Inaugural Symposium Cognitive Economics:
"The invisible hand extended by the market mind"
Panmure House, Edinburgh (UK); 23-24 May, 2022

MARKET MIND HYPOTHESIS
A cognitive economic theory for the 21st century

SPEAKERS	
Name, Association, and Bio	**Title and Abstract**
Tobias Adrian; Financial Counsellor and Director of the Monetary and Capital Markets Department, International Monetary Fund (IMF) Tobias leads the IMF's work on financial sector surveillance, monetary and macroprudential policies, financial regulation, bank resolution, debt management, and capital markets. He also oversees capacity building activities in IMF member countries with regard to the supervision and regulation of financial systems, bank resolution, central banking, monetary and exchange rate regimes, and debt management. Prior to joining the IMF, Mr. Adrian was a Senior Vice President of the Federal Reserve Bank of New York and the Associate Director of the Research and Statistics Group. At the Federal Reserve, he contributed to monetary policy, financial stability policies, and to crisis management. Mr. Adrian has published extensively in economics and finance journals, including the American Economic Review and the Journal of Finance. His research spans asset pricing, financial institutions, monetary policy, and financial stability, with a focus on aggregate consequences of capital markets developments. Mr. Adrian holds a Ph.D. from MIT, an MSc from LSE, a Diplom from Goethe University Frankfurt and a Maîtrise from Dauphine University Paris.	**Global financial stability and market mood** TBC.
Vivienne Brown; Professor of Philosophy & Intellectual History, The Open University. Vivienne Brown is Emeritus Professor at the Open University, UK. She has written on Adam Smith, John Locke, rights and interpretative methodologies. Her recent and current work proposes a new approach to modelling multiple agents in shared social context, with applications including shared belief/knowledge, game theory and the collective action problem.	**The market's mind** Although the Market Mind Hypothesis posits the two-way premise of market-as-mind and mind-as-market, the emphasis of Patrick Schotanus's 'Cognitive Economics and the Market Mind Hypothesis' (2022) is directed to the former because its primary concern is with the analysis of financial markets. In this paper I therefore focus on the delineation of the market-as-mind component of the wider project. In particular I shall try to explore what seem to me to be two different modes in which the market's mind seems to be presented. One mode seems to posit the market's mind in terms of the mind of a singular collective entity – the mind of the (financial) market or the mind of Mr Market. The other mode seems to present the market's mind in terms of the intersubjective relations of the market participants. In this paper I aim to

	draw out some philosophical implications of this distinction and then consider possible applications for the analysis of financial markets.
Nick Chater; Professor of Behavioural Science, University of Warwick Nick Chater joined WBS in 2010, after holding chairs in psychology at Warwick and UCL. He has over 200 publications, has won four national awards for psychological research, and has served as Associate Editor for the journals Cognitive Science, Psychological Review, and Psychological Science. He was elected a Fellow of the Cognitive Science Society in 2010 and a Fellow of the British Academy in 2012. Nick is co-founder of the research consultancy Decision Technology; and is on the advisory board of the Cabinet Office's Behavioural Insight Team (BIT), popularly known as the 'Nudge Unit'.	**Can cognitive science create a cognitive economics?** Cognitive science can intersect with economics in at least three productive ways: by providing richer models of individual behaviour for use in economic analysis; by drawing from economic theory in order to model distributed cognition; and jointly to create more powerful 'rational' models of cognitive processes and social interaction. There is the prospect of moving from behavioural economics to a genuinely cognitive economics. Comments on the MMH will complete the talk.
Emanuel Derman; Professor of Financial Engineering, Columbia University Emanuel Derman is a professor at Columbia University, where he directs their program in financial engineering. He was born in South Africa but has lived most of his professional life in Manhattan. He started out as a theoretical physicist, doing research on unified theories of elementary particle interactions. From 1985 to 2002 he worked on Wall Street where he co-developed the still widely used Black-Derman-Toy interest rate model and the local volatility model. He is the author of The Volatility Smile (Wiley, 2017), Models.Behaving.Badly (Free Press 2011), and My Life As A Quant (Wiley 2004), in which he introduced the quant world to a wide audience. Since 1995, Derman has written many articles pointing out the essential difference between models in physics and models in finance. "In physics there may one day be a Theory of Everything; in finance and the social sciences, you're lucky if there is a usable theory of anything." Derman, together with Paul Wilmott, wrote the Financial Modelers' Manifesto, a set of principles for doing responsible financial modeling.	**Ways of Knowing** • You can try to understand the world with data, intuition, models and theories. • Raw data has no voice. It takes models, theories and intuition to use data. • Models are metaphors that explain the world we don't understand in terms of worlds we do. • Models tell you only what something is more or less like. • Theories try to tell you what something really is. • It takes intuition to discover a theory. • Financial models are mere metaphors, idealizations that always sweep dirt under the rug. • Good models and good modelers have an obligation to make the dirt explicit.

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Sheila Dow; Professor of Economics, University of Stirling Sheila Dow is Professor Emeritus of Economics at the University of Stirling, Scotland and adjunct Professor of Economics at the University of Victoria in Canada. Her main research focus is on the fields of the methodology of economics, the history of economic thought, money and banking, and macroeconomics. While her career has primarily been in academia, she has held positions with the Bank of England and the Government of Manitoba, and as special advisor on monetary policy to the UK Treasury Select Committee. She has held academic positions such as Chair of INEM and co-editor of Economic Thought and is a member of the Academic Council of INET. Her recent books include The General Theory and Keynes for the 21st Century, and Money, Method and Post-Keynesian Economics for the 21st Century (both co-edited with J. Jespersen and G. Tily, 2018), and Foundations for New Economic Thinking (2012).	**Cognition and Sentiment: from Adam Smith to the future of economics** There is a growing sense that standard mainstream economics is limited by its closed-system methodology. While behavioural economics has challenged the narrow mainstream economic notion of rationality, possibilities have been constrained by a methodology that requires a separation of cognition (as reason) from sentiment. Yet, at the beginnings of modern economics, Adam Smith, with David Hume, had developed a theory of human nature, including a theory of mind, as providing the basis for all knowledge under conditions of uncertainty. His open-system approach allowed for interdependence rather than separation, between cognition and sentiment and between the individual and society. Modern heterodox economics similarly takes an open-system approach, challenging the mainstream view of science based on logical positivism. This challenge draws on a range of ideas about knowledge and action which find an early articulation in Adam Smith. Here we attempt to take these ideas forward in order to address the systemic and structural issues faced by modern economies. The reference point for this discussion is the Market Mind Hypothesis, including the notion of a practical mind/body duality.
Karl Friston; Professor of Neuroscience, University College London Karl Friston is a theoretical neuroscientist and authority on brain imaging. He invented statistical parametric mapping (SPM), voxel-based morphometry (VBM) and dynamic causal modelling (DCM). These contributions were motivated by schizophrenia research and theoretical studies of value-learning, formulated as the dysconnection hypothesis of schizophrenia. Mathematical contributions include variational Laplacian procedures and generalized filtering for hierarchical Bayesian model inversion. Friston currently works on models of functional integration in the human brain and the principles that underlie neuronal interactions. His main contribution to theoretical neurobiology is a free-energy principle for action and perception (active inference). In 2000 he was President of the international Organization of Human Brain Mapping. In 2003 he was awarded the Minerva Golden Brain Award and was elected a Fellow of the Royal Society in 2006. He became of Fellow of the Royal Society of Biology in 2012, received the Weldon Memorial prize and Medal in 2013 for contributions to	**Minds, Markets and Self-evidencing** In the cognitive neurosciences and machine learning, we have formal ways of understanding and characterizing perception and decision-making; however, the approaches appear very different: current formulations of perceptual synthesis call on theories like predictive coding and Bayesian brain hypothesis. Conversely, formulations of decision-making and choice behavior often appeal to reinforcement learning and the Bellman optimality principle. On the one hand, the brain seems to be in the game of optimizing beliefs about how its sensations are caused; while, on the other hand, our choices and decisions appear to be governed by value functions and reward. Are these formulations irreconcilable, or is there some underlying information theoretic imperative that renders perceptual inference and decision-making two sides of the same coin?

mathematical biology and was elected as a member of EMBO (excellence in the life sciences) in 2014 and the Academia Europaea in (2015). He was the 2016 recipient of the Charles Branch Award for unparalleled breakthroughs in Brain Research and the Glass Brain Award, a lifetime achievement award in the field of human brain mapping. He holds Honorary Doctorates from the Universities York, Zurich, Liège and Radboud University.	
Gerd Gigerenzer; Director of the Harding Center for Risk Literacy, University of Potsdam Gerd Gigerenzer is Director of the Harding Center for Risk Literacy at the University of Potsdam, Director emeritus at the Max Planck Institute for Human Development, and partner of Simply Rational – The Institute for Decisions. He is former Professor of Psychology at the University of Chicago and John M. Olin Distinguished Visiting Professor, School of Law at the University of Virginia. In addition, he is Member of the Berlin-Brandenburg Academy of Sciences, the German Academy of Sciences and Honorary Member of the American Academy of Arts and Sciences and the American Philosophical Society. He was awarded honorary doctorates from the University of Basel and the Open University of the Netherlands, and is Batten Fellow at the Darden Business School, University of Virginia. Awards for his work include the AAAS Prize for the best article in the behavioral sciences, the Association of American Publishers Prize for the best book in the social and behavioral sciences, the German Psychology Award, and the Communicator Award of the German Research Foundation. He is a member of the Science Council of the ERC. His award-winning popular books Calculated Risks, Gut Feelings, and Risk Savvy have been translated into more than 20 languages. His academic books include Simple Heuristics That Make Us Smart, Rationality for Mortals, Simply Rational, and Bounded Rationality (with Reinhard Selten, a Nobel Laureate in economics). In Better Doctors, Better Patients, Better Decisions (with Sir Muir Gray) he shows how better informed doctors and patients can improve healthcare while reducing costs. Together with the Bank of England, he is working on the project "Simple heuristics for a safer world." Gigerenzer has	**Homo Heuristicus: Decision Making Under Radical Uncertainty** Should risk and uncertainty be differentiated? What is "rational" decision making under uncertainty? In this talk, I will answer "yes" to the first question: the best decision in situations of known risks is not necessarily the best one under uncertainty. I will give an introduction into the study of Homo heuristicus, which addresses the second question. It includes three research agendas. The first is descriptive: What are the heuristics in the adaptive toolbox of a species, an organization, or an individual, and how do people choose between heuristics? The second is prescriptive: In which situations is a heuristic better than a complex strategy? This question is known as the study of the ecological rationality of heuristics. The third question is one of intuitive design: How can systems be designed that help experts and laypeople make better decisions, be it in developing simple rules for safer financial regulation or improving medical diagnosis? The methodological tools are threefold: formal models of heuristics (instead of vague labels such as "System 1"), competitive testing of heuristics against complex strategies (instead of null hypothesis testing), and tests of the predictive power of heuristics (instead of data fitting). These tools also help to overcome earlier misconception of heuristics as biases.

trained U.S. federal judges, German physicians, and international top managers in decision making and understanding risks and uncertainties. The Swiss Duttweiler Institute has distinguished Gigerenzer as one of the top-100 Global Thought Leaders worldwide.	
Dylan Grice; Co-founder of investment firm Calderwood Capital Dylan was formerly Head of Liquid Investments at Calibrium AG, Zurich, where he helped build and establish one of the largest Family Office's in Europe. Dylan started his career at Dresdner Kleinwort Benson in 1997 in the Quant, Strategy and Economics group before moving to Société Générale's highly regarded global strategy team. He was the top ranked sell-side analyst for several years before leaving for Switzerland. He is a graduate of Strathclyde University and the London School of Economics.	**What if the Market Mind Hypothesis is correct? (TBC)**
John Kay; Economist and Fellow of St John's College, Oxford University John Kay is one of Britain's leading economists. His work is centred on the relationships between economics, finance and business. His career has spanned academic work and think tanks, business schools, company directorships, consultancies and investment companies. Today his main focus is on writing and he is renowned for his ability to express complex ideas clearly and succinctly. John has been a Fellow of St John's College, Oxford since 1970. In 1979 he became research director and then director of the Institute for Fiscal Studies, establishing it as one of Britain's leading think tanks with a fearsome reputation for independence. In 1986 he founded an economic consulting business which became Europe's leading autonomous economics consulting company. He was the first dean of Oxford's Said Business School and has held chairs at London Business School, the University of Oxford, and the London School of Economics. He is a Fellow of the British Academy and the Royal Society of Edinburgh.	**The map is not the territory** Since the second world war, subjective expected utility (SEU) has been the dominant economic model of behaviour under uncertainty. The capital asset pricing model (CAPM) describes a market equilibrium in which agents, differentiated by their degree of risk aversion, maximise their SEU. SEU is presented as both normative and descriptive model; normative because its axioms are deemed to be definitive of rationality, and descriptive because agents are deemed to be rational. The principal critique has been from behavioural economics, which has found many examples of inconsistency with the behaviour required by SEU; but, insisting on the continued validity of the normative perspective, it describes these inconsistencies as 'biases', indicative of irrationality. An alternative perspective disputes the axioms of SEU, regarding them as mainly relevant to 'small worlds' in which options can be precisely defined and connected directly to unambiguous outcomes. It believes that humans navigate complex situations with the aid of narratives rather than prior or posterior probabilities. The question of which account is right and which is wrong is fundamentally misconceived. There is no single theory, descriptive or normative, which will explain market behaviour. We need a variety of models each providing perspectives on what we observe and how we should behave. Economic models, like maps, are purpose specific simplifications.

Born and educated in Edinburgh, he has been a member of the Scottish Government's Council of Economic Advisers and chaired the Review of Equity Markets and Long Term Decision Making which reported to the UK government's Department of Business, Innovation and Skills. Following the outcome of the referendum on British membership of the European Union in June 2016, he was appointed a member of the Standing Council on Scotland and Europe appointed by the First Minister of Scotland, Nicola Sturgeon. John Kay is a director of several public and private companies. He is the author of many articles and books. John's work has been honoured by many different bodies. He became Commander of the British Empire in the Queen's New Year Honours List of 2014, and was knighted in the Queen's Birthday Honours List of 2021.	
Anatole Kaletsky; Co-founder and Chairman of investment firm GaveKal Anatole Kaletsky is chairman and chief economist of Gavekal Dragonomics, an economic consulting and asset management company based in Hong Kong and Beijing. He is also a commentator for newspapers around the world in the Project Syndicate network. Before co-founding Gavekal in 2002, Anatole worked for 25 years as an economic journalist and columnist on The Times, Financial Times, The Economist. New York Times and Reuters, writing from London, Washington, New York, and Moscow. Anatole was the first chairman of the Institute for New Economic Thinking (INET) and is now on the boards of INET and the Open Society Foundations. He served on the governing council of the Royal Economic Society from 1998 to 2001 and as a director of JPMorgan Emerging Markets Investment Trust from 2002 to 2018. Anatole's book Capitalism 4.0 published in 2009 anticipated many of the post-crisis transformations of the global economy and was nominated for the Samuel Johnson Prize. His 1985 book, The Costs of Default was influential in the negotiations that followed the Latin American debt crisis. His journalism was recognized by numerous awards including Newspaper Commentator of	**The Four Ages of Capitalism: why collective economic thinking keeps changing, while individual human thinking does not** Since 1776, the year in which Adam Smith published *The Wealth of Nations* and the US Declaration of Independence created the first self-consciously capitalist nation, the nature of global capitalism has undergone at least four revolutionary transformations. Yet individual economic preferences and human behaviour have not changed very much at all. This suggests that a fundamental difference exists between the collective behaviour of the economy and the individual behaviour of the people of whom the economy is comprised. If so, then the effort which has dominated economic theory since the 1960s to "discover" the micro-foundations of macro-economics, whether Keynesian or monetarist or Hayekian, is a category error and a fool's errand.

the Year, European Journalist of the Year and the Wincott Prize for economic commentary. Anatole was educated at King's College, Cambridge, where he gained a first-class honors in Mathematics, and at Harvard, where he was a Kennedy Memorial Scholar and received an MA in Economics. He is an honorary Doctor of Science from the University of Buckingham.	
Scott Kelso; Professor of Complex Systems and Brain Sciences, Florida Atlantic University Scott Kelso's research is devoted to understanding how human beings (and human brains)—individually and together—coordinate their behavior on multiple levels, from cells to cognition to (most recently) social settings (see http://www.ccs.fau.edu/hbblab/index.php). His approach, called Coordination Dynamics, extends the physical concepts, methods and tools of self-organizing dynamical systems to the (informationally-based) activities of animate, living things (moving, perceiving, learning, remembering, developing, etc.). From 1978 to 1985 Kelso was Senior Research Scientist at Yale University's Haskins Laboratories in New Haven, Connecticut. Since then, he has held the Glenwood and Martha Creech Eminent Scholar Chair in Science at Florida Atlantic University where he founded and directed The Center for Complex Systems and Brain Sciences. Kelso is also Emeritus Professor of Computational Neuroscience at Ulster University in Ireland. Kelso and colleagues' research has been published in multidisciplinary journals such as Science, Nature, PNAS and Proc. Roy. Soc., as well as other prominent journals in the fields of neuroscience, physics, biology and psychology. His books include Dynamic Patterns: The Self-Organization of Brain and Behavior (1995), Coordination Dynamics (2004) and The Complementary Nature (with D.A. Engstrøm, 2006). A recent edited contribution is Learning to Live Together: Promoting Social Harmony (2019). Kelso is a Fellow of APA, APS, SEP and AAAS and has received a number of honors and awards for his work, including the MERIT, Senior Scientist and Director's Innovations Awards from the U.S. National Institute of Health. In 2007 he was named Pierre de Fermat Laureate and in 2011 he was the	**Coordination Dynamics and The Metastable Mind** The Market Mind Hypothesis (MMH) raises a provocative question: what kind of mind are we talking about? One view, stemming from cognitive neuroscience, is that mental operations and emotion regulation engage a small number of widely separated brain areas that are "orchestrated" to perform cognitive tasks. The nature of the orchestration has yet to be specified. This talk will introduce some of the main concepts of an empirically based theory of coordination called Coordination Dynamics (CD) that spans brains, bodies and environments, both natural and artificial. Among those potentially relevant to MMH are: (i) CD's grounding in the physical concepts of open, self-organizing dynamical systems (not the usual physics) and synergistic selection (not the usual Darwinian view); (ii) CD's inherently metastable nature in which coexisting tendencies and dispositions (hearkening to Hayek) replace "states"; (iii) metastable CD's dwell~escape dynamic characteristic of a flexible, adaptive, creative and anticipatory mind that mirrors, as William James said, the perchings and flights of a bird; (iv) CD's inherently relational and transitional nature in which agency emerges spontaneously as an 'aha' effect; and (v) CD's fundamental complementary nature which transcends dualistic either/or mindsets (even as it includes them). In short, CD's metastable brain~mind is the proposed (evolving?) mind of that rare creature homo sapiens, which, if we can realize it may hold the key to our survival.

recipient of the Bernstein Prize. He was elected an Honorary Member of the Royal Irish Academy in 2016.	
Julian Kiverstein; Professor of Neurophilosophy, University of Amsterdam Julian is currently writing a monograph for Palgrave Macmillan entitled *The Significance of Phenomenology*, and editing a comprehensive handbook for Routledge Taylor Francis on the philosophy of the social mind. He is associate editor of *Phenomenology and the Cognitive Sciences* and was until recently Book Review Editor for the *Journal of Consciousness Studies*. Before his appointment at Amsterdam in 2011, Kiverstein was teaching fellow at Edinburgh University, where he played a lead role in developing and designing the Mind, Language and Embodied Cognition Masters Programme, of which he also became director. He lives with his family in a village near Amsterdam where Descartes lived and worked from 1638 to 1640.	**Making sense of market moods** Could 4E (embodied, embedded, extended, enactive) cognitive science provides a framework for cognitive economics? One of the aims of the embodied approach to the mind was to overcome dualism of mind as object of scientific study and mind as it is subjectively experienced (Varela, Thompson & Rosch 1991). The objective was to make room for lived experience within cognitive science. A 4E approach to cognitive economics would seek to achieve something similar for cognitive economics. Instead of conceiving of markets as machines and human actors as making decisions based on unconscious computations, a 4E approach to cognitive economics would understand both markets and traders as, first of all, self-organising systems with emergent properties. Novel properties such as prices emerge out of the interactions of investors. These properties act as "order parameters", to use the terminology of dynamical systems theory, that entrain the behaviour of investors, serving to temporarily stabilise patterns of coordinated action such as trading behaviours. In this talk I will ask whether market moods, such as exuberance or despair, can be understood as emergent properties. These are experiences that investors get caught up in. Once they emerge, they seem to take on a life of their own with investors either rushing to buy or sell. Could we think of market moods as example of what enactive cognitive scientists call "participatory sense-making"? In participatory sense-making two or more agents regulate their coupling to one another in such a way that the pattern of interaction becomes self-producing and sustaining. The result is that the pattern of activity that establishes itself is no longer fully under the control of the participants. I will argue first that market moods can indeed be thought of as examples of participatory sense-making. I will consider next if market moods can also be understood as examples of the extended conscious mind. Andy Clark has argued against extended consciousness on the grounds that consciousness depends upon fine-grained processes of temporal coordination within the brain that are not found outside of the individual's nervous system. I will take up recent work by Tom Froese to argue that in participatory sense-making fine-grained patterns of temporal coordination may be found in the brains of interacting individuals. Froese argues for the extended conscious mind on the basis of patterns of inter-brain neural synchronisation. I will consider whether Froese's research could also be generalised to the case of market moods.
Howard Marks; Co-founder and co-chairman of investment firm Oaktree Capital Management Since the formation of Oaktree in 1995, Mr. Marks has been responsible for ensuring the firm's adherence to its core investment philosophy; communicating closely with clients concerning products and strategies; and contributing his experience to big-picture decisions relating to investments and corporate direction. From 1985 until 1995, Mr. Marks led the groups at The TCW Group, Inc. that were responsible for investments in distressed debt, high yield bonds, and convertible securities. He was also	**Fire-side interview with Howard Marks about his memos, books, and the market's mind.**

Chief Investment Officer for Domestic Fixed Income at TCW. Previously, Mr. Marks was with Citicorp Investment Management for 16 years, where from 1978 to 1985 he was Vice President and senior portfolio manager in charge of convertible and high yield securities. Between 1969 and 1978, he was an equity research analyst and, subsequently, Citicorp's Director of Research. Mr. Marks holds a B.S.Ec. degree cum laude from the Wharton School of the University of Pennsylvania with a major in finance and an M.B.A. in accounting and marketing from the Booth School of Business of the University of Chicago, where he received the George Hay Brown Prize. He is a CFA® charterholder. Mr. Marks is an Emeritus Trustee and member of the Investment Committee at the Metropolitan Museum of Art. He is a member of the Investment Committee of the Royal Drawing School and is Professor of Practice at King's Business School (both in London). He serves on the Shanghai International Financial Advisory Council and the Advisory Board of Duke Kunshan University. He is an Emeritus Trustee of the University of Pennsylvania, where from 2000 to 2010 he chaired the Investment Board.	
Geoff Mulgan; Professor of Collective Intelligence, Public Policy and Social Innovation, University College London Sir Geoff Mulgan CBE is Professor of Collective Intelligence, Public Policy and Social Innovation at University College London (UCL). Prior to that he was Chief Executive of Nesta, the UK's innovation foundation (an endowment which grew in worth to around £450m) between 2011 and the end of 2019. Between 1997 and 2004 Geoff had roles in the UK government including director of the Government's Strategy Unit and the Performance and Innovation Unit, and head of policy in the Prime Minister's office. From 2004 to 2011 he was the first Chief Executive of The Young Foundation. He was the first director of the think-tank Demos; and has been a reporter on BBC TV and radio. He has a PhD in telecommunications and has been a visiting professor at London School of Economics (LSE), University College London (UCL) and Melbourne University. Geoff has founded or co-founded	**Collective intelligence, cognition and the life of real economies** Economics has developed many theories based around information and the signalling of markets. It now needs a broader conception of shared intelligence and its role in the real life of economies. Here we need theory and methods that can address: First, the elements of intelligence in real economies: how firms and sectors observe, create, remember, judge, in ways that go well beyond the signalling of information. Second, the dynamics of learning, whether first loop (using new data within an existing paradigm); second loop (where models and categories change); or third loop learning where the system of cognition is changed. Third, the coupled nature of visible and invisible hands which is essential to the intelligence of systems, as different types of events (from stock market crashes to pandemics) trigger interventions by regulators, central banks or governments (triggered hierarchies). Fourth, some of the microdynamics of cognition, including in teams and organisations, where there is the potential for more rigorous analysis of synergistic, synchronic roles, the place of diversity. Finally, the increasingly important economics of how machine and human intelligence combine and interact, including human oversight of algorithms and vice-versa, which requires analysis of the costs and risks of different options.

many organisations. He also has advised many governments, foundations and companies, e.g. from January 2021 he is a member of the International Advisory Board of the European Parliament's Science and Technology Options Assessment panel (STOA). Geoff has written a number of books, including 'Big Mind: how collective intelligence can change our world' (2018, Princeton University Press). Geoff has given TED talks on the future economy, happiness and education. He was knighted in the Queen's Birthday Honours in 2020.	These frameworks provide new tools for understanding the dynamics of real economies, pervaded with information (and misinformation) and different types of formal and tacit knowledge. They also point to alternative methods of intervention to improve the cognitive capacity of economies. The talk will share both some theory and also some recent empirical work on how different sectors mobilise and use new knowledge.
Søren Overgaard; Professor of Philosophy, University of Copenhagen Søren is the author of *Husserl and Heidegger on Being in the World* (2004) and *Wittgenstein and Other Minds:* (2007), co-author of *An Introduction to Metaphilosophy* (2013) and co-editor of *The Routledge Companion to Phenomenology* (2011), *The Cambridge Companion to Philosophical Methodology* (2017), and *In the Light of Experience* (2018). Overgaard's work straddles the analytic-continental divide. His articles have appeared in analytic journals such as *Philosophical Studies*, *Erkenntnis*, and *Synthese*, as well as in continentally oriented journals such as *Continental Philosophy Review*. Søren Overgaard is currently president of the Nordic Society for Phenomenology, and along with Komarine Romdenh-Romluc and David Cerbone, he edits the book series *Routledge Research in Phenomenology*.	**What is it like to be a group?** In my talk, I wish to discuss the idea that groups as such can be conscious, i.e. can have their own consciousness over and above the consciousness of individual group members. In addressing this question, some philosophers invoke Ned Block's famous distinction between 'access consciousness' and 'phenomenal consciousness' and argue that groups can have the former, but not the latter. I suggest, however, that the two notions of consciousness cannot easily be separated in the way this move requires. If I am right, then insofar as groups can have access consciousness, they can be phenomenally conscious. Thus, to extent that we have good arguments reasons for thinking that groups can have access consciousness, we have reason to think there is something it is like to be a group.
Duncan Pritchard; UC Distinguished Professor of Philosophy, UC Irvine Duncan Pritchard mainly works in epistemology, and has written on most of the topics in this field, including scepticism, theory of knowledge, virtue epistemology, modal epistemology, epistemic luck/risk, social epistemology, understanding, inquiry, and know-how. He is also interested in various topics that explore epistemological ideas in particular domains, such as law, education, religion, and cognitive science. Relatedly, he's been involved with a number of projects in applied philosophy, such as bringing the teaching of philosophy	**Sociotechnical Extended Market Knowledge** Our interest is in understanding the 'market mind' as a sociotechnical cognitive system, akin to the kind of sociotechnical cognitive systems that we find in certain kinds of highly collaborative and technologically dependent scientific inquiry. It is proposed that we should unpack this notion of sociotechnical cognition through the lens of the extended cognition research program. With this in mind, a three-tiered account of sociotechnical cognition is set out—along with the corresponding variety of sociotechnical knowledge that results—and applied to the special case of financial expertise employed within a market setting. The first tier is sociotechnically-facilitated cognition, which results in sociotechnically-facilitated knowledge. This is a form of cognition which, while genuinely social (in that social factors play an important explanatory role in producing the target cognitive success), falls short of sociotechnical extended cognition. The second tier is sociotechnical extended cognition, which generates sociotechnical extended knowledge. This form of cognition is sociotechnical in the specific sense that the information-processing of other agents is a proper

into Scottish prisons, exploring the role of extended cognition in special needs education, and incorporating the intellectual virtues into the heart of the UC Irvine curriculum. He has won the Philip Leverhulme Prize, been elected to a fellowship of the Royal Society of Edinburgh, and delivered the annual Soochow Lectures in Philosophy. Recent monographs include Epistemological Disjunctivism (Oxford UP, 2012) and Epistemic Angst (Princeton UP, 2015). His most recent book is Scepticism: A Very Short Introduction (Oxford UP, 2019).	part of the sociotechnical extended cognitive process at issue. It is argued, however, that the core notion of sociotechnical extended cognition is individual in nature, in that the target cognitive success is significantly creditable to the sociotechnically extended cognitive agency of the individual. Sociotechnical extended cognition, in its core sense, thus generates individual knowledge. Finally, there is sociotechnically distributed cognition, which generates sociotechnically distributed knowledge. This is where the cognitive successes produced by a sociotechnical cognitive system are irreducibly attributable to a group agent rather than to participating individuals. (Sociotechnically distributed knowledge is thus irreducibly group knowledge). It is argued that financial expertise employed in market settings is at least typically at most a form of sociotechnical extended cognition (thus leading to sociotechnical extended knowledge).
Kiril Sokoloff; Chairman and Founder of investment firm 13D Research and Strategy Kiril Sokoloff founded 13D Research & Strategy in 1983. For decades, he has been an active yet low-profile global investment strategist, thought leader, and visionary, advising many of the largest pools of global capital.	**ESG: the green energy transition will take longer than everyone expects** TBC.
Shannon Vallor; **Professor in Ethics of Data and Artificial Intelligence, University of Edinburgh.** Shannon Vallor is the Baillie Gifford Professor in the Ethics of Data and Artificial Intelligence in the University of Edinburgh's Department of Philosophy. She serves as Director of the Centre for Technomoral Futures in the Edinburgh Futures Institute and is a Fellow of the Alan Turing Institute. Professor Vallor's research includes advising academia, government and industry on the ethical design and use of AI. Her current project examines responsibility gaps in the governance of autonomous systems, as part of the UKRI Trustworthy Autonomous Systems programme. She is the author of *Technology and the Virtues: A Philosophical Guide to a Future Worth Wanting* (Oxford University Press, 2016) and editor of the *Oxford Handbook of Philosophy of Technology* (2022).	**The AI Mirror: Reclaiming Humane Futures in an Age of Machine Thinking** The accelerating spread of commercially viable artificial intelligence is transforming nearly every economic, cultural and political domain of human activity, from finance and transportation to healthcare and warfare. The new interdisciplinary field of AI ethics has revealed to extent to which AI systems are prone to reflect back and amplify human vices: our unfair biases and discriminatory behaviours, our penchant for consuming and spreading misinformation, and our tendency to pursue narrow gains while losing sight of the bigger picture. While this is true, the 'mirror metaphor' conveys the misleading and dangerous impression that AI merely captures and replicates our humanity in software. Yet we all know that a mirror does not capture the embodied human presence. Glass mirrors erase and occlude much of our material and conscious reality. Mirror images convey no smell, no depth, no softness, no fear, no hope, no imagination. What does the AI mirror erase from us? In this talk I explore the dimensions of our humanity that AI's transformation of the socioeconomic order makes it harder for us to see in ourselves and in one another, and why our futures depend upon bringing these vital aspects of our humanity back into view.

Inaugural Symposium Cognitive Economics:
"The invisible hand extended by the market mind"
Panmure House, Edinburgh (UK); 23-24 May, 2022

MARKET MIND HYPOTHESIS
A cognitive economic theory for the 21st century

CHAIRS	
Name and association	**Bio**
Uziel Awret; Member Inspire Institute	Uzi did his undergraduate studies in Israeli Technion (Physics). He then entered Georgetown university and studied Biophysics. While he passed his PHD exams in both physics and biophysics, he did not complete his thesis and started studying philosophy of consciousness. Uzi also taught physics at Washington Trinity University for 7 years. He is currently a member of the Inspire Institute, Alexandria Va, working on quantum mechanics and consciousness studies. His recent paper is on Holographic Theory of Consciousness and was published in *Frontiers in Systems Neuroscience*. Finally, Uzi is the editor of the 2016 special on the singularity in the *Journal of Consciousness Studies*, with contributions by, e.g., David Chalmers, Daniel Dennett, Nick Bostrom, and Ray Kurzweil.
Arnab Bhattacharjee; Professor of economics and Head of the economics department, Heriot Watt University	Arnab joined Heriot-Watt University in 2013, where he is currently Professor and Head of Economics, and was previously Director of Spatial Economics & Econometrics Centre (SEEC). His research interests lie primarily in econometrics – the discipline of quantitative measurement of economic and social behaviour. His research focuses on foundations and methodology for modeling and identification of structural models using observational data, including Big Data settings. Arnab's applied research is collaborative with government, policy community, civil society, and private enterprise. It has generated active policy debate and societal impact in several areas including: • impact of large economic shocks (like the financial crisis, COVID and Brexit) upon destitution and extreme poverty in the UK and its regions; • development of Scottish Government guidelines for socio-economic-environmental impact evaluation of offshore and marine developments; • the structure and organisation of Monetary Policy Committees; • policies for reducing health inequalities across Scottish regions and demographic regeneration of interior regions of Portugal; • and impact of land reform programmes on forest regeneration and sustainable agriculture in the Amazon. Arnab's areas of interest include Econometrics and Statistics, Urban and Housing Economics, Regional Economics and Regional Studies, Social networks, agent-based modeling and microsimulation, Macroeconomics and monetary economics, Corporate finance, strategy and industrial economics. Arnab's qualifications include a PhD in Statistics (Indian Statistical Institute) and a PhD in Economics (University of Mumbai). He is a Fellow of the National Institute of Economic and Social Research (UK), an Elected Life Member of the International Statistical Institute (since 2004), and a Fellow of Robinson College, Cambridge (UK).

Lizzy Burden; UK Economics Reporter, Bloomberg	Lizzy Burden is a reporter at Bloomberg, covering the UK economy for Bloomberg.com and the Terminal. Listed as one of MHP's 30 under 30 journalists, previously she was an economics reporter at The Telegraph, a graduate trainee at The Times, presented CoronaNomics TV and produced BBC Daily Politics. Before journalism, she assisted in the production of documentary films for National Geographic and PBS. She graduated in History from the University of Cambridge.
Ron Chrisley; Professor of Cognitive Science and Artificial Intelligence, School of Engineering and Informatics, University of Sussex.	Ron Chrisley is Professor of Cognitive Science and Artificial Intelligence in the School of Engineering and Informatics at the University of Sussex, where he is also director of the Centre for Cognitive Science (COGS) and on the faculty of the Sackler Centre for Consciousness Science. He was awarded a Bachelor of Science from Stanford University and a DPhil in Philosophy from the University of Oxford. Before arriving at Sussex he was an AI research assistant at Stanford, NASA, RIACS, and Xerox PARC, and investigated neural networks for speech recognition as a Fulbright Scholar at the Helsinki University of Technology and at ATR Laboratories in Japan. From 2001-2003 he was Leverhulme Research Fellow in Artificial Intelligence at the School of Computer Science at the University of Birmingham. More recently he was a Visiting Scholar at the Stanford Institute for Human-Centered AI. He is currently on extended leave from Sussex to be co-founder and Chief Science Officer for an AI startup in Silicon Valley. He is the editor of the four-volume collection Artificial Intelligence: Critical Concepts (Routledge, 2000).
Larry Hatheway; co-founder Jackson Hole Economics and professor of economics, University of Wyoming.	Larry Hatheway has over 25 years experience as an economist and multi-asset investment professional. Prior to co-founding Jackson Hole Economics, LLC Larry worked at GAM Investments from 2015-2019 as Group Chief Economist and Global Head of Investment Solutions, where he was responsible for a team of 50 investment professionals managing over $10bn in assets. While at GAM, Larry authored numerous articles on the world economy, policy-making and multi-asset investment strategy. Larry was also the lead investment manager for various mandates, funds and an actively managed multi-asset index. Larry also served on the GAM Group Management Board, was Chairman of the GAM London Limited Board and served as member of the GAM Investment Management Limited Board. Larry was also Chairman of the GAM Diversity & Inclusion Committee. During his tenure at GAM, Larry was based in London, UK and Zurich, Switzerland. From 1992 until 2015 Larry worked at UBS Investment Bank as UBS Chief Economist (2005-2015), Head of Global Asset Allocation (2001-2012), Global Head of Fixed Income and Currency Strategy (1998-2001), Chief Economist, Asia (1995-1998) and Senior International Economist (1992-1995). During his tenure at UBS, Larry was also a standing member of the UBS Wealth Management Investment Committee. While at UBS, Larry worked in Zurich, Switzerland, London, UK (various occasions), Singapore and Stamford, CT. At both GAM Investments and UBS Investment Bank Larry was widely recognised for his appearances on Bloomberg TV, CNBC, the BBC, CNN and other media outlets. He frequently published articles and opinion pieces for Bloomberg, CNBC, Project Syndicate, and The Financial Times, among others.

	Before joining UBS in 1992, Larry held roles at the Federal Reserve (Board of Governors), Citibank and Manufacturers Hanover Trust. He holds a PhD in Economics from the University of Texas, an MA in International Studies from the Johns Hopkins University, and a BA in History and German from Whitman College.
Andrew Hauser; Executive Director for Markets, Bank of England (BoE).	Andrew is responsible for: • managing the BoE's balance sheet, including all aspects of the design and execution of our operations in financial markets • managing the UK's official foreign exchange reserves on behalf of HM Treasury • providing market intelligence and analysis for our policy committees. Andrew joined the BoE in 1992, and has held senior roles across most of our major functions. As Executive Director for Banking, Payments and Financial Resilience, he oversaw its financial risk framework; the operation and strategic development of its payment systems and its wholesale and retail banking operations. He was also an executive sponsor for the BoE's work on FinTech. Andrew ran the Fair and Effective Markets Review, a joint initiative by the BoE, the Treasury and the Financial Conduct Authority (FCA). He was Private Secretary to the Governor, and represented the United Kingdom as a member of the Executive Board of the International Monetary Fund in Washington DC. He has overseen the BoE's Inflation Report and regional agency network, and served on the secretariats to the Monetary and Financial Policy Committees. Between 2013 and 2017, Andrew was a Non-Executive Director and Chair of the Audit and Risk Committee for NHS Resolution. Andrew has a first degree in politics, philosophy and economics from Oxford University and a master's degree in economics from the London School of Economics.
Robbie Mochrie; Associate Professor of Economics, Heriot-Watt University	Robbie Mochrie is a Chartered Banker, and since completing his PhD training (thesis: Rational Choice and Choosing Rationally), he has taught economics at Heriot-Watt University.
Russell Napier; Visiting Professor, Heriot-Watt University; Co-founder of the investment research portal ERIC	Professor Russell Napier is author of The Solid Ground investment report for institutional investors and co-founder of the investment research portal ERIC- a business he now co-owns with D.C. Thomson. Russell has worked in the investment business for over 30 years and has been advising global institutional investors on asset allocation since 1995. Russell is author of the book *Anatomy of The Bear: Lessons From Wall Street's Four Great Bottoms* ('a cult classic' according to the FT) and is founder and course director of The Practical History of Financial Markets at The Edinburgh Business School. Russell is Chairman of Mid Wynd International Investment Trust a GBP500m market cap. closed end investment vehicle listed on the London Stock Exchange. He is a member of the investment advisory

	committees of three fund management companies, Cerno Capital, Kennox Asset Management and Bay Capital. In 2014 Russell founded the charitable venture The Library of Mistakes a business and financial history library in Edinburgh that now has branches in India and Switzerland. Russell has degrees in law from Queen's University Belfast and Magdalene College Cambridge. He is a Fellow of The CFA Society of the UK and is an Honorary Professor at The University of Stirling and a Visiting Professor at Heriot-Watt University. He is a contributing columnist for The Toronto Star newspaper. His second book – The Asian Financial Crisis 1995-1998: Birth of the Age of Debt- was published in July 2021.
Danilo Spinola; Senior lecturer in Economics, Birmingham City Business School	Dr. Danilo Spinola is currently the chairman of the community board of the Institute for New Economic Thinking (INET)'s Young Scholars Initiative (YSI), a community in which he has been involved for the past 10 years. Danilo has a PhD in economics from Maastricht University, and he is currently working as a senior lecturer in economics in the department of finance and economics at the Birmingham City Business School, where he teaches modules on Political Economy and Economic Development. Danilo is particularly interested in complexity economics, and its relationship to evolutionary mechanisms of development.
Discussants	
Name and association	**Bio**
Jo Danbolt; Professor of Finance, University of Edinburgh.	Jo Danbolt jointed the University of Edinburgh Business School in 2012, having previously worked at the University of Glasgow and Heriot-Watt University. He holds the Baillie Gifford Chair in Financial Markets and is also currently Interim Director of Faculty and Deputy Dean of the University of Edinburgh Business School. He has published widely, mainly in the areas of empirical corporate finance and mergers and acquisitions.
James Clunie; Director at Long-Short Consulting Limited	James is Director at Long-Short Consulting Limited, providing consultancy on investment process design and risk management. Prior to this, he worked as an investment manager, specializing in long/short global equities. He has been Head of Strategy, Absolute Return at Jupiter Asset Management; Investment Director at Scottish Widows Investment Partnership; Head of Global Equities at Aberdeen Asset Management; and Head of Asset Allocation at Murray Johnstone International. James has served on investment committees and trustee boards for several charities and pension funds. He was also a Senior Lecturer in Finance at the University of Edinburgh, where he set up their MSc in Finance and Investment. He served as Programme Director, and lectured on topics including Financial Markets, Portfolio Management & Investment Analysis, and Cases in Finance and Investment. The MSc programme was awarded the Scottish Financial Enterprise Innovators Award in 2005. James has published a series of books and journal articles on topics such as short-selling, risk assessment and complex financial products. He also co-authored the CFA Level III Reading 21: Overview of Equity Management. James earned his PhD in Management from the University of Edinburgh in 2009, and has been a CFA Charterholder since 1995. He is an Honorary Professor at the University of Edinburgh.

Christel Fricke; Professor of Philosophy, University of Oslo	Christel Fricke holds a PhD in philosophy and a habilitation from Heidelberg University, Germany. Since 2003, she has been a professor of philosophy at the University of Oslo, Norway. Her main research interest is moral sentimentalism. She has published on moral theory and its history, especially Adam Smith and Immanuel Kant. Volumes she co-edited include Nature, Culture, Gods, and Reason – Exploring Evaluative and Normative Constraints on Right Action in a Historical and Comparative Perspective (Special Issue of the Journal of Value Inquiry, 2015), Intersubjectivity and Objectivity in Adam Smith and Edmund Husserl (Ontos Verlag, 2012), The Ethics of Forgiveness (Routledge, 2011) and Adam Smith and the Conditions of a Moral Society (The Adam Smith Review VI, 2011). For details see: http://www.christelfricke.no/curriculum-vitae.
Sam Johnson; Assistant Professor of Psychology, Warwick University	Sam Johnson is an Assistant Professor of Psychology at Warwick University in the Behavioral Science group. Sam works at the intersection of cognitive science, behavioral economics, and social psychology. His work examines strategies that people use for making sense of the world, especially explanatory reasoning for navigating the informational landscape and moral reasoning for navigating the social landscape, primarily using experimental tools but incorporating ideas from philosophy, economics, and anthropology.
Edward Jones; Associate Professor of Finance and Director of the Centre for Finance and Investment (CFI), Edinburgh Business School (Heriot-Watt University)	Edward Jones is Associate Professor of Finance and Director of the Centre for Finance and Investment (CFI) at Edinburgh Business School. Eddie has also recently served as Head of the Finance Group. Dr Jones obtained his PhD from Heriot-Watt University in 2002. He joined Heriot-Watt for a second time as Senior Lecturer in Finance on 1st December 2009 having previously served as Lecturer in Financial Economics at the University of Edinburgh and Lecturer in Finance at Heriot-Watt. He has also worked as a Lecturer in Finance at the University of Wales, Swansea. He has authored a number of papers on profit measurement, corporate governance, corporate growth opportunities and company investment decisions. In no particular order his research interests include: Agency Costs; Executive Compensation; Capital Structure; Cash Holdings; Earnings Informativeness; Earning Management; Credit Ratings; Corporate Governance; Mergers and Acquisitions; Event Studies; Company Investment Decisions; Joint Ventures; Investor Protection; Fisheries Economics.
Orestis Palermos; Associate Professor in Philosophy, Cardiff University	Orestis works at the intersection of philosophy of mind and cognitive science, epistemology, philosophy of science and philosophy of technology. He is particularly interested in philosophical engineering--the use of philosophy to impact the design of emerging technologies and socio-technical system--and he has published several articles and co-edited volumes on the topic. Currently, he is a Senior Lecturer in Philosophy at Cardiff University and prior to that he was a postdoctoral fellow at the University of Edinburgh. His PhD and MSc in Philosophy are from the University of Edinburgh. He also holds a BSc and MSc in Chemical Engineering from the National Technical University of Athens.
Aaron Schurger; Assistant Professor, Department of Psychology and the Brain Institute at Chapman University	Aaron Schurger completed his undergraduate studies in computer science at Indiana University and then worked as a software consultant before going on to earn his PhD in psychology and neuroscience at Princeton University under the guidance of Jonathan D. Cohen and Anne Treisman. After that he joined the

	research team of Stanislas Dehaene at the Neurospin research center near Paris, France, and also worked as a senior researcher with Olaf Blanke and José del R Millán at the EPFL in Lausanne, Switzerland. He went on to join the French National Institute for Health and Medical Research (INSERM) as principal investigator based again at the Neurospin research center. He is currently assistant professor in the Department of Psychology and the Brain Institute at Chapman University in Southern California. Schurger's research focuses on the neural signatures of subjective experience and the neural antecedents of self-initiated movement. In 2013 Schurger was awarded the William James Prize from the Association for the Scientific Study of Consciousness (ASSC) and in 2015 was awarded the BMI-Kaloy prize from the Kaloy Foundation for his work on the influence of spontaneous fluctuations in brain activity on self-initiated movement. Schurger's work on conscious perception has focused on how the formation of stable patterns of brain activity might play a role in consolidating and transmitting neural information and might serve as a signature of conscious perception. Schurger uses a variety of techniques in his research including behavioral psychophysics, neuroimaging, computational modeling, machine learning, and brain-computer interfaces.
Dave Ward; Senior Lecturer in Philosophy, University of Edinburgh	Dave Ward is a Senior Lecturer in Philosophy at the University of Edinburgh. His teaching and research focus on using resources from philosophy and psychology to understand the relationship between the human mind and the natural world. He has a particular interest in the scope and limits of approaches that understand experience and intelligence as modes of culturally situated embodied activity.