UNIVERSITY OF JOHANNESBURG

INSTITUTE FOR THE FUTURE OF KNOWLEDGE

2020

ANNUAL REPORT

HIGHLIGHTS

- 14,42 research output units from 29 articles
- Letter in *The Lancet:* 'Lockdown is not egalitarian: the costs fall on the global poor'
- Report: *A Framework for Decisions in a Post-COVID World*
- Documentary: *COVID on the Breadline*
- 22 opinion pieces
- IFK Team members Broadbent and Smart were respectively 1st and 3rd most read authors at UJ on *The Conversation* with 473,181 and 429,612 reads respectively

Note from the Director

2020 was the first year of operation for the Institute for the Future of Knowledge (IFK). This was not an easy year in which to open a new institute. Yet the events that shook the world spoke to the reasons for establishing the IFK. 2020 highlighted the mismatch between our accumulating knowledge and our persistent failure to be ready for future events, even when they are not only predictable, but predicted. The IFK found itself internationally prominent for asking whether the consequences of measures designed in the Global North would be fair and effective in Africa. In between these moments of exposure, we reflected on how to refine our broad mandate. This led to the Vision and Mission in this Report, and to the formulation of five research groups, around which the work if the IFK has coalesced. A Team came together and began assembling a network of Research Associates. Between us, we submitted over 14 research output units from 29 articles, published 3 book chapters, an encyclopedia entry, 22 op-eds, and a letter in *The Lancet*, produced a report of our own and worked with the UN on another, collaborated on a documentary, and made 13 external presentations. But perhaps even more important is the unseen work: the foundations laid for the future. These are strong, and by building on them, the IFK will—I predict—become the global authority on conceptually rigorous, contextually grounded and equitably implemented knowledge about, for and in the future.

Alex Broadbent

Director, UJ Institute for the Future of Knowledge

About the IFK

What is the IFK?

The Institute for the Future of Knowledge (IFK) is a cross-disciplinary ecosystem at the University of Johannesburg, devoted to understanding the relationship between what we know and what will happen, for the purpose of improving both. The future is an ancient concern. Recent advances in computational abilities promise improved predictive performance, yet global events have proven to be resiliently unpredictable. The University of Johannesburg established the IFK to further its championing of a future-oriented focus for South Africa and the wider region.

The Institute's strategy makes virtues of the region's vices, capitalising on the acute local awareness of the need for social change, arising from obvious inequalities, through local and international partnerships. The IFK focuses on five themes, each championed by a research group: Data Science *Across* Disciplines, The Future of Health, Green Futures, The Future of Diplomacy, and Metaphysics and Machines.

Mission

To understand the relationship between knowledge and the future, for the purpose of improving both.

Vision

To be the global authority on conceptually rigorous, contextually grounded and equitably implemented knowledge about, for and in the future.

Research Groups

The IFK conceptualises its activities around research groups. In 2020 the following five were founded.

Data Science *Across* Disciplines (DSAD)

Director: Professor Charis Harley (Engineering)

Data Science *Across* Disciplines takes an interdisciplinary approach to both the application of data science and the sense-making theoretical frameworks that shape its development. DSAD supports the educational and intellectual growth of the field of data science by developing specialist educational programmes at the postgraduate level, to support student skills development and upskill current professionals. The DSAD's cutting edge research is allied with close industry collaboration.

The Future of Health (FoH)

Director: Professor Benjamin Smart (Philosophy)

The Future of Health Research Group takes an interdisciplinary approach to understanding humanity's efforts to improve health and deal with sickness, in the conviction that gaining perspective will improve future medical and public health efforts. The group's broad mandate includes philosophical, sociological,

anthropological, and other disciplinary approaches, and covers clinical medicine, public health, epidemiology, biomedical research, and other health knowledges.

The Future of Diplomacy (FoD)
Director: Dr Oluwaseun Tella (Politics and International Relations)

The Future of Diplomacy research group seeks to promote the understanding of diplomacy, negotiation and statecraft in contemporary international politics. The group aims to support research in modern diplomatic practice by redefining diplomacy in contemporary and futuristic contexts in an increasingly complex and globalised world.

Green Futures (GF)
Director: Professor Brett Bennett (History)

Green Futures seeks to positively understand, appreciate and harness earth's plant life and the socio-ecosystems they interact with for the betterment of humanity and nature. Green Futures draws on a range of disciplines, not limited to science, and has a strong grounding in culture, history, and policy.

Metaphysics and Machines (MnM)
Director: Professor Alex Broadbent (Philosophy)

Artificial intelligence is altering how we understand the world. The Metaphysics and Machines Research Group explores the implications, including how the approach of developing machine learning solutions changes or deviates from traditional scientific methodologies, whether such new approaches can help develop new or alternative conceptual frameworks, whether machine learning can improve our grasp of complexity, and what we can learn about the relationship between prediction, explanation and causation.

People

Director
Alex Broadbent PhD is founding Director of the Institute for the Future of Knowledge, Professor of Philosophy, and Associate Member of the African Centre for Epistemology and Philosophy of Science at the University of Johannesburg. His research is in the philosophy of epidemiology, medicine, and causation, and he is Editor in Chief of the journal *Philosophy of Medicine*. Outside university life, he engages in consultancy, advocacy and policy work related to public health and uses of science in legal contexts, and writes opinion pieces on topics such as the fourth industrial revolution and public health issues. He is an Associate Member of the Centre for Humanities Engaging Science and Society at Durham University and of Millennium Chambers, The Barrister Network, London.

Team

Charis Harley PhD is Director of the Data Science Across Disciplines Research Group and Professor in the Faculty of Engineering and the Built Environment at UJ. She is an accomplished researcher in the field of computational mathematics with over 30 articles, experience at a range of elite universities, and multiple research grants. She also has experience in industry as an analyst and quantitative analyst, with practise in data analysis ranging from the use of filters; Auto-Correlation; Principal Component Analysis; Exploratory Data Analysis, to the use of more advanced methods of data analytics.

Oluwaseun Tella PhD is Director of the Future of Diplomacy Research Group at the IFK. He is a specialist on soft power, diplomacy, and migration. He has published over 25 articles and his forthcoming monograph, which will be published by Routledge, is titled *Africa's Soft Power: Philosophies, Political Values, Foreign Policies and Cultural Exports*. He has also edited three books entitled *Nigeria-South Africa Relations and Regional Hegemonic Competence* (Springer, 2019), *From Ivory Towers to Ebony Towers: Transforming Humanities Curricula in South Africa, Africa and African-American Studies* (Jacana, 2020), and A Sleeping Giant? Nigeria's Domestic and International Politics in the Twenty-First Century (Springer, 2021).

Brett Bennett PhD is Director of the Green Futures Research Group and Associate Professor of History at the University of Johannesburg and University of Western Sydney. His research uses historical methods to investigate how the interaction of human actions and natural processes created contemporary ecosystems, scientific ideas, and conservation policies. He is the author of *Plantations and protected areas: a global history of forest management* (MIT Press, 2015), co-author with Frederick J. Kruger of *Forestry and water conservation in South Africa: history, science, policy* (ANU Press, 2015), and co-author with Gregory Barton on the book *Saving the world the first time: ideas of climate change before global warming,* under contract with Reaktion Press. He works with historians, geographers, ecologists, heritage experts and local communities to explore the legacy and meanings of human-plant, human-animal, and human-climate relations.

Benjamin Smart PhD is Director of the Future of Health Research Group, Associate Professor of Philosophy and Associate Member of the African Centre for Epistemology and Philosophy of Science. He is Y1 rated by the NRF. Smart's research focuses on the philosophy of medicine, epidemiology and public health, and on the metaphysics of laws and causation. He published a monograph entitled *Concepts and Causes in the Philosophy of Disease* in 2016, and has numerous papers in highly ranked international philosophy journals. Dr Smart believes that philosophical work in medicine can have a direct impact on society, and so also collaborates with academics in the medical sciences to address real world problems in public health.

Anthony Kaziboni MA is Director of Research at the Institute for the Future of Knowledge (IFK). His works is in hydropolitics, migration, social inequalities, and social policy. He is the Regional Representative for South Africa for the International Sociological Association's (ISA) Clinical Sociology Research Group. In 2018 he received the prestigious *Outstanding Early Career Award in Clinical Sociology* by the ISA's Clinical Sociology Research Committee in Toronto, Canada. He has [co]authored publications in accredited journals, newspaper articles and book chapters.

Visiting Professors

Nancy Cartwright is a Professor of Philosophy at Durham University and a Distinguished Professor at the University of California, both in the United States (US). At Durham, she is also co-Director of the Centre for Humanities engaging Science and Society. Her research interests include philosophy and the history of science (especially physics and economics). Professor Cartwright has worked extensively in modelling, causal inference, causal powers, and objectivity, evidence, especially for evidence-based policy (EBP) and the philosophy of social technology. For the project 'Knowledge for Use' (K4U), her current work investigates how to use scientific research results for better policies. She has worked with others on projects in education, child protection and international development.

Nancy Jecker is a Professor of Bioethics and Humanities at the University of Washington School of Medicine, in the US. She holds Adjunct Professorships at the University of Washington School of Law, Department of Global Health, and Department of Philosophy. Professor Jecker's research focuses on individual and societal ageing, justice, human dignity, medical futility and global perspectives in philosophy and bioethics. She was elected to the Board of Directors for the International Association of Bioethics (2019-2022) and to the Board of Directors for the American Society for Bioethics and Humanities (2016-2019).

Research Associates

Kyle Blumberg is a Research Fellow at Australian Catholic University's Dianoia Institute of Philosophy. Dr Blumberg holds a doctorate in Philosophy from the New York University, United States (US). He was a researcher in the African Centre for Epistemology and Philosophy of Science at the University of Johannesburg. His interests are the philosophy of language and the philosophy of mind.

Adrian Erasmus is a PhD candidate in the History and Philosophy of Science at the University of Cambridge, United Kingdom (UK). Before starting his doctorate, he held teaching positions at the University of Johannesburg and the University of Pretoria, both in South Africa. His research employs conceptual analysis, empirical findings, case studies, and the application of formal methods to solve important practical problems in science. His research interests are conceptual and methodological questions about medical inference and the intersection of values and epistemic concerns in medical artificial intelligence.

Jonathan Fuller is an Assistant Professor in the Department of History and Philosophy of Science (HPS) at the University of Pittsburgh, in the US, specialising in the philosophy of medicine. He is also Deputy Editor-in-Chief of the journal *Philosophy of Medicine* and Secretary of the *International Philosophy of Medicine* Roundtable Scientific Committee. He was a post-doctoral research fellow in the Institute for the History and Philosophy of Science and Technology at the University of Toronto, Canada.

Ross Harvey is a Director of Research and Programmes at Good Governance Africa (GGA). He holds a PhD in economics from the University of Cape Town. From 2010 to 2011, Ross lectured political economy at UCT. The following year he worked as a parliamentary researcher. In mid-2013, he became a senior researcher at the South African Institute of International Affairs, where he worked until 2019, joining GGA in 2020.

Rebecca Kukla is a Professor of Philosophy at Georgetown University and Senior Research Scholar at the Kennedy Institute of Ethics, in the US. They are Editor-in-Chief of the *Kennedy Institute of Ethics Journal*, and a faculty member in the Disability Studies Program at Georgetown. For 2020 and 2021, they are also a Humboldt Research Scholar at Leibniz University Hannover. Dr. Kukla's research interests within practical ethics include the ethical and social complexities of scientific knowledge production and communication, reproductive ethics and the culture of pregnancy and motherhood, public health ethics, the ethics of health communication, research ethics, methodological issues in medical research, and the social epistemology of medicine. Much of their research bridges bioethics, epistemology, and philosophy of language. They have ongoing interests in the varieties of embodiment, agency, and autonomy.

Mathew Mercuri holds a PhD in Health Research Methods at McMaster University and a PhD in History and Philosophy of Science and Technology at the University of Toronto, both in Canada. He completed a post-doctoral fellowship in the

Department of Medicine at Columbia University, in the US. Dr. Mercuri is currently an Assistant Professor in the Division of Emergency Medicine, McMaster University, and the Institute of Health Policy, Management and Evaluation, at the University of Toronto. He was named Editor-in-Chief for the *Journal of Evaluation in Clinical Practice* in 2018. His research interests are medical epistemology, medical practice variations, and issues around radiation exposure from diagnostic imaging.

Neil Pearce is Professor of Epidemiology and Biostatistics, and Director of the Centre for Global Non-communicable Disease, at the London School of Hygiene and Tropical Medicine, in the UK. During 2000-2010 he was Director of the Centre for Public Health Research in the Research School of Public Health on the Massey University Wellington Campus. He continues to work in a broad range of epidemiological NCD research areas, including epidemiological methods, respiratory disease, neurological disease, cancer, diabetes, indigenous health, and occupational and environmental health research.

Jacob Stegenga is a Reader in the Department of History and Philosophy of Science at the University of Cambridge, in the UK. Before joining Cambridge, he taught in the US and Canada, and he received his PhD from the University of California, San Diego. His research interests are in evidence and inference, and much of his work focuses on biology and medicine. His research employs conceptual analysis, empirical findings, and formal methods to establish prescriptive conclusions about science.

Jan Vandenbroucke is a Belgian epidemiologist and physician known for his work in clinical epidemiology. He was a Professor of Clinical Epidemiology at Leiden University Medical Centre, the Netherlands (1986-2015). He has been mainly involved in observational studies; his main interest is the application of epidemiologic methods to problems of aetiology and pathogenesis that are investigated in academic medical centres. In 2002-2003 he held a sabbatical at Oxford University, UK. He was appointed as an Academy Professor by the Royal Netherlands Academy of Arts and Sciences (2006-2015) and a Professor of Clinical Epidemiology at Aarhus University, Denmark, in 2014. He serves on the international advisory board of *The Lancet*, and was a co-author of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. He was appointed as an Honorary Professor at the London School of Hygiene and Tropical Medicine (LSHTM) in 2015.

Sridhar Venkatapuram is a Senior Lecturer in Global Health and Philosophy at the King's College Global Health Institute, United Kingdom (UK). He is an interdisciplinary academic practitioner in the area of Global Health Ethics. He was previously a Lecturer and Wellcome Trust Research Fellow in Ethics at the London School of Hygiene and Tropical Medicine (LSHTM), UK, and an affiliated Lecturer at Cambridge University, UK. From 2008 to 2011, he was Co-Investigator on an Economic and Social Research Council (ESRC) and UK's Department for International Development (DFID) research project.

Michael Vlerick is a Senior Lecturer in the Department of Philosophy at Tilburg University, in the Netherlands. He was a post-doctoral research fellow at the University of Johannesburg. His post-doctoral research dealt with the philosophical implications of the theory of evolution. His research focuses on evolutionary epistemology, evolutionary morality, cultural evolution and social ontology in particular, and the philosophical implications of evolution theory in general.

Publications

IFK staff have contributed to two reports, 29 journal articles, yielding 14,42 research output units as per the Department of Higher Education and Training, a letter in *The Lancet*, three book chapters, and an Encyclopedia entry:

Reports

Institute for the Future of Knowledge. 2020. *A Framework for Decisions in a Post-COVID World: An Aid to Policy-Makers in South Africa*.

UNDP South Africa 2020. *COVID-19 Rapid Emergency Needs Assessment*. [Broadbent contributed as a report writer]

Journals edited at IFK

Philosophy of Medicine was launched in 2020. Hosted by the IFK in partnership with Pittsburgh Department of History and Philosophy of Science, to be an international, open-access, free-to-publish, peer reviewed home for the best new work in the discipline.

Journal articles

Akabayashi A, Nakazawa E, Ino H, Ozeki-Hayashi R, **Jecker NS***. 2020. 'Sacrificing the Fukushima 50 again?' *Journal of Public Health*, 28;42(1):194-197. [0,2 units]

Akabayashi A, Nakazawa E, Jecker NS*. 2020. 'Adhering to Ethical Benchmarks in Neurology Clinical Trials Using iPSCs.' *Neurotherapeutics*,17(2):606-608. [0,33 units]

Baigrie, B and **Mercuri, M***. 2020. 'Relevance, Validity, and Evidential Reasoning in Clinical Practice.' *Journal of Evaluation in Clinical Practice*, 26(5):1341-1343. [0,5 units]

Bennett, B*, Hifazat, S, Barton, GA, Tsuwane, B, and Kruger, LM. 2020. 'Sustaining the University of Johannesburg and Western Sydney University Partnership in the Time of COVID: A Qualitative Case Study'. *Yesterday and Today*, (24):71-91. [0,5 units]

Blumberg, K. 2020. 'Demonstratives, Definite Descriptions and Non-redundancy.' *Philosophical Studies*, 177(1):39-64. [1 unit]

Boudry, M, **Vlerick, M***, and T Edis. 2020. 'The End of Science? On Human Cognitive Limitations and How to Overcome Them'. *Biology and Philosophy,* 35(1):1-16. [0,33 units]

Broadbent A. 2020. 'Better the Drug you Know: Commentary on "Daughton 2020, Natural Experiment Concept to Accelerate the Re-purposing of Existing Therapeutics for Covid-19"'. *Global Epidemiology*, 2(1000267):1-6.

Broadbent, A*, Combrink, H and **Smart, B***. 2020. 'COVID-19 in South Africa.' *Global Epidemiology*, 2:100034.

Cartwright, N* and Joyce, K. 2020. 'Bridging the Gap Between Research and Practice: Predicting What Will Work Locally'. *American Educational Research Journal*. 57(3):1045-1082. [0,5 units]

Cartwright, N*, Pemberton, JM, and Wieten, S. 2020. 'Mechanisms, Laws and Explanation'. *European Journal for Philosophy of Science*, 10:25. [0,33 units]

Cartwright, N. 2020. 'Middle-Range Theory: Without it What Could Anyone Do?' *THEORIA. An International Journal for Theory, History and Foundations of Science*, 35(3):269-323. [1 unit]

Chan, TM, **Mercuri, M***, Turcotte, M, Gardiner, E, Sherbino, J and de Wit, K. 2020. 'Making Decisions in the Era of the Clinical Decision Rule: How Emergency Physicians Use Clinical Decision Rules.' *Academic Medicine,* 95(8):1230-1237. [0,17 units]

De Wit, K, **Mercuri, M***, Wallner, C, Clayton, N, Archambault, P, Ritchie, K, Gérin-Lajoie, C, Gray, S, Schwartz, L and Chan, T. 2020. 'Canadian Emergency Physician Psychological Distress and Burnout during the first 10 Weeks of COVID-19: A Mixed-Methods Study.' *Journal of the American College of Emergency* Physicians,1(5):1030-1038. [0,1 units]

Erasmus, A*, Brunet, TDP and Fisher, E. 2020. 'What is Interpretability?' *Philosophy and Technology*, 1-30. [Advance access]

Fuller, J. 2020. 'Epidemiologic Evidence: Use at Your Own Risk?' *Philosophy of Science*, 87(5):1119-1129. [1 unit]

Harvey, R. 2020. 'Towards a Cost-Benefit Analysis of South Africa's Captive Predator Breeding Industry'. *Global Ecology and Conservation*, 23. [1unit]

Jecker, NS. 2020. 'Upstream Influences and Fair Subject Selection'. *The American Journal of Bioethics*, 20(2): 22-24. [1 unit]

Mercuri, M* and Gafni, A. 2020. Defining the Meaning and Measurement of "Values and Preferences" in the Development of Practice Guidelines: The Case of GRADE.' *European Journal for Person Centered Healthcare*, 8(1):45-57. [0,5 units]

Mercuri, M*, Upshur, REG and Gafni, A. 'Guidelines Should not Recommend the Type of Decision-Making for the Medical Encounter.' *Patient Education and Counseling*, 103(12):2613-2615. [0,33 units]

Pearce, N and Vandenbroucke, JP. 2020. 'Educational Note: Types of Causes.' *International Journal of Epidemiology*, 1;49(2):676-685. [1 unit]

Pearce, N, Vandenbroucke, JP*, Vander Weele, TJ and Greenland S. 2020. 'Accurate Statistics on COVID-19 Are Essential for Policy Guidance and Decisions.' *American Journal of Public Health*, 110(7):949-951. [0,5 units]

Seymour, CW, McCreary, EK, **Stegenga, J***. 2020. 'Sensible Medicine-Balancing Intervention and Inaction During the COVID-19 Pandemic.' JAMA Network Open.

Smart, B. 2020. 'Practicing Afrocentric Ethical Teaching: Towards a Decolonized Pedagogy'. *Teaching Philosophy*, 43(2). [1 unit]

Tella, O. 2020. 'Soft Power Individuals in Nigeria and South Africa: An Appraisal of Olusegun Obasanjo's and Thabo Mbeki's Power of Attraction'. Round Table. [1unit]

Tseng, EK, Mukerji, G, Weinerman, A, Fuller, J*, McLeod, A, Wong, BM, Kuper, A and Stroud, LS. 2020. 'Choosing Words Wisely: Residents' Use of Rhetorical Appeals in Conversations About Unnecessary Tests'. *Academic Medicine*, 95(2):275-282. [0,13 unit]

Van Der Merwe, R. 2020. 'Stuart Kauffman: A world beyond physics: the emergence and evolution of life [book review].' *Metascience* 29:279-282.

Vlerick, M. 2020. 'The Cultural Evolution of Institutional Religions'. *Religion, Brain and Behavior*. 10(1): 18-34. [1 unit]

Vlerick, M. 2020. 'The Evolution of Social Contracts.' *Journal of Social Ontology*, 5(2):181-203. [1 unit]

Vlerick, M. 2020. 'Towards Global Cooperation: The Case for a Deliberative Global Citizens' Assembly'. *Global Policy*, 11(3): 305- 314. [1 unit]

Letters and comments

Broadbent, A*, Walker, D., Chalkidou, K., Sullivan, R., and Glassman, A. 2020. Lockdown is not egalitarian: the costs fall on the global poor. Lancet, 396(10243), 21–22.

Book chapters

Broadbent, A. and Smart, B. 2020. 'Kinds of Explanation in Public Health Policy,' in Sholl, J and Rattan, S. (eds), *Explaining Health Across the Sciences*. Cham: Springer. Pages 405-415.

Smart, B. 2020. 'South Africa,' in Georgeou, N and Hawksley, C. (eds), *State Responses to COVID-19: a Snapshot at 1 June 2020*. HADRI Western Sydney University: Sydney. Pages 90-91.

Bennett, B. M. 2020. 'A Global History of Species Introduction and Invasion: Reconciling Historical and Ecological Paradigms,' in Kirchberger, U and Bennett,

BM (eds), *Environments of Empire: Networks and Agents of Ecological Change*. University of North Carolina Press: North Carolina. Pages 224-245).

Encyclopedia entries

Broadbent A. 2020. Causation. *Internet Encyclopedia of Philosophy*.

Presentations

The IFK made 13 presentations to various international events, 7 of them online.

Broadbent, A. 'Health data in South Africa and responses to the virus.' Briefing at inception meeting of African School of Economics / Princeton / IDRC project *Socio-economic Impact of COVID-19 on African Economies*. (Online)

Broadbent, A. 'Is lockdown right? Public health, bioethics and COVID-19.' Public lecture at Virginia State University. (Online).

Broadbent, A. 'What are the specific contributions of researchers in public debates?" Invited talk at workshop on *Research and Responsibility*, The New Institute, Hamburg. (Online)

Broadbent, A. 'Is lockdown right? Bioethics, global health and COVID-19'. Invited talk at PhilHEAD Research Centre for Philosophy of Health and Disease, Italy. (Online)

Broadbent, A. 'Why Robots Cannot Do Epidemiology.' Keynote for two-day workshop *Philosophy of Medical AI*, University of Tubingen Cluster of Excellence for Machine Learning: New Perspectives for Science. (Online)

Broadbent, A. '"Either philosophy can make the difference between life and death, or it has no place in medical education." Discuss.' Sowerby Project One-Day Online Conference on Philosophy in Medical Education, King's College London. (Online)

Broadbent, A. 'A Framework for Decisions in the Post-COVID World.' Centre for Humanities Engaging Science and Society (CHESS), Durham. (Online)

Broadbent, A. 'COVID-19 pandemic and global policy response', Cambridge Virtual Conversations, Dept of History and Philosophy of Science, Cambridge. (Online)

Broadbent, A. 'Applicability of the Social Distancing Model in the Global South', panel discussion, Center for Human Rights and Global Justice, New York University School of Law. (Online)

Broadbent, A. 'Machine learning and epidemiology: a philosophical perspective on public health disruptors.' Invited presentation to the National Institute of Health (US).

Broadbent, A. 'Machine learning and epidemiology: a philosophical perspective on public health disruptors.'

Broadbent, A. 'Causation and responsibility', workshop at the American Philosophical Association Central Division Annual Conference.

Broadbent, A. 'Evolution, reasoning, and causal nihilism.' History and Philosophy of Science Seminar Series, University of Pittsburgh.

Media

TV
IFK Team members were interviewed by:

- Newzroom Africa
- eNCA
- BBC World Focus on Africa
- KykNET
- ETV
- Network 24
- SABC

Radio
IFK Team members were interviewed by:

- PowerFM
- Balito Radio
- RSG
- Cape Talk
- Salaam FM
- Radio Islaam

Opinion Pieces
IFK authors published 22 opinion pieces. Broadbent and Smart were respectively 1st and 3rd most read authors at UJ on *The Conversation* with 473,181 and 429,612 reads respectively.

Ade-Ibijola, A and **Harley, C***. 2020. *Battling Covid-19 with Artificial Intelligence: What Will Work in Africa?*, *The Thinker: A Pan-African Quarterly for Thought Leaders, Special Edition: COVID-19*. 2:84.

Broadbent A*, Combrink H, Krubiner C, **Smart B*** and Walker D. 2020-10-26. How should we evaluate lockdowns? Disentangling Effectiveness, Context and Politics. *Center for Global Development* blog. https://www.cgdev.org/blog/how-should-we-evaluate-lockdowns-disentangling-effectiveness-context-and-politics

Broadbent, A. 2020-02-15. The Fourth Industrial Revolution and the Importance of Disagreement. *The Thinker*, 83: 48-52.

Broadbent, A. 2020-03-09. Thinking Rationally About Coronavirus COVID-19. *The Daily Nous*.

Broadbent, A and B Smart. 2020-03-23. Why a One-Size-Fits-All Approach to COVID-19 Could Have Lethal Consequences. *The Conversation Africa*.

Broadbent, A. 2020-03-27. [The Role of Philosophy and Philosophers in the Coronavirus Pandemic](#). *The Daily Nous.*

Smart, B and A Broadbent. 2020-03-30. [South Africa's COVID-19 Lockdown: Cigarettes and Outdoor Exercise Could Ease the Tension](#). *The Conversation Africa.*

Broadbent, A. 2020-04-08. [Lockdown is Wrong for Africa](#). *Mail and Guardian.*

Roberts, K, **Broadbent, A*** and **Smart, B***. 2020-04-15. [Why Heavy-Handed Policing Won't Work for Lockdowns in Highly Unequal Countries](#). *The Conversation Africa.*

Smart, B. 2020-05-03. Cigarette Ban Opens Window on Corruption. *The Sunday Independent.*

Mokgathle, K and **Smart, B***. 2020-05-19. [Hunger, SA's Worst Threat](#). *The Sunday Independent* (South Africa).

Smart B. 2020-05-24. [Parents Have no Reason to Fear COVID-19](#). *The Sunday Independent.*

Tella, O. 2020-05-27. [Beyond the Narratives of Africa's Doom and Gloom](#). *Daily Maverick.*

Broadbent, A. 2020-05-31. [We Were Set Up to Lockdown](#). *The Sunday Independent* (South Africa).

Smart B. 2020-06. O Coronavirus Podera Aumentar O Numero de Doencas Da Pobreza. *Alem-Mar* (Portuguese).

Tella, O. 2020-06-01. [Covid-19 and the Emerging World Order: What Does it Mean for Africa?](#) *The Star*.

Tella, O. 2020-06-07. [The Great COVID-19 Data Debate](#). *Sunday Independent*.

Tella, O.2020-06-23. [SA's Mega-Event Lustre Dims as Inequality takes Shine off 2010 Fifa World Cup Success](#). *Daily Maverick.*

Broadbent, A. 2020-07-16. [South Africa's Leaders Have Had a Crack: It's Time to let the People have a Go.](#) *The Conversation Africa.*

Tella, O. 2020-08-05. [Nigeria Leads Africa's Race for Space with Ambitious Satellite Programme](#). *Daily Maverick*.

Tella, O. 2020-11-24. [Mbeki and Obasanjo: Case Studies in the Use of Soft Power in Africa's Interests](#). *The Conversation*.

Tella, O. 2020-12-13. [The Race for a COVID-19 Vaccine Reflects the Emerging New World Order](#). *Daily Maverick*.

Podcasts
IFK Team members were interviewed in depth for the following podcast episodes.

ARC Insider Episode 17: The science of survival.
https://podcasts.apple.com/gb/podcast/the-arc-insider-episode-17-the-science-of-survival/id1509484109?i=1000494252348

ARC Insider Episode 2: In conversation with Professor Alex Broadbent.
https://podcasts.apple.com/gb/podcast/arc-insider-episode-2-in-conversation-professor-alex/id1509484109?i=1000472296428

In Limbo Conversations Episode 4: Bioethics and Philosophy of Disease, with Benjamin Smart. https://www.inlimboconversations.com/post/episode-4-benjamin-smart-bioethics-and-philosophy-of-disease

In Limbo Conversations Episode 7: Philosophy of epidemiology, decolonizing medicine, and the pandemic, with Alex Broadbent. https://www.inlimboconversations.com/post/episode-7-alexander-broadbent-philosophy-of-epidemiology-decolonising-medicine-and-the-pandemic

Documentary
COVID on the Breadline
The documentary COVID on the Breadline was a partnership with the NGO Picturing Health. The film explores the impact of severe lockdown measures on poor and vulnerable communities in the developing world.
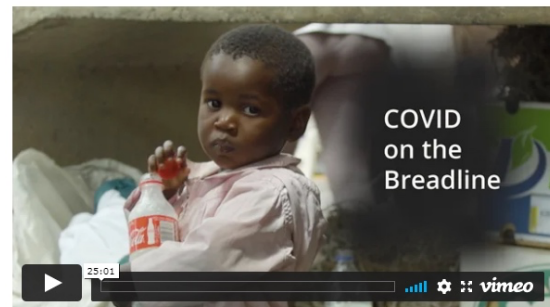
Community engagement

Panel discussions: Shaping the Post-COVID World
IFK held a series of panel discussions in webinar format, on the post-COVID world. This series of webinars, envisaged by UJ's Vice-Chancellor and Principal, Professor Tshilidzi Marwala, were designed to provide a wide-ranging collective examination of key aspects of the post-pandemic future: from the impacts on the humanity, the economy, health, education, the environment, and the future world of work.

The events, chaired by the IFK Director, were attended by hundreds of participants from universities, civil society, business community, policy, members of the public, as well as drawing government officials and diplomats in South Africa and further afield from diverse disciplinary backgrounds. The following is a description of each event.

Reimagining the world after COVID-19 (13 May)
Hosted by the University of Johannesburg (UJ) on Wednesday, 13 May 2020 the first episode of UJ's webinar series delved into life beyond Covid-19 and in particular, the motivation and impact of varying national lockdown approaches. The speakers at this event were Dr. Joyce Banda, Former President of Malawi; Professor Johan Giesecke, an infectious disease epidemiologist, and a leading consultant on the

Swedish model and Professor Sehaam Kahn, Microbiologist and UJ's Dean of Health Sciences.

Dr. Banda was highly critical of the efficacy of lockdowns in African countries citing poverty and underdevelopment. She further noted that lockdowns would erode the economic gains already made. Professor Giesecke noted the differences between the Global North and South and how the impact would be more severe because of wealth differences globally. Professor Khan indicated that higher education as a sector needed to plan ahead. This included bringing together expertise with a deep understanding of universities' nature and its and societal role to emerge from the pandemic.

Covid-19 and the emerging world order (20 May)

The second webinar of the series on *COVID-19* was kicked off by Professor Tshilidzi Marwala, Vice-Chancellor and Principal of the University of Johannesburg.

The event was live-streamed by the South African Broadcasting Corporation (SABC) News. The first panellist was **Dr. David Masondo**, the Deputy Finance Minister for South Africa.

The second panellist was a former Special Assistant to the President and Senior Director for African Affairs at The White House under US President Barack Obama,

Mr. Grant Harris. The third and fourth panellists were Professor Dong Wang, the Executive Director of the Institute for Global Cooperation and Understanding, Peking University, China, and Dr Oluwaseun Tella.

During this webinar, Dr. Masondo expressed that it was premature to predict how the South African economy would be affected by COVID-19, and early indications showed that it would contract. This would negatively affect employment and the government's ability to generate revenue. The speakers also addressed how COVID-19 would redesign the world order, highlighting the pandemic's geopolitical implications regionally and internationally.

Data and delusion after COVID-19 (27 May 2020)

The third webinar was held on Wednesday, 27 May 2020, themed, *Data and Delusion after COVID*. The panellists were Dr. Shakir Mohamed a Senior Researcher at DeepMind in London, United Kingdom (UK); Professor Charis Harley, and Professor

Olaf Dammann, Vice-Chair of Public Health at Tufts University in Boston, US), Professor of Perinatal Neuroepidemiology at Hannover Medical School, Germany, and Adjunct Professor in the Department of Neuromedicine and Movement Science at the University of Science and Technology in Trondheim, Norway

The meeting discussed the role of machine learning and artificial intelligence in addressing global challenges. The meeting further raised issues about information manipulations and fake news. The meeting ended at the fact that data privacy and individuals' right to decide on the use of their own data should be high in everyone's agenda.

Inequality after Covid (3 June 2020)

The fourth, and last, webinar was on inequality post-COVID. The panellists were Professor Letlhokwa Mpedi, the Executive Dean of Law at UJ and a specialist in labour law and social protection; Dr. Sridhar Venkatapuram, a Senior Lecturer in Global Health and Philosophy at King's College Global Health Institute, UK; and Professor Steven Friedman, a political scientist, columnist, public intellectual, activist, former trade unionist and journalist.

This webinar explored various issues concerning inequality that COVID-19 has highlighted as well as those created by the response to the disease. Whilst Professor Friedman held the view that Covid-19 national lockdown regulations would lead to the curtailing of some social and economic rights, which was quite rational within this context, Professor Venkatapuram focused on the need for global health public ethics. He argued that there had been an absolute lack of declaration of ethics in how the policies were implemented globally. Professor Mpedi noted the complexities associated with policymakers trying to strike a balance between guaranteeing human rights and protecting lives.

DSAD Postgrad Workshop: Remaking the world through Machine Learning (2-9 December)

The Data Science Across Disciplines Research Group held its first annual Postgraduate Workshop facilitated by academics and industry professionals from across multiple research fields, institutions, and sectors. The workshop was on the impact of Machine Learning tools, technologies, and algorithms, on various social, economic, and technical hurdles experienced daily. This event aimed to educate postgraduate students with this in mind, so that they may not only envision, but also create, a more remarkable world.

The Organising Committee consisted of Professor Harley, Professor Alan Cornell, from the Department of Physics, in Faculty of Science, UJ; Professor Abejide Ade-Ibijola, from the Department of Applied Information Systems in the College of Business and Economics, UJ; and Ms. Amira Abbas, from the Centre for Quantum Technology at University of *KwaZulu-Natal* (UKZN).

The workshop explored machine learning under the following themes:

Agriculture

The concept of smart farming has become prominent in agriculture. This notion speaks to an effort to make agriculture more efficient and effective with high-precision algorithms. The mechanism that drives it is Machine Learning which, together with big data technologies and high-performance computing, has created new opportunities to unravel, quantify, and understand data-intensive processes in agricultural operational environments. Machine Learning is everywhere throughout the whole growing and harvesting cycle. It begins with a seed being planted in the soil — from the soil preparation, seeds breeding and water feed measurement — and it ends when robots pick up the harvest determining the ripeness with the help of computer vision.

The two plenary speakers were Olaniyi Fawole, Associate Professor of Postharvest Crop Preservation Research in the Department of Botany and Plant Biotechnology, at UJ, and Turgay Çelik, Professor in the School of Electrical and Information Engineering at Wits.

Finance

Machine Learning in finance has become more prominent recently due to the availability of vast amounts of data and more affordable computing power. Machine Learning algorithms are reshaping the financial services industry in various ways, often leading to cutting edge research. Leading banks and financial services companies deploy AI technology, including Machine Learning, to streamline their processes, optimise portfolios, decrease risk, and underwrite loans.

To further unpack this ML in finance, speakers were Professor Terence van Zyl who holds the Nedbank Research and Innovation Chair at the University of Johannesburg in the Institute for Intelligent Systems, and Dr. Dieter Hendricks, a Systematic Trading Strategist at the Rand Merchant Bank, South Africa.

Healthcare

The use of Machine Learning in Healthcare is exploding, given the various ways such tools can be utilised. These algorithms can provide immediate benefit where processes are reproducible or standardised. There are large image datasets, such as radiology, cardiology, and pathology, Machine Learning is the ideal tool given its versatility. Machine Learning algorithms can be trained to look at images, identify abnormalities, and point to areas that need attention, thus improving all these processes' accuracy. It also supports developing a more objective opinion to improve efficiency, reliability, and accuracy of diagnoses.

For this session, plenary speakers were Dr. Suneej Surendran-Nair, a qualified medical doctor and a Medical Officer Head of Maternal Health at Shongwe Hospital, in Mpumalanga, South Africa, and Dr. Hennie Loubser, the C*hief Executive officer* (*CEO*) of South African Database for Functional Medicine (SADFM).

Mining

With mining machinery becoming larger and equipment more sophisticated, the sector can gain immensely from advanced technologies such as Machine Learning.

The benefits are in terms of operational efficiency and reducing costs and the use of real-time data to aid in accelerating timelines for multiple mining stages and decision-making intelligence. Remote sensing data is used for rock-face identification and soil classification, while satellite imagery, aerial photography, geophysical maps, and drone-based monitoring are used to predict mineral prospectively or the locations of potential ores. Along with supporting the safety of mining personnel through robotics, these are only a few of the areas where Machine Learning can contribute.

The main speaker in this session was Ms Archana Arakkal, Practice Lead: Intelligent Data Engineering, at the Johannesburg based Synthesis Software Technologies (Pty) Ltd.

Particle Physics
High energy physics has been using machine learning for almost 30 years, particularly in the context of the searches for the Higgs boson at the Large Electron-Positron (LEP) collider at CERN in the 1990s and early 2000s. Multivariate analyses and neural network methods were used to exploit the data in the best possible way by using the different functional behaviours of the signal and the backgrounds on a large set of kinematic variables. This helped increase the signal's sensitivity compared with more traditional analyses involving sequential conditions in the event selection process. With the hadron collider era of the last 20 years (i.e. with the Tevatron collider at Fermilab and the LHC at CERN), machine learning has become routinely used, especially with the advent of deep learning in the last decade, that opened new avenues in the usage of machine learning in research. Thanks to patterns that can be learned from (real or simulated) data, backgrounds and signals can be distinguished to a level rarely obtained by any other means.

The two main speakers for this session were Benjamin Fuks, Professor at Sorbonne University's Laboratory of Theoretical and High Energy Physics (LPTHE), France, and David Rousseau, Professor and Senior Scientist at *IJCLab-Orsay, Université Paris-Saclay*, France.

Quantum Computing
Quantum computing harnesses quantum mechanical effects, such as superposition, entanglement and interference, to do computation. Whilst the quantum devices available today are still noisy and limited in their ability, the promise of universal quantum computing has given rise to the field of quantum machine learning --an emerging discipline that aims to exploit quantum computation to find synergies between quantum information processing and machine learning. Quantum-enhanced machine learning algorithms have the potential to revolutionise many industries and could lead to new drug discoveries, better optimisation algorithms and more robust financial models. Although research exhibits potential, there is still much to uncover in quantum machine learning.

The speakers were Ms. Abbas and Francesco Petruccione, Professor and Pro-Vice-Chancellor for Big Data at UKZN, and Director of The National Institute for Theoretical Physics (*NITheP*).

Other speakers

Other speakers invited to discuss the applications of ML broadly were: Jan Nordström, Professor and Head of Computational Mathematics in the Department of Mathematics at Linköping University, Sweden, and also a Distinguished Visiting Professor in the UJ's Department of Mathematics and Applied Mathematics; Mr. Jake Shepherd, Director and Co-founder of Synthesis Software Technologies; and Montaz Ali, Professor in the Wits School of Computer Science and Applied Mathematics.

Collaborations

Makerere University (Uganda): collaborative project on indirect impacts of COVID-19.

Centre for Global Development (NGO, UK): funding for a project on indirect health effects of COVID-19.

Picturing Health (NGO, UK): collaborative documentary, *COVID on the Breadline*.

Cluster of Excellence: Machine Learning for Science, Tubingen University (Germany): collaborative research on machine learning, epidemiology and causation.

Grants

External

The IFK received nearly R 1.2m external research funding in 2020, and holds contracts with an outstanding value of R 800,000.

Project	Funder	Period	Total contract amount (original currency)	Total contract amount (ZAR)*	Received in 2020 (ZAR)
Biological Complexity	University of Bath / Templeton	2020-2022	UKP 26,800	R 536,000	R 112,000
Indirect health effects of COVID-19	Center for Global Development	2020-2021	USD 60,000	R 969,000	R 969,000
Philosophy of Medicine **journal support**	University of Pittsburgh	2020-2024	USD 35,000	R 560,000	R 112,000
Totals				**R 2,065,000**	**R 1,192,000**

*Where necessary, estimates are on the basis of 16 ZAR to 1 USD and 20 ZAR to 1 GBP.

Internal

Project	Funder	Period	Total contract amount (ZAR)	Received in 2020 (ZAR)
Philosophy of Medicine journal support	Faculty of Humanities	2020	R 75,000	R 75,000