical guidance in concrete situations that sufficiently consider the socio-cultural and political economic context in which such situations occur (28, 29, 30, 31). The vast majority of the world's nations through their UN membership already politically commit them-

selves at least in theory to human rights flowing from intrinsic dignity (including their detailing and defense in the UDHR) as the real, metaphysically grounded ethical foundation their diverse politics and philosophies can agree for reasons inherent in their own systems –the PSC simply proposes the philosophical detail (metaphysically and ethically) of what its explicit and implicit philosophical foundation is–.

In brief, the PSC features robust metaphysical justification, anthropological consistency, multicultural sensitivity, pluralistic convergence, political embeddedness, economic pragmatism, and ethical clarity in its summary *theoretical principles*. These principles in hierarchical order include: fundamental respect for the dignity of each human person solely because of their existence as human persons; personhood and thus respect for dignity existing independent of any traits often used throughout history as supposed qualifications to assert varying degrees of respect (such as on the basis of age, race, sex, nationality, etc.); dignity is orientated toward the end or purpose of each person and peoples of human flourishing through love (as commitment of the will to the good of other persons solely because they are persons). This flourishing is the good of each person which in the context of the community is the common good. And from respect for each person's dignity follows respect for each culture in its unique concrete historical and geographic context to pursue this end.

These theoretical principles are expressed in the *practical principles* of solidarity (in which each person within a community [i.e., local organization, city, nation, etc.] is due to respect the rights of each person required for the person's flourishing) and subsidiarity (in which solidarity requires respect for persons at the most local level possible to order, organize, and coordinate their actions for the individual and common good).

The *ethical principle* expressing the above is the Personalist Norm (translating through the classical Thomism and specifically its mo-

dern Thomistic personalism [and even personalism in general] the modern Kantian categorical imperative):

This norm, in its negative aspect, states that the person is the kind of good which does not admit of use and cannot be treated as an object of use and as such the means to an end. In its positive form the personalistic norm confirms this: the person is a good towards which the only proper and adequate attitude is love (page 41) (33).

The above PSC with philosophical substance and political efficacy provides a common affirmation for and is anchored by the core ethical principles of the global human family's primary belief systems:

– Buddhism (*sila* or virtue articulating the principles of equality among all living beings and reciprocity expressing a similar Golden Rule to Christianity and Judaism above) (34).

– Christianity (God as the Creator making every person in His Image, and as the Supreme Good's incarnation as Jesus Christ endowing every person with infinite dignity and thus rights) (35).

– Confucianism (*jen* or humaneness and *yi* or justice supporting respect for others) (36).

– Daoism (living in harmony with the normative natural *dao* or way ordering and respecting the diverse human *daos* of each person's individual path) (37).

– Hinduism (*dharma* or ethics normatively ordering all other human goals by integrating both consequentialist and deontological ethics to advance the good of others) (38).

– Islam (the *Shariah*-specified human rights fellow human beings can expect from one another) (39).

– Judaism (similar to the above Christian concept of the Divine Image as the derivative Leviticus chapter 19-specified Golden Rule or 'love your neighbor as yourself') (40).

– Religiously unaffiliated (articulated by the Rawlsian justice as fairness) (41).

The PSC does not equate or reduce such principles or their derivative belief systems (such as in a type of ethical relativism which is philosophically problematic at best and indefensible at worst due to its inherent logical fallacy of objectively asserting there are no objective ethical systems), but rather attempts to show the extent of their agreement (28, 29, 30). Far from being abstract principles excessively distant from lived reality, the PSC articulates what and how its principles can thus be flexibly applied across various concrete situations while still being clear in the specific applications, as suggested by the following section.

Rather than an excessively superficial though popular Rawlsian «overlapping consensus» of pluralistic belief systems, the PSC can provide a robust «converging consensus» as a sustainable philosophical foundation for an effective and equitable political framework globally to respond to COVID-19. AI-supported PSC thus allows a global ethical framework to expedite the AI-accelerated scientific solutions for COVID. AI has grown increasingly central to the above as the global community through and with the UN increasingly operationalize human rights development through this new analytic approach (42). Through the common foundational philosophical concept of the human person transcending biology and politics, such resultant ethics for reasons latent in diverse belief systems and cultures can speak ‘from within’ to join a global voice accelerated through AI to search scientifically and ethically for shared solutions to such shared challenges as COVID-19.

4. PSC ethical analysis of COVID-19 recovery

Since we have covered a common scientific and ethical methodology, let us now analyze COVID-19 countermeasures to facilitate as effective and equitable recovery as possible. Considering the above PSC principles supported by broad support from the world’s diverse belief systems, we can argue for the real and foundational need

to respect personal and population dignity and pluralism and thus the resultant human rights proportional to their needs in solidarity with the global human family. Scientifically, there is robust evidence supporting the unique cost and time efficient role AI can play accelerating the research to practice pipeline identifying, testing, and applying effective and safe public health and medical countermeasures for COVID-19 (and by extension, future pandemics). There is growing evidence further for the superior role AI may play doing so relative to more traditional analytic methods. Thus, states and health systems' optimal ethical response to COVID-19 is to where possible apply AI to the following countermeasures:

- 1) Global transparent coordination of shared de-identified health data only in so far as required to inform early detection of emerging pandemic-risk illnesses to guide targeted and temporary local quarantine.

- 2) Robust simulated trials of possibly effective public health and medical countermeasures to emerging and current pandemics;

- 3) Platform study designs which rapidly identify and confirm comparative cost and health effectiveness relative to competing measures particularly based on promising candidates identified in (2) above.

- 4) Globally expedited, transparent, and coordinated private-public funding, authorization, and distribution of vaccines particularly mRNA as with the Moderna and Pfizer.

- 5) Targeted interventions for vulnerable groups including early population vaccinations prioritized over indiscriminate population lockdowns.

- 5) Transparent global data sharing building on the data infrastructure in (1) above to guide real-time refinement of public health and medical protocols for governments and health systems and related organizations particularly to ensure that resources are prioritized according to level of vulnerability and needs.

Such de-identified data infrastructure of note should include not just medical and public health outcomes (such as infected ca-

ses, mortality, and medical and hospital costs), but also economic data including production, supply-chain, and distribution barriers which can not only be harmed by a patchwork of conflicting COVID-19 health policies at the regional, state, and international level but also can in turn harm COVID-19 countermeasures (i.e., the economic productivity to afford the above and the global distribution of vaccines to poorer nations due to conflicting quarantine and vaccine policies imposed on factories, seafarers, port workers, and ground transportation workers).

Scientifically in the above cases, these research and operational developments can produce accelerated but still trusted results. Ethically, they respect human dignity and thus each person's rights of «life, liberty and security of person» (UDHR, Article 3), to «share in scientific advancement and its benefits» (Article 27), and have «equal access» to these advancements as a «public service» (Article 21), being good ethics and thus true justice requires the above since «all human beings are born free and equal in dignity and rights» (Article 1) (28).

5. Conclusion

COVID-19 not only revealed the devastating destruction of a deadly global pandemic in both clinical and financial terms, but also the structural inequities that accelerate the above that disproportionately leaves the world's most vulnerable peoples to shoulder their greater share of its burden. Yet COVID-19 also manifest a historic opportunity for the global human family to unite science and ethics through the emerging tools of AI and such global ethics as the PSC to recognize our common humanity and capacity to deploy such sophisticated tools *humanely* for the benefit of each person. The AI already has demonstrated its novel utility being able to predict and model (thus suggesting it can even help prevent) pandemics through better inter-nation and inter-community communication

and coordination, while developing faster, cheaper, and more efficacious medical and public health countermeasures to respond with its inevitable consequences.

Yet like any technology, AI can be a weapon or a tool. It can amplify the best in humanity, or the worst. Its very development and deployment require coordination among diverse stakeholders and communities, thus lending itself naturally to what the PSC can articulate and defend as a naturally knowable and shared understanding of what makes an AI application just and ethical. And this ethics system can unify the world's richly different belief systems to inform, nourish, correct, and optimize such a technical roll out to help ensure it is effective and equitable. Such an ethical system already is operating in the world's political systems through the UN, international law, and states' varied legal systems as reflective of their underlying cultures and ethics (which can still find converging consensus which the PSC can uniquely identify, strengthen, and clarify in its concrete application and technical details).

Yet this review begs the question of how can the above actually happen? How do we go from theory to practice? From academics and government papers to real progress? Additional collaboration of diverse disciplines, stakeholders, and belief systems is required to advance this topic, which is evidently manifest in COVID-19 but is not restricted to it, as additional global and local challenges inevitably will continue coming. Yet when we actively rather than reactively engage seriously with AI and global ethics, is it possible for us to together glimpse a future more humane? A future we face through the unique individuality of each person, united in a global family that leaves no one orphan.

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