Editorial Introduction for 28:1

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In this issue we are pleased to share with you a diverse set of reading materials. Sadly, we mark with an obituary the passing of Julian Miller, a researcher whose loss has been keenly felt within the community of Artificial Life researchers. He shall be sorely missed.

On a much brighter note, the second installment of Chris Adami's column exploring how artificial evolution might facilitate the design of General Intelligence is to be found within the pages of this issue. Adami explains how the indirect encoding of artificial brains to facilitate neuro-evolution might be managed. He discusses approaches to choosing an appropriate neuron, how to connect neurons to create a functioning network, how to train the network, and how the different options scale up to high levels of complexity. Drawing such connections between the techniques of Artificial Life and the concerns of Artificial Intelligence is key (we feel) to enhancing the recognition that embodiment, developmental processes, and evolutionary processes all have a role to play in the emergence of natural intelligence – to overlook this whilst striving for artificial general intelligence is likely problematic.

Simon Penny, an artist long engaged in Artificial Life art and robotics, provides for us a critical review of a new book by Sofian Audry, *Art in the Age of Machine Learning* (MIT Press 2021). The title might seem to be slightly out of line with Artificial Life's main focus, perhaps even more suited to an AI readership, but, as Penny points out, this isn't necessarily the case. In fact, by presenting both the practical artistic-technological concerns of the day, and the philosophical issues these raise with respect to agency, creativity and art-making by machines, Audry is in fact delving into areas that should concern us as researchers of Artificial Life.

A topic infrequently explored within the pages of this journal is the impact that Artificial Life has on human relationships. In *Uncanny Beauty: Aesthetics of Companionship, Love, and Sex Robots*, Paolo Euron enters this space by examining "physical beauty according to the artistic, cultural, and philosophical traditions", of sexbots. Since Euron focuses on the visual appearance of these humanoid robots, with this article we have adopted a new approach for the Artificial Life journal to widen the perspective. The text is therefore supported by commentaries the editors have sought from alternative points of view. Thomas Arnold provides comment on Euron's work from the perspective of Human-Robot Interaction by assessing the ethics of sex robots and how concepts of human trust, dignity, and autonomy potentially influence our interactions with such machines. Maria O'Sullivan examines how human interactions with sexbots relate to gender power relations and our expectations and human norms of intimacy and vulnerability. She also considers the very real dangers now widely associated with the commodification of beauty and the potential for moral harm that may result from an increase in the ubiquity or use of sexbots. We hope that you find the article and commentaries thought provoking.

The issue also includes five other intriguing research articles.

In *Computation by Convective Logic Gates and Thermal Communication*, Bartlett et al. demonstrate a simulation of an embodied computational system of Boolean NOR gates that can be realised in a convective fluid. This demonstrates that computation can be achieved in relatively simple physical contexts.

The article *Morphological Development at the Evolutionary Timescale: Robotic Developmental Evolution*, by Benureau and Tani, flips the usual biological timescales (slow evolution, faster developmental processes) to one where morphological development is slower than evolution, and applies this in the context of robot design. Early in the evolutionary process, robots are 'babies', and only later on in evolution have they developed into 'adults'. The authors investigate this novel approach to evolve diverse gaits.

In *Effect of Environmental Change Distribution on Artificial Life Simulations*, Bullinaria explores the effect of environmental change (modelled as coloured noise) on evolutionary outcomes. He carefully dissects two factors: the average size, and the distribution of changes, to show that results are not as sensitive to noise colour as previously thought.

Monte Carlo Physarum Machine: Characteristics of Pattern Formation in Continuous Stochastic Transport Networks, authored by Elek et al., takes inspiration from slime mould growth to develop an algorithm for reconstructing networks from sparse data. The authors demonstrate their algorithm by applying it to a case study rarely seen in the Artificial Life arena: cosmological data sets of the large-scale distribution of gas and dark matter in the universe.

In *From Dynamics to Novelty: An Agent-Based Model of the Economic System*, Recio et al. explicitly include time evolution in a new model of a complex self-organising economy. They realise their model in an agent-based simulation of an economy that can generate new technologies and products, and investigate the dynamics of the resulting system.

We hope you enjoy the issue!