Making Space for Algorithmic Alphabets

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Over the past few decades, the development of technology has largely focussed on controlling people's work, rather than helping them control their own craft and expression (Franklin 1999). Furthermore in computer science, due to a variety of social and societal factors, programming languages have generally been designed for and by particular groups of people (Ko 2021). As a result, technology cultures have moved towards homogeneity around particular mindsets. Perhaps then we need to *undo* computer science, in order to find a way forward based on different assumptions.[1] Indeed, many have worked on making alternative programming languages and practices, and creating space for alternative cultures to grow around them. Examples can be found across computer art (Brown et al. 2009), live coding (Blackwell et al. 2022) and esolang[2] communities, where we see a common theme of questioning the pervasive constraints of technology, in the process of developing alternatives.

Through this talk we build on this theme, by examining code and its notation as a pivotal means of computational expression, and introducing our concrete early experiments in how it might be reimagined to support a much wider diversity of cultures and communities. Our collaboration brings together work from two non-profit, independent research labs; namely Dynamicland, build a communal computer by bringing everyday material to life via its Realtalk system (Victor, Iannini, and Douglas 2023), and Then Try This, aiming to learn from heritage technologies to inform the design of new creative and collaborative technology within the developing *Algorithmic Pattern* research theme (Mclean 2020). Both contexts put communities of practice very much in focus in the development of technologies, creating space for people to collectively reimagine the future, by building on a long history of tangible, collaborative and hands-on craft and thinking practices.

So far, the focus of our collaboration has been on the possibilities of exploring hand-drawn symbol systems, in a project that we are calling *Algorithmic Alphabets*. In one experiment, we employ simple computer vision techniques in a playful system based on recognising and relating symbols to one another, according to simple but perceptually salient features, namely 'spikiness' and 'wonkiness'. This allows us not only to recognise discrete symbols, but also relate symbols to each other within continuous conceptual spaces (Gärdenfors 2000). There is a long tradition of visual programming language research, but we still see relatively uncharted territory in including visuospatial features and arrangement in otherwise symbolic languages, allowing us to effectively program using conceptual metaphors.

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[1] See Bret Victor's 2013 talk "The Future of Programming" at the DBX conference for a view on how the future of computing is revealed by looking at the past, free of dominant paradigms http://worrydream.com/dbx/

[2] *Esolang* is short for *esoteric programming languages*. See esolangs.org for a catalogue of works, and esoteric.codes for historical perspectives and interviews with practitioners.

Our aim in this work is to create experimental systems for exploring algorithmic patterns (initially musical patterns) through hand-drawn symbols. Once we have a minimal viable system, we will explore it in participatory workshops with diverse groups, looking to support them in building their own symbolic languages. Our aim is that these groups of people will be able to work together to make their own notations, while live coding how those notations are interpreted.

After sharing progress on these systems, we will conclude by looking at the wider, long term context for this work. As Amy Ko laments (Ko 2023), nearly all explorations of liberatory computing are still trapped within the confines of imperial, colonial, capitalist, and commodity technology, which inherently bounds their revolutionary potential. We argue that computing will never be a liberatory technology until the entire means of computation are under the full agency of the people, communities and cultures using them — from authorship over the software environment all the way down to the production of the computing hardware, as well as the "soul" of computation being expressed. By "soul" we mean the fundamental models of computation that express the culture and worldview of a community of practice, as explored e.g. by Lewis et al. (2020). To achieve genuine agency, this principle should be reflected right down to the hardware level, such as differing concepts of time and clocks, different architectures of communication, different divisions of labour and parallelism, etc. We believe the history of computation and algorithmic pattern should be rewritten, reflecting its foundations far beyond the conventional western narrative.

Realtalk is an attempt to put the operating system, computational materials and the "means of interaction" under the authorship and agency of the community, as fundamental components of its broader conception of communal computing. At present, it still remains bound by commodity hardware, commodity projectors, commodity CPUs and GPUs and storage devices. There is only so much we can do to provide agency over such black boxes, when, for example, the details of Intel, NVIDIA and AMD silicon's operation and design remain proprietary, and their production requires billions-to-trillions in capital and labyrinths of extractive and exploitive supply chains.

For now we can look to ancient computational technology such as handweaving (Harlizius-Klück 2017), to better understand how communal computing can work in open, collaborative, social and sustainable ways. By looking to the past, we can challenge the linear narratives around technology towards unbound, destructive overgrowth, and find alternative, humane approaches. We don't even know what we're missing in a world of diverse invention and production of the fundamental building blocks of computation, and the variegated ever-evolving ecosystems that would grow in their soil.

Biographies

Alex McLean is non-academic research fellow at Then Try This, co-founder of the algorave and TOPLAP movements, and originator of the free/open source TidalCycles live coding environment.

Luke Iannini is a researcher at Dynamicland and co-authored the Realtalk operating system.

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References

https://www.washington.edu/doit/webinars/?webinar=wordplay

Blackwell, Alan F., Emma Cocker, Geoff Cox, Alex McLean, and Thor Magnusson. 2022. *Live Coding: A User's Manual*. MIT Press. https://doi.org/10.7551/mitpress/13770.001.0001.

Brown, Paul, Charlie Gere, Nicholas Lambert, and Catherine Mason, eds. 2009. *White Heat Cold Logic: British Computer Art 1960-1980 (Leonardo Books)*. The MIT Press. http://www.worldcat.org/isbn/0262026538.

Franklin, Ursula. 1999. *The Real World of Technology*. 2nd edition. House of Anansi Press.

Gärdenfors, Peter. 2000. *Conceptual Spaces: The Geometry of Thought*. The MIT Press. http://www.worldcat.org/isbn/0262071991.

Harlizius-Klück, Ellen. 2017. 'Weaving as Binary Art and the Algebra of Patterns'. *TEXTILE* 15 (2): 176–97. https://doi.org/10.1080/14759756.2017.1298239.

Ko, Amy. 2021. 'Deconstructing CS Culture – Dr. Amy J. Ko – 2021 IEEE RESPECT Keynote'. Keynote, May 22. https://www.youtube.com/watch?v=c8TQ29I8lK4.

———. 2023. 'Searching for Justice in Programming Language Design'. University of Washington, August 23. https://www.washington.edu/doit/webinars/?webinar=wordplay.

Lewis, Jason Edward, Angie Abdilla, Noelani Arista, Kaipulaumakaniolono Baker, Scott Benesiinaabandan, Michelle Brown, Melanie Cheung, et al. 2020. 'Indigenous Protocol and Artificial Intelligence Position Paper'. Monograph. Honolulu, HI: Indigenous Protocol and Artificial Intelligence Working Group and the Canadian Institute for Advanced Research. 2020. https://doi.org/10.11573/spectrum.library.concordia.ca.00986506.

Mclean, Alex. 2020. 'Algorithmic Pattern'. In *Proceedings of the International Conference on New Interfaces for Musical Expression*, 265–70. Birmingham, UK. https://doi.org/10.5281/zenodo.4813352.

Victor, Bret, Luke Iannini, and Shawn Douglas. 2023. 'Communal Computing for 21st-Century Science'. Dynamicland. https://dynamicland.org/links/2023-04-27.