De/coding Reality UXA

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PART III. Re/coding experience

To the 24 generations of students
I taught at the Faculty of Philology,
University of Belgrade

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Richard P. Gabriel who transformed my thinking and emboldened my exploration. Jenny Quillien for her maieutic role in helping this book come along. Dave West for his critique. Vesna Stemwell for helping format the bibliography. Daniel Temkin. Fernando Borretti. Alex Schroeder. The Emacs community. HN's Daniel Gackle; Sam Altman for receiving my phone call. My academic reviewers, Professors Vesna Lopičić, Ana Kocić Stanković, Miloš Vukelić. Professor Sarah Hayes for reading 4.4. Tommy Goetz. Jacqueline and Kevin Pelky. Dr. Dušanka, Radoslav, Biljana, and Nenad Mandić. Mirjana Butković. Dana and Thomas. My brother. O. Budimir.

That to exist, something must grow from the past;
That to express thought, language must be recursive –

Where do we come from? What are we? Where are we going? — Paul Gauguin

Life is short and Art is long. We all fail in our efforts to present the essentials of culture to our students. It remains for their genius to convert our failure into success. I discern decisive signs of the coming of ***a new epoch in American thought*** — Alfred North Whitehead (emphasis added)

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Foreword

WHAT DID AMERICA DO WITH THAT IDEA (:) BICYCLES FOR THE MIND

Jenny Quillien and Richard P. Gabriel

An innovative teacher in American studies has prepared an educational toolkit—dense and demanding—for colleagues courageous enough to pick up the challenge. The toolkit proposal runs roughly like this:

Google, Microsoft, Netflix, iPhone, Airbnb, Facebook, Instagram, Slack, WhatsApp, tXtter[1], & desktop and wearable computing devices are part of our every waking hour, shaping our thoughts, directing our choices, tracking our clicks, steps, proclivities, and purchases. Their business models are based on brokering attention, addiction, advertising, and the commodification of data and its manipulation. They know how to take over and eliminate pockets of local embodied knowledge by extracting abstracted data into larger data sets. Automatization and legibility are both method and goal: all the better to eat you with. They are all American. Deeply American. (Silicon-Valleyish Californian, actually.) Therein lies an adventure for the inquisitive student of cultural studies. What values, behaviors, and assumptions find expression in these digital goings-on? Mind you, also American are their most effective critics, hackers, and creators of potential alternatives. European consumers of American commercial software may squawk in limp protest, raise ineffectual barriers of privacy protection laws, but let's face it: they are on the American lunch menu along with burgers, nuggets, and coke. So, what does the student of cultural studies do with that?

It behoves any educator charged with teaching 21st century American culture (and its wider sphere of influence) to acknowledge that here/now is the hot current cultural core that must not be glossed over. Wave away reading Thoreau or the Federalist papers, or observing the cavalier evolution of popular TV choices: Gunsmoke, All In The Family, Roseanne, Dancing With The Stars, & The Big Bang Theory along with their streaming cousins Breaking Bad and The Walking Dead.

Furthermore, forewarned is forearmed: a competent grasp of the digital situation requires serious effort and skill. Bring it: the toolkit. That toolkit has some expectable items: extensive references, a syllabus, discussion prompts, and interviews with notable people, but it mostly surprises. The explanatory text develops new

[1] Our whimsical name for X, formerly known as Twitter.

vocabulary to draw our attention to subtle phenomena we might miss. Consider, for example, re-presencing, hermeneutechnics, phenomenography or infraculture. To unpack just the first example, the author has rejected the established term, represent, where X stands for Y, as well as revive, where X comes back from the dead, but coins a needed word for the context-sensitive bringing to the surface a living thread of knowledge, giving it fresh presence. This is care-full work. Research in cultural studies involves such delicate teasing out of underpinnings, i.e., the grid of meaning systems by which lives are lived. How does one go about that? The author crates an essentially Geertzian method of cultural analysis to identify "objects," i.e. artifacts and techniques that structure and codify current American culture. These objects can then be mapped onto grids.

...and some unexpectable ones: using code—the stuff of computer programming—as ansatzpunkts (starting points) to observe / appreciate / savor the gap between scratching one's own itch using technology and climbing into a software silo designed to sate the inexhaustible itch of shareholder value and consumer lock-in. Free software, open-source software, hackers making their own comfortable nests of automatized helpers, and esoteric programming languages (esolangs) serve as examples of how the imperialistic American way is not the only way to a digital (née cultural) expanse; how instead of the understatement of the lowest common denominator we could have an equally American lushness, i.e., a fructifying of personal, idiosyncratic understandings and undertakings.

Hardly passive or complacent in intent, teaching with this material is clearly a subversive activity in the Neil Postman sense. For full disclosure to potential readers, it is this subversion which attracted the two authors of this foreword, Jenny Quillien and Richard Gabriel. And note it took two of us: it will be a rare reader who possesses all the necessary background to fully and evenly enjoy the treasures of the toolkit. One of us (Quillien) can navigate anthropology, phenomenology, cognitive psychology, education, and late 20th century French intellectualism; the other (Gabriel) digital literacy and skills, mathematics, poetry, and literature. Both of us, along with the author (Greta Goetz), wish to dis-automatize knowledge creation and strengthen a much wider base of human-centered learning with comfortable and appropriate digital tooling. Curiously, on this question, Goetz's main toolbox choice is not an American voice but the French scholar and activist, Bernard Stiegler. Stiegler, looking backward, has much to say about the technical history of memory and knowledge exteriorization and, looking forward, has a vision of a contributory economy, far more sane, interesting, and adult than advanced capitalism endlessly marketing to libidinal drives.

The current manuscript ends with pedagogy as the responsive cure to our current ills, but Jenny and Richard see room for more: for antidotes and curatives, for escape hatches and safe rooms. Jenny Quillien wishes for some sort of introductory guide to digital martial arts in the For Dummies series—digital skills for self-defence,

to counter, for example, endless and impossible Terms of Service agreements; digital skills for blocking when we are being snookered or lullabied. The Cloud doesn't float fuzzy, white, and innocent in the sky; the Cloud is other people's servers which give them distinct power and manoeuvrability. She wants alternative ways to search and navigate. She wonders how learners can create their own truly convivial tools in the Ivan Illich sense. Richard Gabriel already has the skills to build convivial tools and he does so in the privacy of his home, but wonders how can they be effectively shared and developed—how can curiosity and exploration become a commonplace.

The toolbox addresses a bespoke audience of educators in American cultural studies; but this is too limited for the fertile work that has been accomplished here. It's time to re-presence the possibility of Steve Jobs's early vision of personal computing as bicycles for our minds.

–jgq (Weesp)

–rpg (Redwood City)

Preface

Research for this book began in around 2018 when I co-led a networked learning pilot now documented in *Teaching and Learning to Co-Create*, (Palgrave-Macmillan, 2021). Teaching with digital technology raises all sorts of questions, from how to adopt it meaningfully within pedagogical design to which software, services, and platforms are being used and why.

My research accelerated in 2020 when I noted the mass adoption of just a few types of software and/or platforms like Zoom and Google Classroom. I was disappointed with my peers for not debating what these technologies afford and how, for whom, under what circumstances (Davis 2020), especially because there are (still) alternatives that allow choices to be made. These include a variety of free software options that can be tailored to specific needs by IT departments. This was not even considered although tools like Zoom received bad press among IT experts (e.g. Schneier 2020; GNU n.d.). Compelling reasons as to why these tools should be avoided include security and dependency though understanding why requires some fluency with the subject matter.

It was perplexing how few people seemed to want to discuss this problem outside of the free and open source communities, so I wrote a hasty entry (Goetz 2022) in a collective response to Bayne et al.'s 2016 *Manifesto for Teaching Online*, which gained new relevance between 2020-2022. Finding myself alone in my research pursuit, I spent hours that became years scouring social news websites where programmers chatted, like Hacker News and lobst.rs, trying to increase my receptivity to and fluency with their concerns and interests.

Here I must pause for readers concerned about what on earth this has to do with the "America" suggested in the title of this book. UXA can onomatopoeitically "sound like" USA. While the title is a deliberate play on words, the United States of America has not yet been referenced in this preface as the premise of this book is that American culture is most ubiquitous today through digital culture and that until very recently this has gone without saying. Google is American. Facebook is American (which people do still use – socially, not just to buy furniture – in some countries). Internet architecture and myriad software platforms and stacks – if largely unseen and highly complex – is American. New literacies and accompanying pedagogies are needed to read into where the tools that we use come from, the ethos behind their development, and the socio-environmental supports and costs of their architecture.

Less visible manifestations of American culture have been unpacked by critical theory. The work of thinkers like Deleuze and Guattari is often used to explain how power and capital arranges the relations between people and things. More generally, it is popularly understood that the American way, its cultural "way of being", seeks to get things done no matter what the cost. This is both represented by and popularized through the life-hacker mindset, the scientific management of speed and efficiency, and the idea that "time is money" which can ultimately, if not purposely, instrumentalize the human being. These topics will be touched on in this book. But they are not my reason for writing it.

Rather, to return to my narrative, this book came out of my own experience as the world shifted from being digital to postdigital, by which I mean that digital interfaces have become more embedded in multiple aspects of daily experience around the world. Therefore, I felt a need to try to understand something about this technology – and not just through the lens of critical theory, which is less useful for discursive exploration of how ubiquitous postdigital tech is being used and used without public debate or broader consideration. How does it work? What do the people doing the work to make it work think?

To answer these questions, part of my research involved listening to podcasts about programmers like Adam Gordon Bell's excellent Corecursive, Henry Zhu's thoughtful Hope In Source, the iapp's Privacy Podcast, Software Engineering Radio, the EFF's How to Fix the Internet, HTML Energy, Coder Radio, NET Rocks, Linux Unplugged, Indie Hackers, the AI Podcast, and Techtonic, hosted by Mark Hurst, who was also a guest in one of my online classes. I also drew diagrams that mapped out my understanding of the components of programming and its architecture and infrastructure. An early iteration is documented on my blog (2022a) though it now makes me cringe.

I also corresponded with programmers like software engineer and writer Fernando Borretti. His excellent blog post on writing a compiler prompted me to ask if he would act as a mentor and answer some of my early questions, which he did. I also conducted an interview with Daniel Temkin who maintains a wiki and interview site on esoteric programming languages, which is in this book. Finally, I exchanged a few emails with Hacker News's Daniel Gackle. While Gackle also set up a phone call between me and Sam Altman which I was unprepared for at the time, his support helped me to persevere when I felt I was in over my head.

I learned (and re-learned) rudimentary programming and did my own HTML and CSS for the TextPattern sites I use with my classes, documented on my blog gretzuni.com. I learned how to use Emacs, blogged a lot about it, and now get obscure jokes and argue with Vim users in my spare time (that is an example of a joke). I explored how to use wikis in learning and enjoyed excellent correspondence with the Emacs wiki legend Alex Schroeder, some of which is cited on my blog.

In part due to Mark Hurst's arguments that we should all "get off Google", I began to wonder whether I would be able to get work done if I stopped using

Microsoft, Amazon, Google, Facebook (now Meta), YouTube, and other "MAGFY" type services, software, and platforms. So I decided to try and to document the experience in an autoethonographic study. This ended a few months ago, having culminated in a disastrous mess when an academic publisher sent me page proofs that were to be corrected in Adobe. This required logging in via Google or Facebook or signing up for a software trial, which could only be activated by entering credit card information. With only a day to make corrections, I found I could not remember my old Google password, and because I had canceled my credit card (for unrelated reasons), I could not even login for the software trial. I eventually hacked the corrections but lost sleep over the extra work and felt traumatized long afterwards. I will let this anecdote stand, without further commentary.

But the experience made the topic of postdigital America more personal than it already was. As an American living in Belgrade I had felt apologetic for the thrust of the postdigital in the past decade. Yet I have also been enamored by the ideas shared through it, such as the renewed interest in craft and design (e.g. Buckley 2020), or the new approaches to pedagogy it affords or inspires, like in the work of Americans Jeff Bloom or Howard Rheingold.

And then I sat down to write the book. When I finished one of the drafts, I sent it to esteemed American poet, writer, and computer scientist Richard Gabriel, who agreed to write an introduction together with American anthropologist Jenny Quillen. I had been in correspondence with Gabriel over his important book *Patterns of Software* and interviewed him for this book. Incidentally, my enthusiasm for Gabriel's book partly fueled the inspiration behind a presentation I gave at EmacsConf 2021 (Goetz 2021a). Later that year, I had the privilege of meeting Jenny in person, who asked: how does writing about this subject in Belgrade, Serbia, bring perspective to it? We also talked a lot about Stiegler and she encouraged me to round out the book with work I was doing on his (non-)metaphysics and digital culture.

This book is not quite that book. May readers be forgiving. Due to an attempt to help with family as I was finishing the final draft, I made a temporary move back to the States, where I write now. *While this book is an improvement of the earlier version, it merely stakes out a claim on the range of topics I had originally hoped to cover*. I have to let go now. At least the book points to the problem of metaphysics. I will tell you why I think that matters today and what it had to do with my life as I was writing.

After six years of research and discomfort due to my autoethnographic experience of living without mainstream software and services, I felt as if I had lost a spark of life and that the journey to write this book had left me in a meaningless wasteland. Is there even any "reason" to reflect the (digitized) world? After all, research is often but the attempt to arrive at accuracy that is as close as possible to "nature". I realized that I had internalized the nature of the method behind the things I was researching, namely: Cartesian objectivity, calculation, and a scientific

approach to re-presenting, even if by way of cultural-philological mimesis and cultural description. There was no light in it. Even the anthropological, human side of re-presentation lost its allure.

And then I remembered why I had left the West 23 years ago in pursuit of "rocky Eastern Europe," to quote an early email from Jenny. The reason had to do with the path of the Pascalian heart, having "reasons of which reason knows nothing".

Something similar was described by Alfred North Whitehead who influenced Stiegler who influenced this book. He wrote of "the urge to transform mere existence into the good existence, and to transform the good existence into the better existence" (1929: 23). This can be compared to an account of the spirituality of Serbian orthodoxy in the autobiography of Serbian-American scientist and Columbia University Professor Michael Pupin. It unfolds through a beautiful leitmotif describing the pursuit to understand and reach the stars. To share an example:

> Many a time during my early experiences in [the] drill school I thought of my mother's words which described the steep and slippery climb which awaited me, and which was leading, as she had expressed it, to real stars from heaven (Pupin 1923/1926: 178).

I chose that passage as I, too, had been in a drill school of my own in conducting the research for this book, trying to learn about the technical "terminal" of the postdigital. By terminal I both mean something about the "input/output devices" of computing but also the hard facts of physics that support their work. Pupin writes:

> Every terrestrial activity, every physical fact, with one of its terminals anchored in our consciousness, can trace its origin to the life-giving breath of some heavenly bridegroom, some burning star. Just explore the path which leads from one of these terminals to the other, and you will discover on each side of that path those beauties which continually thrill the heart of a scientific man. Do that and you will never again speak of the cold facts of science (Pupin 1923/1926: 380).

I do not know whether I have succeeded in the activity path of this book. Nonetheless, it is the fruit of my labors, and my Belgrade contribution to the American Studies topic of postdigital America is to re-member reason, not just as the reason behind what appears before us through the interfacing of cyberspace, but as something possibly more, as νοῦς, or *nous*, the reason of the heart. And to use that heart to carry on, λαμπάδια ἔχοντες διαδώσουσιν ἀλλήλοις ἁμιλλώμενοι τοῖς ἵπποις (cf. Plato Rep.: 328a), in the hopes of discovering through our study design that thrills the heart indeed.

Introduction

Part one of this book introduces the key contribution of the book, which is to understand code not just as (post)digital code but as cultural-philological conventions of how we act and speak. It also anchors the title of the book and my background as a researcher. This will be explained in the following paragraphs.

In the postdigital Americanized consumer-style planet, we are all "users" of postdigital interfaces. Thence the pun in the title: UXA can sound like USA. UXA is research into how users experience and perceive digital systems. The reality of the world today is that the digital traces that we leave through interfacing with these systems, whether of products, services, or games, is used for this research.

The pun in the title is a signal to this book's academic domain, philology. The book grew out of syllabuses for American studies classes taught within the Faculty of Philology, University of Belgrade, Serbia. There were three guiding lights for this exploration. They are introduced in Part I on American "reticulations" – a word I will shorthand to mean "organizations that resemble a net". Where is the human in these nets? Where is the human making and human culture?

The first guiding light was to enable a questioning of the ontological meaning of "experience" in UXA. I did this by way of phenomenological hermeneutics, which had been the theoretical orientation of my postgraduate work. I extended it to encompass "experience research" with its emphasis on measurements, mapping (to digital interfacing), and categorization. Astute readers will notice potential disconnect here, which Priya Parker neatly encapsulated in her book chapter title, "a category is not a purpose" (2018).

Second was inquiry into the subject matter of the postdigital, seen (e.g. computers) and unseen (e.g. inconspicuous server farms; the programs behind the interfaces). This was also related to my postgraduate research that was science and technology studies adjacent, with its focus on Michael Pupin and early modern scientists who were, incidentally, all very well-versed in the classics. In that work, I began to build a vocabulary and a means to teach cross-disciplinary communication.

Third was the question of how hermeneutical interpretation and the language in which it is expressed (whether spoken or encoded otherwise) maps over what would otherwise be a blank canvas of possible reality. My postgraduate research was related as the theological and scientific narratives I was reading brought me to the world of ancient *theoria* which is explained in this volume.

Coming back to where we are today, and thinking always of Gauguin's *Where do we come from? What are we? Where are we going?*: our daily interactions increasingly interface with some form of code, both in what we are served and the digital traces we leave behind in our interactions. The "code" of our digital traces, in the highly complex field of UXA, involves how a person perceives a system (product, service, non-commercial item, or a combination of them) before, during, and after interacting with it.

Although this code can be interpreted by taking a cultural-philological approach, its system operates through mathematics and mathematical symbols. Understanding this is fundamental if we care to create a mental model that can work through the complexities of the 21st century when, for example, what we read online can determine our mortgages. What is American about this is how America was the fastest and most efficient at adopting and transforming the systems and technologies that shape such facts of life today.

The last section of Part I is devoted to applications of Stiegler's work because he makes important conceptual contributions to understanding Americanization. In his reading, America builds on the universalizing sciences of thermodynamics and cybernetics, which will be seen to have an effect on the the nature of knowledge and its reason(ing). While Americanzaition appears to spread through the capitalism of things, its ultimate impact is upon the nature of knowledge and its reason(ing) as seen in the example central to this book of the *systems* of products and services that human behavior is *analyzed* in UXA. Ultimately, reason becomes madness through linguistic twists that give pause for thought and becomes a (non-) metaphysical issue. Stiegler's work can be useful in coming to terms with the postdigital age if we are interested not just in defining it but exploring what this means to our *being* and what is immediately possible in the heavily-engineered interfacing that is increasingly projected onto the world around us. Applying Stiegler to American studies importantly broadens both *what can be taught* and *how* and the importance of epistemic fluency. *This is a natural extension for American cultural studies, which already puts an emphasis on the intimacy between teaching and research* (ASA 2024). Also, key pedagogy resources in the References section of this book are American. Examples include the interdisciplinary work of Jeff Bloom, Jesse Tommel's work on ungrading, Howard Rheingold on mind maps, Howard Gardner's Good Project within Harvard University's Project Zero, and Peter Elbow's work.

Part II explores the types of tools that can be used by individuals and groups to do the type of interpretive and relational knowledge work done by Stiegler. Its topics should be more accessible than Part I. The section on Decoding Currents explains that unless we stop to think about life or are engaged in learning, we are carelessly following whatever "goes without saying", whatever is commonplace. But that type of commonplace can become dogmatic and further organize or contextualize our lives in ways that do not make sense. It can do so through conceptual architecture that can be "mapped" over our lives, onto "reality".

This section does not seek to work out of such impasses through critical theory though it is in informed by it. Rather, it purposefully and agogically shifts gears to autoethnography to describe a way of being in and through postdigital "reality". This is of pedagogical relevance as the increased automatization of the interfaces that surround us do not allow or encourage processes for learning. This section seeks to *model* a type of work that can promote the experience of *personal learning*, which can be explained in terms of phenomenography (see Goetz 2025b). Resources that can be worked into syllabuses seeking to promote this learning are marked specially in the References at the end of the book. The section then returns to list examples of how "reality" can be obscured through nominal and categorical choices, which has ontological, epistemological, and metaphysical implications.

Part II also contains a toolbox for people interested in doing interpretive work to inquire into the reason(ing) of the artifacts and systems that surround us. These range from twists on classical literary work in organizing, defining, and classifying (such as through Auerbachian *ansatzpunkt*) to the question of *how* to gather material for thoughtful assemblages, re-ordering what is presented as reality through care-ful re-presentation. As such it ultimately teaches literacy as a tool with which to engage meaningfully with the lived as an act of *disautomatization*, taking a step back from what would otherwise "go without saying" in an attempt to become reflectively aware of motives, outcomes, values, and so on. *This toolbox can be used in conjunction with resources in the References section to teach postdigital literacies.*

Wrapping up the book, Part III includes dialogic interviews that extend a selection of topics introduced earlier. In this, the book takes a cue from Nora Bateson's idea of "symmathesy", which is the importance of learning to learn together (2015). The emphasis on programming is to inspire learning to look behind the terminals of code for new openings onto postdigital life and meaning. The final chapter contains an essay into a recursive ending that interrelates key topics in the book.

The Glossary is to clarify the Stieglerian jargon in the book. It is noted that for students seeking an additional glossary with terms such as data capture, technofeudalism, platform capitalism and its consequences, such as technopopulism, see Vukelić (2024: 66-84).

The References section was written to also serve as a stand-alone resource. As indicated in the reference in the paragraph above, and given the newness of the postdigital field, *the purpose of this book is to serve as a pedagogical and research resource as much as to stand as a "finished" book*. Along these lines, the Index can be used as an alternative way to navigate through the book and as a starting point for postgraduate readers to create their own glossaries. They could pick a word from the Index and trace all the places the word appears in this book to arrive at an understanding.

This book was written so that it can be read in many different ways, not just from cover to cover, and possibly not even in entirety. To provide structure to support

the pedagogical ambitions of the book, Figure 1. in Part I presents a dependency graph illustrating relationships between key themes.

The book can be used to teach American studies with a focus on the country's leadership in technology, software, and computational capitalism. The book illustrates the latter through problematic postdigital AirSpace while also furnishing material that weighs in against it (Quillien 2025, personal correspondence). This includes the section on The Law of Code (see page 68), the digital literacy resources in the References section (see page 176), and the initial analysis here and in Part I.

Other possible reading flows include:

- focusing on the problem of learning that is needed to de/code
- exploring the categories in the references section
- combining the sections on American reticulations, transformative information, and participatory software
- only reading the interviews
- using the text to practice annotating and 'dialoguing' with the content
- mining it for content for thematic mind maps
- remixing it (cf. Lloyd 2009)
- skimming it with the following questions in mind: What is the problem? What is the context? What tools do we have? How can we use them?

When the book was first being iterated, the plan was for it to take after François Fénelon's coming-of-age story, *Les Aventures de Télémaque* (1699/1872), but to make of it a choose-your-own-adventure.

Part I

American reticulations

1. WHY DE/CODE AMERICAN CURRENTS

Epigraphs and dependency graph

The world that took shape after the Second World War, a world that took the 'American way of life' as its model, a world globally 'rationalized' and 'Westernized', was, according to Adorno and Horkheimer, actually in the course of losing its reason — Bernard Stiegler

And all depends on keeping the eye steadily fixed upon the facts of nature and so receiving their images simply as they are. For God forbid that we should give out a dream of our own imagination for a pattern of the world; rather may he graciously grant to us to write an apocalypse or true vision of the footsteps of the Creator imprinted on his creatures — Francis Bacon

Digital technology is a new stage of writing (and thus also of reading), an industrial system founded on the production and activation of traces ... from clay and papyrus to today's micro-electronic structures (and tomorrow's nano-electronic, if not bionic) that encode in silicon the industrial standards we refer to as ASCII, XML, and so on, that 'scan' the algorithms of search engines that automate reading and writing, and that index, 'tag' and categorize the new metalanguages which all of this presupposes – the totality of which results in generalized traceability and trackability — Bernard Stiegler

Reproducing paradigms is both the end and the means of this kind of education — Anne Carson

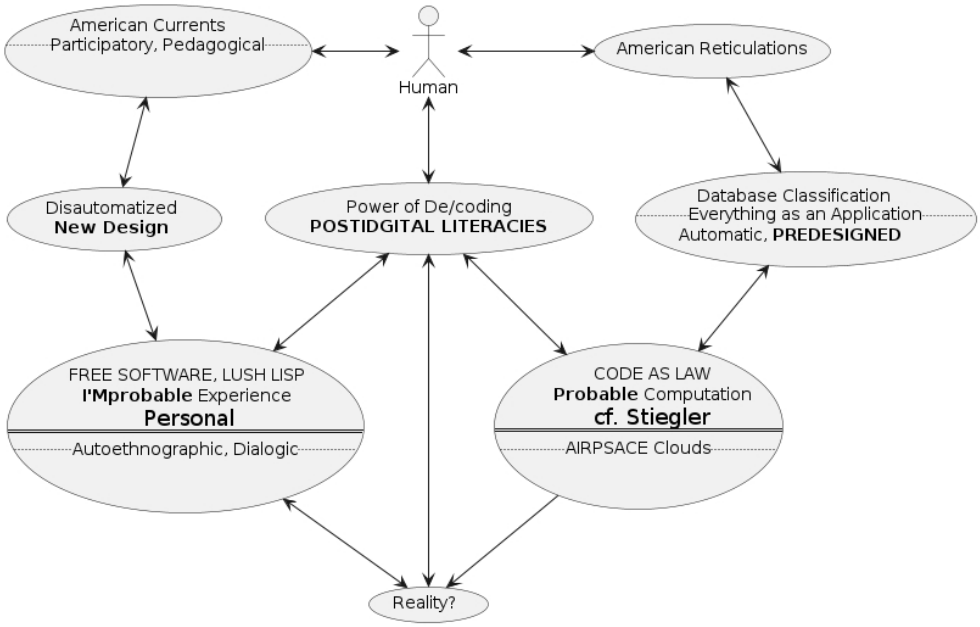

Figure 1:Dependency graph illustrating relationships between key themes of the book.

> *…in which software takes over aspects of everyday life and its major currents and corporations are American…*

World as postdigital American currents

In the words of American philosopher and literary critic Kenneth Burke (1966: 5), "just how overwhelmingly much of what we mean by 'reality' has been built up for us through nothing but our symbol systems? … What is our 'reality' for today … but all this clutter of symbols about the past combined with whatever things we know mainly through maps, magazines, newspapers, and the like about the present?" Just *how much* of reality is symbolic?

Present reality appears to be largely virtual, influenced and projected by chatbots and automatically generated content generated by artificial neural networks. These have been given permission to "read" extortionately more "texts" – including the text of data in digital images and recordings – than humans can. This difference is especially notable among younger generations who "read" multimedia more than texts. The "architectures" of the digital networks underlying that media have billions of parameters and are trained on dozens of TeraBytes of text data.

This data is used to influence the text we read, the media we consume, and re-presentations of reality when we put the technological devices serving those symbols

down. This data is at the "heart" of today's culture – whether we are doing library research in Peru, where one has to contend with digital databases in order to gain access to the content of books, or accessing medical records, which are now largely digitized across the globe.

Why can this said to be North "American"? It is acknowledged that there is an important difference between "America" and "North America". This book uses the word "America" as a shorthand for "North America". The purpose of this is to problematize the projection of "America" as it appears ("American movies", "the American dream", "American lifestyles", and so on).

The obvious answer to why digitization can be described as American lies in how it is at the root of globalization and global lifestyles, described by an American artist as "AirSpace". This artist, Laurel Schwulst, observes that technology shapes:

> the physical world, influencing the places we go and how we behave in areas of our lives that didn't heretofore seem so digital. Think of the traffic app Waze rerouting cars in Los Angeles and disrupting otherwise quiet neighborhoods; Airbnb parachuting groups of international tourists into residential communities; Instagram spreading IRL lifestyle memes; or Foursquare sending traveling businessmen to the same cafe over and over again (Schwulst 2018).

Technology today, thanks to the development of what is known as ubiquitous computing, or UbiComp, "supports work practices, mobility, urban sociality, leisure activities, health concerns and certain forms of social and institutional relationships – remote communication and monitoring in particular. There have also been attempts to expand the conversation to include notions of pleasure, affect, and intimacy" according to Genevieve Bell (2006: 145), a cultural anthropologist specializing in technological development who has pioneered both futurist research and the user experience field.

Many of the key thinkers and scholars who are helping articulate the present environment in which we live are interdisciplinary. While not American, Bell works at one of the few universities today to continue research in the American field of cybernetics, which will be explained in more detail later. Cybernetics, as a systemic approach that takes a techno-scientific view of the management of people and things, is an interdisciplinary field. However, it is not as expansive as other systemic approaches such as von Bertalanffy's General Systems theory or Complex Adaptive Systems, as professional software developer and professor of software development David West has pointed out (2024).

Key thinkers in this book take an interdisciplinary view, like Bell and West do. After all, to describe the world in which we live today requires not just an understanding of the post-Enlightenment human/techno-science divide, but also

an understanding of how they interface with each other and the hybrids that can emerge. For computing has today become ubiquitous – and in myriad ways, from the calculations that determine the choices we are offered to make to the Internet of Things recording data about us.

A foundational vision of UbiComp was promoted by Mark Weiser. His central thesis was for the computers then only predicted to be everywhere in our environments "and even embedded in our bodies" to "*stay out of the way*" (in Rogers 2006: 404)(emphasis added). They were not supposed to burden our everyday lives, only streaming us with information when needed but disappear when not. This was known as "calm computing". But since then, the strategies for and motivations behind diffusing information technology in and through everyday objects and settings have become a new realm for competition of clashing interests, from the political to the economic.

Psychologist and computer scientist Yvonne Rogers (2006: 405) writes how "An assortment of sensors have been experimented with in our homes, hospitals, public buildings, physical environments and even our bodies to detect trends and anomalies, providing a dizzying array of data about our health, movements, changes in the environment and so on. Algorithms have been developed to analyze the data in order for inferences to be made about what actions to take for people."

A challenge for UbiComp is to "enable people, themselves, to engage with the collected information, by monitoring, understanding, interpreting and acting upon it – and not the environment or others to act upon their behalf", Rogers writes (2006:406). Having visionaries like Weiser is not enough, as people themselves need to want to move from the passivity of expecting environments to be smart for to wanting themselves to be "smarter and proactive in their everyday and working practices" (Rogers 2006: 418). There is a long history of seeking to "enable humans" within computing, but it is almost completely ignored (West 2024). At the moment, we seem stuck in a frictionless homogenized global AirSpace, far removed from Douglas Engelbart's "Augmenting human intellect" (1962).

AirSpace, according to Schwulst (2018), is "a profusion of symbols of comfort and quality … to a certain mindset" that influence a certain type of coffee shop, bar, co-living or co-work spaces. These are marked by "Minimalist furniture. Craft beer and avocado toast. Reclaimed wood. Industrial lighting. Cortados. Fast internet. The homogeneity of these spaces means that traveling between them is frictionless".

In practice, this has meant that physical architecture has been modified – in some places physically destroyed to be rebuilt – to match the same online designs – bringing new meaning to UbiComp…

As will be seen in more detail, the key to understanding how this has come about lies in grasping that there is an important relation between language and reality, text and the world. According to Aristotle's *Poetics*, literature (or, today we could say any digital text and certain code) is an imitation of action. The relation

between language and reality exhibits a structural pattern which exemplifies an ideal or universal pattern or design of action.

This is a "hermeneutical" observation, pertaining to interpretation, both of live and of texts and is an observation made by the late Roger Lundin, professor of English and Faith and Learning and specialist in 19th century American literature (Lundin et al. 1985). In a lesser-known of his works (ibid), he and his co-authors point to the antipathy in American culture for the mediating role played in understanding by history, institutions, and communities. This will be seen to be of central importance to the ethos and perhaps even *telos* (final purpose) of cybernetics.

Though hardly studied today, cybernetics underlies the thinking behind much of the technology we use (Hui 2024; Hayles 2012). It also underlies the supposition that material matter can be overthrown or co-opted. West (2024) points out that "Xerox Parc was a leader in creating 'Smart Matter' infusing computational capabilities into physical matter, like the particles of toner in a laser printer."

The overthrowing and co-opting of matter is central to the vision of digital America (Dyson et al. 1994/1996). This becomes imputed to postdigital America through a further layer of abstraction, through the self-organized entities of so-called "third-order cybernetics". These require as much physical participation as meta-level theorizing.

If the data of reality can be "captured," it is posited that there is a chance that a structural pattern can be grasped that exemplifies a universal pattern of action. At the very least, an expectation based on mathematical calculation reigns that posits that the more data that is possessed of human action, the greater the probability that this action can either be predicted or even controlled through manipulative technique. An example of the latter are dark patterns, user interfaces used to trick people into doing certain things. Examples are listed on Harry Brignull's site https://www.deceptive.design. The four companies featured as worst offenders by Brignull in his "hall of shame" are all American companies.

Postdigital America is AirSpace but fittingly, as can be seen in work like Brignull's, it is also resistance to AirSpace. Both Laurel Schwulst, who coined the term AirSpace in 2016, and the online publication to publicize the the diagnosis it stands for (her article appeared in the Verge) are American.

Postdigital America became possible through the 20th century promotion of the American lifestyle. Philosopher Bernard Stiegler (2009/2010) roots this in the need to sell goods made possible through industrialization, and how advertising – through the application of psychological technique taught to the industry by Freud's nephew Edward Bernays – drove a "psychic" demand – based on the human drives of libido – for the consumption of these goods.

Historian John Brewer roots this in a speech of President Woodrow Wilson made "(aptly enough) in Detroit in 1916 to the first World's Salesmanship Conference, in which he urged American entrepreneurs to 'go out and sell goods that will make

the world more comfortable and happier, and convert them to the principles of America'" (2010: 95). This is called technological determinism. Its tenets hold that technological exports, including organizational technologies like labor unions, will make other countries just like America (e.g. Veblen 1921: 134-6).

American commodities came to represent the American (liberal democratic) way of life, according to Lizabeth Cohen (in Brewer 2010: 95). Brewer (ibid) explains how the consumer lifestyle became "a key measure of politics". A set of "economic and social practices (signed through goods) is conflated with a political vision or ideology of the good". The "good" becomes the stuff of everyday life: the "soft drinks, refrigerators and phones", Brewer writes (ibid).

While the industrialization and media technologies and knowledge used to produce those goods were not particular to America, it was America that had the know-how to adapt and transform these technologies at greater speed and scale. This is a central thesis of French philosopher Bernard Stiegler, whose thinking inspired much of this book. Though French, he brings critical insight into the history and ethos of postdigital global America, reflected in patterns like AirSpace.

AirSpace lifestyle UXA

In the 20th century, much of the reality of "everyday life" stimulated consumer-lifestyle urges.

Coca Cola bottles could be found even in remote Thai and African villages. An example of the latter was featured in the film The Gods Must Be Crazy (Uys 1980) which portrays the cultural confusion of the encounter of village culture with modern, global, industrialization. The film begins when a Coca Cola bottle falls on a villager's head from a small, modern plane: global, consumer culture literally falling from the sky...

The next "logical" step to this development is the celestial postdigital networks now also occupying the sky as satellites. These networks optimize logistics, industry, capital, and the manufacture of dreams… presenting us with AirSpace. Describing postdigital America as AirSpace is an oversimplification but provides us with a symbol through which to grasp the interface of everyday life that is otherwise virtual or unseen.

A version of AirSpace will be projected at us based on the digital traces that we leave. Having gathered more data points on each individual than a single individual or even groups of individuals can retain in their minds, an attempt is made to project speculations of what will be desirable to individuals before they have had time to create their own dreams. This is something Stiegler (2009/2010) writes of in *For a New Critique of Political Economy*.

The architecture of realistic possibility available to individuals within this system will be a projection wherever the lifestyle is sold. Whatever is already on offer is predetermined like a Choose Your Own Adventure or Which Way book,

guided by social media influence and "influencers" (Brown, D. & Hayes, R. 2007; Lim et al. 2017; Keller, E. & Berry, J. 2003; Katz & Lazarsfeld 1955/2006; Martínez-López et al. 2020). This genre of book presents an adventure with decision-points, where readers make the decision but nonetheless continue to a pre-written narrative that picks up on a different page, depending on the decisions they make.

The increasingly interconnected probabilistic world – like that of AirSpace – is a very specific type of digital system. As we have seen, it projects onto reality expectations of reality, "at least to a certain connoisseurial mindset", to cite Schwulst (2016).

We could also say this mindset belongs to a person who is ultimately a "user" of the applications of probability. To use something can also mean to subscribe, whether wittingly or unwittingly, to its values. It is different from co-production. To use is to subscribe to a system's work simply by agreeing to participate in it. The question of work is a question of the investment of energy, both metaphysically metaphorical as well as physical.

This is why there is discussion of entropy today, which measures the extent of energy that is unavailable for conversion into work. Put more simplistically, it is the collapse of a system when it is no longer open to other sources of energy. It also has to do with the natural logarithm of the probability of occurrence, and in information theory is used to measure the average information rate of a message or language.

The "work" of users is measured through the methods, skills, and tools of so-called user experience evaluation (UXE) or user experience assessment (UXA). The Wikipedia definition explains how it is: "utilized to uncover how a person perceives a system (product, service, non-commercial item, or a combination of them) before, during and after interacting with it". Note how UXE and UXA also measures what comes before and after interaction, attempting to systematize even that space and time.

Key interests in qualitative and quantitative measurement include whether the user perceives the functions to be fit for the purpose and whether an interface is easy to use, identifiable, inspirational, and important to the user. This is far more complex than the theoretical framework use by Microsoft to develop its digital assistant "Clippy" (Swartz 2003).

In UXE and UXA, metrics are set to measure "efficiency". Methods use "state of the art equipment" to measure "all aspects of the experience." This involves complex user reflection and reflexion obtained through diaries, questionnaires, and sophisticated interviews including those designed to discover attitudes or values. Also used are sensual evaluations and continuous non-verbal self-reports as well as attention tracking. The latter monitors not just eye movements or body language but psychophysiological emotion measurements aimed to "identify emotions from physiological changes in muscles (e.g. face) pupils, skin, heart, brains, etc." (Wikipedia). These studies are today enhanced by "creative methods" allowing for

users and designers to collaborate on co-designs (ibid). Typical methods include (deep) ethnography, participant observation, personas, prototypes, wireframes, and mind maps.

The measurements made of user perception before and after their interaction with interfaces allow consideration of how user experience is subjective, context-dependent and dynamic over time. The research dimensions, constructs, and methods employed are highly sophisticated.

The models are nonetheless constrained. By design, they can only focus on that which can be formalized and digitalized. Additionally, given that most of these interfaces are in service of a single capitalist system, in which profit – often for corporations, at the expense of human beings – is literally the bottom line, it is pertinent to consider them more generally within the context of entropy or the economy of stewardship in the broadest sense.

We inherit the world but the decisions behind our actions influence the direction we take it. The more we have (knowledge, resources, money, etc.), the greater the responsibility. On the one hand, we are urged to use what we have to cultivate lifestyles, learning to appreciate otherness as tastes often to be literally savored. Such tastes can metaphorically include the differences among nations (cf. Mauss 1953/1969) and localities including the pleasures (*saveurs*) (cf. Lévi-Strauss 1974) of subtle differences and incalculable differences (Stiegler 2018b; Stiegler 2016/2019), to paraphrase my encyclopedia entry on Bernard Stiegler (Goetz 2025a). Knowledge of these specifics is reduced into information and generalized through computation that entropizes this knowledge, such as through reductionist identities that become the fuel for reactionary anti-politics (2018a), to paraphrase further. This then becomes a form of cultural appropriation, disrespectful of the context of origin.

On the other hand, to appreciate taste is still no guarantee of the respect needed for responsibility. Taste means nothing if it is merely intellectual and we have learned nothing about what it means to truly behold the other, which is at the root of respect. This is different from tasting and consumption and requires introspection purified of self-interest. Self-interest clouds our ability to receive the reality of the world, influencing how we leave, adopt, and transform the imprints that shape lives, first individually then culturally.

American studies as de/coding the planet (Stiegler's way)

Americanization and American control of so much of the digital infrastructure and (economic) system design of our postdigital culture makes it possible to speak of an "American planet".

The academic field that is epistemologically closest to de/coding this transnational situation is the field of American studies. Central to the field is the concept of "culture" in "all of its generative definitional varieties" (Oppermann 2016:

19). The field views culture as engaged; concerned with myth, ideology, power and disorienting discursive subject positions, pluralistic and hybrid approaches, multiple perspectives including the heteroglossic and poststructuralist, and is open-endedly dialogic and always at play (Campbell & Kean 1997/2000: 1-19).

While America-centric, the field acknowledges the comparative and transnational nature of the "multi-directional flows" of people and goods across America's borders (Fishkin 2009). The "ongoing transnationalization" of the field further recognizes how power and culture "aren't neatly divided into nations" but how America's significance and reach has never been confined to the space within its borders (Pfister 2008: 17).

Ultimately, the field has theoretical foundations to address how the cultural sources of America's power and reach can only be properly understood within the context of global power and cross-cultural translation and relations. Illustrations of this include the role of digital technologies in shaping a new transnational politics (Rowe 2012: 109) and "the cultural work of multi-national "American" companies like Facebook or Google or the ways in which the United States has used institutions like the International Monetary Fund to influence social and political policies in many Latin American countries" (Oppermann 2016: 18).

This general orientation informs this book, along with the field's recent consideration of a broad range of media and cultural expressions including "nonliterary modes of social and cultural expression" permitting interdisciplinary dialogism that refuses "analytic totalization" (Rowe 2002: xxvi).

Stiegler's work extends the above approaches. It combines an anthropological, cultural, and interpretive lens with not just digital media studies and literacy but also the nonliterary textual criticism of digital code and the transdisciplinary mathematical assumptions it stands for – to say nothing of its transnational ubiquity. How else can we intelligently talk about the informational infrastructure that designs the decisions available to the actions that shape our lives?

Yet his work is also a warning of the limits to rational understanding and points to the need for a new phenomenology, new ways of being with what we think we know and what we do with it. Where his work sometimes presents a totalizing view of America, the country becomes symbolic of transcontextual planetary-scale genesis and growth of complex social and technical "bodies" that capitalize on human knowledge, storing, using, and manipulating that which conforms to pre-existing formats or patterns. The American studies presented here are informational, as will be seen.

The power of de/coding

Information about the world, and reality, can be filtered, structured, and processed by technological actors like the algorithms that read and process the "traces" that we

leave through our daily activities like banking or searches on the web to then present us with constraints to the choices that we can make (Carr 2014). These traces show the reach of the (coded) text informing and about our lives today. They point to the need for a more general and comprehensive view of reading which in this book is referred to as de/coding. This is explained in the section entitled Why De/code American Currents. Here we are concerned with the power of this (coded) text. Understanding the flow of this text to be a back-and-forth interfacing layer over the world reveals its potential to obscure the full range of possibility simply through omission.

This has consequences on the "truth" about reality which requires discernment if it is to be differentiated from how things appear – whether through what is said, what is inherited, or what is re-presented in the media. While media is not a "person" it is an "actor" playing a role in our understanding of the world, to paraphrase Latour (1987).

The problem is where or whether we allow this mediatic actor to "stand for" us. Ulterior motives can inform any interpretation of the world, reading into the scheme or web of understanding simple prejudices. Interpretations have effects on communities of people, shaping what they take for granted, what goes without saying, and the course of their actions.

According to Ludwig Wittgenstein, words are used according to different functions, like tools, in countless "language games" that are played in the quotidian activities of life. Life is lived through language: "to imagine a language means to imagine a form of life" (Wittgenstein 1953/1958: 8). Language, like rules, belong to the larger scheme of action in human communities, functioning as a *custom*, which Wittgenstein equates with "uses, institutions" (Wittgenstein 1953/1958: 81).

We are born into a world that is already (and so, originally) heavily mediated by codes of understanding. This raises the question of the possibility for "right" action if all language is following the code of convention – especially today, given how much pre-programmed language interfaces what we can or cannot do.

To be born is to inherit unquestioned code. We first understand ourselves in terms of our family, society, and state – excepting a select few. We only later have the possibility to understand ourselves through processes of self-examination. This possibility can begin with inter-textual consideration: comparing personal understandings with the understanding of the "other" in a text, and gradually "fusing" one's own horizon with that of the text, to paraphrase Ricoeur and Gadamer.

In Gadamer's phenomenological understanding (2004), people seeking understanding engage in a hermeneutical "dialogue", even with a text, to establish a broader context through which to arrive at a shared understanding. The "horizon" is the context of the meaningful presentation of external reality or its abstractions. However, this does not imply that it is possible to arrive at absolute or objective knowledge (entirely forgetting ourselves in the exchange) or that universal history, of all possible experience, can be expressed within a single horizon.

The exchange that takes place within this shared context allows for culture to be continuously changed. This is possible even though a new context must also be received or even while a context is exerting its formative influence. The latter can be described in terms of dogma, as Ricoeur demonstrates in "Science and ideology" (1981/2006) departing from the work of Jacques Ellul. Ellul (1968) reminds us of the role of the commonplace, which is a heuristic tool, or shared cognitive shortcuts or rules of thumb that are not examined but taken for granted. These are dogmatic where they are passed down (Ricoeur notes that it is this very characteristic that permits their transmission) but open where they can be reinterpreted over time. The latter can be compared with Alexander's non-self conscious approach to design, which is more likely to lead to the desirable "quality without a name" in architecture than that which can be prescribed through schools of architecture (Alexander 1964/1973: 34-39; Alexander 1979).

Codification is recognizable or teachable because it is reflected in observable regularities or behavioral patterns so can be inferred. In terms of Wittgenstein's language games, it is like a condensed model of delimited behavioral patterns in which people occupy different rules. But games in reality are not the same thing as the truth about reality. A further critical question is whether reality, as Descartes would have it, is ultimately objectively scientific and can be rationally grasped by an individual consciousness (cf. Lundin et al. 1985: 9).

Descartes sought to be rid of preconceptions like Bacon sought to be rid of idols of the mind. The rationalist supposition that such liberation is possible was adopted in America where it dismissed the human past, understanding its people to "act unimpeded by it" (Lundin et al. 1985: 17). Eighteenth century Americans championed against prejudices and passions, hypocrisy, partiality and fanaticism (Barth in Lundin et al. 1985: 17). As a result the American ideal can be seen as the possibility for a "clean slate" to leave behind ancient codifications of prejudices and manners so as to be "melted into a new race of men" (Crèvecœur in Lundin et al. 1985: 17). Benjamin Franklin even wrote of how the bindings of human pride can be overcome by the amendable errata of the (rationally) enlightened human mind (in Lundin et al. 1985: 16).

But, as will be returned to with Stiegler, how much of reality can be objectively "grasped"? Once grasped, it can be used to describe and order (the appearance of) reality.

Why read cyber America, why decode its UX

In the Cartesian West, the "knowing subject" became the center of thought, separating art from rationalism and the scientific method. During the mechanistic and rationalistic Enlightenment the romantics championed another reality, yet remained within the two-term (binary) system (of subject/object, ego/non-ego…) by

opposing it. Yet they did not question the right of science and reason to describe and order reality (Lundin et al. 1985: 9-11). This became incorporated in foundational American thought.

It can be said that "American culture displays an antipathy to the mediating role played in understanding by history, by institutions, and by communities" (Lundin et al. 1985: 15). Thus the American context, with its presuppositions "that inform but do not determine" the course of a reading, is downplayed. An example is the New World vision of the man free of prejudice but also the Emersonian view of history and books as "impertinence and injury" if they do anything less than "inspire" (Lundin et al. 1985: 17-18). It was posited, if not true in experience, that individual instincts would make universal sense, as if a scientific affair.

The presupposition was that the facts of life could be rationally derived from nature (whether of the world, ecology, divine scripture and creation) that lies behind the supposition that we can arrive at a "right knowing" to inform actions, as if this were merely an intellectual transaction, as if life could be wholly reduced to a mental model. This is an ideology, Ricoeur argues (1981/2006).

And though in postmodernity we see the first-person certainty of epistemology and modern metaphysics removed (Scruton in Lundin et al. 1985: 23-24), we are still making suppositions about reality or "what is there" by reading into it and assuming we know how to read.

Even though the search for truth has been abandoned in favor of a progressive hermeneutic, or subjective search for relevance, it is still assumed that this is subjectively possible in a way that "makes sense". So we "make" sense, through a logic of validation, between dogmatism and skepticism. Where this is shared, it is assumed that this is because the sense in question was arrived at through neutral observation.

This is characteristic of American theology and the epistemological theory, Common Sense Realism, according to Lundin and his fellow hermeneuticists, as it claims the human mind can "know some things with certainty and without the need of validation by an outside authority" (Lundin et al. 1985: 20). Basic laws like a theory of virtue and sin, liberty and obligation from "facts" in the Bible can be arrived at by all right-thinking people, just as science examines the facts of nature to arrive at laws. It clings to the myth of neutral observation and assumes that the reader will somehow not impute their own prejudices into parables, their own self-serving into how the Gospel relates to life (Lundin et al. 1985: 19-22).

Lundin and his fellow hermeneuticists explain that the synthesis of faith with science is the belief of a very specific time and place in history: the romantic Enlightenment in America. It is not a "self-evident set of truths" that can be gleaned. "Because it clings to a myth of neutral observation, it can be used to sanction the beliefs of any group, however aberrant, which claims to have discovered the truth of the Scriptures through an exacting study of them" (Lundin et al. 1985: 22).

What America exported to the world was the appearance of ahistoric scientific objectivity with transcontextual applications. But "science itself is a historical discipline and its systems build upon basic metaphors or paradigms" which are themselves products of history (Lundin et al. 1985: 23).

Extensions of this approach can be found in cybernetics. This generalized scientific model claims to be universal, both ontologically in the reduction of socio-politics to information, and epistemologically, through its attempt to overcome the opposition between machine and organism (Hui 2024: 50). This is in part achieved through a generalized model of feedback information that is used to understand living beings and phenomena (Hui 2024: 14).

Transcontextual America, where Crèvecœurian men and women select out past prejudice in favor of achieving a new amalgamation, is the birthplace of this science. J. Hector St. John de Crèvecœur himself was a French-American transplant and diplomat.

Transcontextual science persists in the postdigital age, if no longer by the name of cybernetics then through its continued rhetoric suggesting that matter can be overthrown. This was a premise in one of the founding documents of cyberspace, *The Magna Carta of the Knowledge Age*, written by futurist businessman and editor of *Fortune* magazine Alvin Toffler, Esther Dyson and others at the behest of Newt Gingrich (Hayles 1999: 18). Hacking and cyberspace was bound to come out of America and not another country due to its antipathy towards convention. This was observed by programmer and venture capitalist Paul Graham in *Hackers and Painters*. He wrote that hacking had to emerge from America due to its unconventional ethos. To labor and rework this point, transcontextuality emerges from a very specific historical-cultural *American* context (2004: 53).

This has extended to the market and to history through applications of thermodynamic and cybernetic theories, as will be explained further on. In Yuk Hui's reading (2024: 15), cybernetics influenced the development of Hayek's free market economy and Fukuyama's "end of history".

Cybernetics can be seen to complete metaphysics by being a generalized scientific method. Its generalizability allows it to claim to be free of ideology. Yet it remains a science as it claims (rational) objectivity in line with Cartesian oppositional thinking. This denies art its didactic functions.

Through cybernetics, messages can be issued by machines that become information-bearing "actors". The science is concerned with the self-regulation of programmed machines through circuits of feedback loops. In the digital world of cyberspace, these act according to complex mathematical models, largely informed by algebra and calculus. This further points to the scientific basis of a method that claims to be epistemologically and ontologically transcontextual, universally applicable – thence metaphysical or cosmological in nature, and to have overcome an oppositional thinking divide (science/art, machine/organism…). Cyberspace is projected onto myriad areas of our lives, from banking to Internet searches.

What is mediating and structuring our reality and why? What are its claims? It is suggested in this book that literacy centers on the problem of mediation and pattern recognition. Things are complicated in the postdigital age as Crèvec œ urian deracinated ideas can de- and recodify patterns that have been taken for granted at great speed and scale. Further, due to control via digital apparatus made possible through cybernetic models, it is possible for police states and surveillance societies to emerge.

This has become possible due to what Katherine Hayles (1999: 19) described as the American ethnocentrism that regards digital information as more important than more context-bound analogue information.

Thus, while more of life and more jobs are pushed online with more work being done in the "cloud", which actually means someone else's physical, material servers or "terminals", this only means that more digital traces will be left, which are in turn used to feed the feedback loops of this system.

This does not mean that cybernetics has uncovered the truth of the relation between language, text, or code and reality but merely that it can output a structural pattern that exemplifies an ideal or universal pattern with respect to some previously rated digital material and some previously trained mechanical learning models. This ideal is different from the philosophical ideal arrived at through the *theoria* of contemplating the heavens, which the ancient Greeks were devoted to more than to progress (Randall 1967: 310).

But the natural heavens are not referred to here in opposition to artificial machines as the emphasis is on the problem of agency in the pursuit of knowledge and the problem implied by being a "user". "Actors" in human life are today the output of artificial learning models used to train machines. Without new human creativity, these machines will recursively feed on their own output which will eventually lead to what is known as model collapse and degenerative quality cascade (asthasr 2024).

Learning models feed on human creativity. It is no mistake that just as the ethnocentrism Hayles wrote of is being discovered, a movement has emerged to decolonize user experience assessment (UXA). This seeks the articulation of multiple perspectives on digital interfacing, largely but not necessarily, in order to make it more accessible, accessibility being another emerging field of study and work. Where decolonization serves UX it can be seen to increase not only its ubiquity but also its creative input.

While this book covers the history of certain ideas its purpose is to point to processes of codification so as to facilitate processes for self-reflection not necessarily for continued creativity and innovation of dogmatic schemes but ultimately to serve as a reminder. We have one life to live. This is worth re-membering. The question of the motives behind our actions and restraint from action reveals what can stand the test of time.

2. APPLICATIONS AND PATTERNS OF REALITY

> *As Marx understood in 1857, just as Schumpeter made it the new leitmotiv of American capitalism under the name of 'innovation', and just as it is now expressly thematized with the advent of digital networks and the 'information society', knowledge has become the crucial issue in the [current] economic war* — Bernard Stiegler
> *These technical traces, which constitute 'tertiary retentions', are now being placed under the control of a global industry, even though the university is yet to understand fully their role in the noetic activity through which are formed and trained not only the psychic apparatus, but the social apparatus, and knowledge itself, under the auspices of what is called 'reason'* — Bernard Stiegler
> *This relentless quest for [even]* self-optimizing *authenticity has infused our social and even political sensibilities* — Rod Dreher, emphasis added

Technoscientific progress: A cybernetic pattern

In the contexts of truth, responsibility, sovereignty, politics, ecology, and general questions of how to live, how *reasonable* is the present-day globalization of American culture through IT infrastructure, apps, services as a software substitute? In the last sub-chapter, we saw how self-optimizing authenticity is a distinctly American product despite "decontextual" inclinations. In the last chapter, we saw how the rhetoric of progress is also distinctly American.

What follows is a reading of the story of the traces of externalized ideas that led to the iterative user-centric design of today. We attempt to reverse engineer it, largely taking after Stiegler's work but also that of other decolonial thinkers like Ashish Nandy who has written an important volume recognized by American anthropologist Michael J. Fischer (1995). Reverse engineering is a function of hermeneutic readings which are themselves context-bound and limited to the openness of the receiver's "horizon" (see page 96).

Our narrative centers on the twentieth century, with some historical precedent viewed as the formative context of the postdigital present. Central to this narrative is the Industrial Revolution which the next section will illustrate through Ford automobiles and television networks, programming, and media.

To follow Stiegler's reading, the exploits of the twentieth and twenty-first century have been made possible through narrowing the understanding of reason. He points to how the meaning of νοῦς first changes from "intellect" and "spirit" to "understanding" and "reason" in Kant, who saw it as central to the "faculty of knowing". With the Industrial Revolution it becomes a production function in service of "machinic capitalism" as a form of computational ratio (Stiegler 2016/2019: 41) and calculability. This forms the basis of today's algorithmic governmentality.

The cognitive apparatus for calculation and calculability developed through the practices of Cartesian mathematics as analytical practices of reading and writing became the condition of rationality (Stiegler 2016/2019: 106). This came to form the rationalization of capitalism, which, according to Weber, transforms "the relationship between understanding, reason, imagination and intuition" (Stiegler 2016/2019: 240).

Every Western epoch stems from such a transformation, which engenders a "regime of veridiction" or "truth". This begins when the "faculty of knowing", conditioned by tertiary retentions, by the externalization of memory that can function either as a poison or a cure, as *pharmaka*, accumulates new circuits of transindividuation. These form knowledge and install eras, and, within these eras, successive epochs (Stiegler 2016/2019: 240).

One epochal transformation was marked by the rhetoric of progress which can be traced to a 1945 presidential speech by Harry Truman that gave it a new meaning. "Not only did [the notion of progress] quickly acquire wide currency, it was also retrospectively applied to the history of social change in Europe during the previous three hundred odd years" (Nandy 1988). The rationalization of progress, especially as manifested in technoscience, then becomes the "reason" of the state, as it was in a speech made by President John F. Kennedy in 1962 (Nandy 1988).

Kennedy's speech, in Nandy's reading, projected science as a state goal and substitute for conventional politics. Science became an arena for inter-state competition and part of the popular language of politics. It "gave spectacular technology the central space in science", displacing both the former separation of science and technology and philosophical consideration of the implications of scientific theory. Nandy writes that the speech anticipated the vision of science popular today, wherein science is understood to be equivalent to technology. This foreshadowed the increasing loss of the practice of pure science (Nandy 1988), not to mention the increased focus on science, technology, engineering, and mathematics (STEM) subjects at the expense of all others.

This noetic shift also draws on the mythical promise of the New World. As a secular myth it has exercised a powerful fascination. America is the new world, "a country without a past; it is the frontier, the land of endless opportunity; it is the future telescoped into the present. It is the epitome of Western technological civilization as the perpetual-motion machine [despite] the contradictions between liberal democracy and the liberal commitment to technological progress" (Visvanathan in Nandy 1988).

The myth of progress then unseats politics, drawing on Jeffersonian sentiment: "The spirit of resistance to government," he wrote, "is so valuable on certain occasions, that I wish it always to be kept alive" (Jefferson 1787). Jeffersonian politics were admired by programmers such as Paul Graham who wrote: "When you read what the founding fathers had to say for themselves, they sound more like hackers" (2004: 71).

Complicating questions of this approach to national governance is the impact it has on the global picture. By way of illustration, laws that would not have been possible to pass domestically in the US have instead been passed overseas and then mandated in America as illustrated through copyright protections or filtering mandates that keep digital rights in the hands of companies that can afford expensive filters, locking customers in to digital use patterns. "Both tech and media love 'IP' – not in the sense of 'copyright' or 'trademark,' but in the sense of 'any law that lets me control the conduct of my competitors, critics and customers'" (Doctorow 2023c). Corporate tech interests have become more powerful than government. "The things they lobby for are the things every business wants: no labor protection, no antitrust, no privacy" (Doctorow 2023c).

Put another way, the computing behind current globally ubiquitous made-in-America technical tendencies "has been constituted as a kind of imperialism" (Agre 1997: 131). The US Trade Representative today operates according to a "digital trade agenda," which is "a mix of policies ranging from limiting liability, privacy protection, competition law, and data localization" (Doctorow 2023c) through digital trade ideas originating from the US.

Thence a rationalization that puts progress above politics but in service of capitalism. Once reason is subsumed to serve the industrial economy, it is degraded into the analytical specialization of industrially divided intellectual labor, automation by calculation, and ultimately hinders the possibility for reason to project and synthesize new ends. In this way, capitalist industrial progress demoralizes researchers, teachers, and students, and exhausts reasons for living, acting, and hoping (Stiegler 2016/2019: 41). Rationality itself has become techno-logical (Stiegler 2012/2015: 59).

What emerges in the 19th through the mid-20th century was tension between scientific pursuit, humanities requirements, and what Huxley terms "getting on"(1895: 113-14), which led to emergent tension between the applied and pure sciences (e.g. Pupin 1949 [1922]; Nandy 1998). Applications of mathematics to the real world exemplify this tension.

When the term science was coined by William Whewell in 1834, he noted the difficulties moralists and poets like Hobbes and Goethe encountered when practicing experimental science. Further, he notes the "disintegration" of science itself (Whewell 1834: 59). Such tensions are also synthesized in the 1828 Yale Report in the United States. Penned by both a professor of science and ancient languages, the goal of the text was to identify "what course of discipline affords the best mental culture, leads to the most thorough knowledge of our own literature, and lays the best foundation for professional study" (1828: 49).

The report was delivered a little under two decades after the educational reforms in Prussia, following Wilhelm von Humboldt's initiative to train students in both broader scientific and philosophical domains and train them to conduct

independent study. Humboldt's reforms are significant for combining the scientific with the moral and for presenting individual—and interdisciplinary—freedom as a collective good: "Among men who are really free, every form of industry becomes more rapidly improved,—all the arts flourish more gracefully, all sciences become more largely enriched and expanded" (1792/1854: 69). By the mid-, mid-late 19th century, this model inspired pedagogical change across the globe (Flexner 1930; Huxley 1876/1893, Humboldt 1792/1854 and 1793/1969; Jensen 2010).

Anecdotally, Pupin notes that while he was a student, his Cambridge Tripos colleagues were ahead in mathematics, but not in economics, history, Greek, and Latin (1922/1949: 177)—and not in physics, which he studied in Germany under Helmholtz (1922/1949: 200-1).

This supports C. P. Snow's famous critique in his 1959 Rede lecture of there being two mutually incomprehensible cultures of scientists and literary scholars. It also supports Snow's observation that Britain was behind what "far-sighted men were beginning to see, before the middle of the nineteenth century" that training in the applied sciences was necessary for a nation to attain wealth (1959: 46).

What emerged was an imbalance in the study of science and philosophy and a departure from von Humboldt's reforms. Today, the dominant grid of understanding stems from mathematics, such as where it is expressed through the lambda calculus and symbolic logic that informs programming languages. Perhaps symbolic logic, now called mathematical logic, was the last middle ground across the "two cultures" divide at the turn of the 19th century. It was (somewhat) engaged in by philosophers like Alfred North Whitehead, Bertrand Russell, and C. S. Pierce as well as Lewis Caroll who was also a poet and author. Notably: mathematics was still dominant in Oxbridge, single science specialization being introduced to Oxford from 1886; engineering in 1909 (Brock & Curthoys 1998). Notably, too, symbolic logic becomes important to computer science.

Two major cross-disciplinary intersections since then will be noted. In France, thinkers mentioned earlier like Canguilhem and Leroi-Gourhan were working at such an intersection, and many contributed to the field of the philosophy of science. Leroi-Gourhan was involved in the Musée de l'Homme, which took as its goal to prove the boundaries between ethnography, archaeology, anthropology, and prehistory to be "absolutely artificial" (Clifford 1998: 139). Canguilhem worked with Ignace Meyerson who was among the lecturers at the Course universitaires de Davos from 1928-31, which emerged out of convalescence tourism for intellectuals, promoting internationalism and cross-disciplinary exchange. Attendees included Albert Einstein, Paul Tillich, Maurice Halbwachs, Jean Piaget, Léon Brunschvig, Marcel Mauss, Lucien Lévy-Bruhl, and Lucien Febvre.

Piaget went on to collaborate—on a programming language for children (Logo)—with Seymour Papert, who was an attendee of the American version of the Cours universitaire de Davos following World War II. West (2024) explains that

"Papert, Adele Goldberg, and Alan Kay were instrumental in the development of Smalltalk, which, though sold as a programming language, was fundamentally a language with which humans, especially children, could engage in conversations with machines and create worlds."

The development of this programming language as well as the start of the digital revolution took place through the Macy Conferences, held from 1941-1960. The conferences gave rise to a type of cross-disciplinary synthesis through cybernetics, popularized by Norbert Wiener in his book, *Cybernetics: Or control and communication in the animal and in the machine* (1948/1985).

In the context of cybernetics, a communicated "message" need not be sent by a human; its fundamental element is a decision (Heims 1991 22). Wiener named Leibniz cybernetics' patron saint because the study involves "two closely related concepts – that of a universal symbolism and that of a calculus of reasoning" (Wiener 1948/1985: 12).

Cybernetics is concerned with the self-regulation of programmed machines through circuits of feedback loops. The feedback loops used in the action research applied in the social sciences came out of these conferences through the work of Kurt Lewin. Wiener's initial definition of feedback is suggestive with respect to how we may understand control: "when we desire a motion to follow a given pattern the difference between this pattern and the actually performed motion is used as a new input to cause the part regulated to move in such a way as to bring its motion closer to that given by the pattern" (1948/1985: 6-7).

Cybernetics was not the only focus of the conference, which ultimately aimed to foster "communication and reintegration" among the different disciplinary approaches and overcome the "real difficulties in communication – partly emotional and partly semantic" (Fremont-Smith in Steer 1952: 100). That the dominant outcome of the Macy conferences would lead to what can be called a "narrative-code shift" (explained further on) was hardly preordained. The premises and perspectives presented were far from uniform.

For example, objectives for studying information and messages diverged (Heims 1991: 22). Claude Shannon was interested in statistics, transfer, and language and for him, the meaning of the message was irrelevant. Gregory Bateson was more concerned with empirical and theoretical reflections on communications processes, while J. C. R. Licklider sought sound analysis. Walter Pitts had formal and necessitarian objectives, and Mead was interested in the pragmatics of exotic language learning (Heims 1991: 76-9).

There was disagreement over logical and mechanical approaches to understanding as well. Mead and Larry Frank were mechanistically inclined: regarding minds, self, and community as computers or mechanical systems and agreeing that John von Neumann's game theory was an appropriate lens through which to view social conflict (Heims 1991: 27). Bateson criticized some applications

of von Neumann's game theory by viewing it on a different conceptual level from which it could be seen to block certain types of learning (Heims 1991: 109-110; Bateson 1972/1987: 268).

Game theory was also criticized by Wiener who used type theory to show its unsuitability for long-term gain (Heims 1991: 110; Wiener 1960). Perhaps more significant is how Wiener in both *Cybernetics* (1948/1985: 34) and his later work *The Human Use of Human Beings* (1950/1989: 183) did not consider cybernetics appropriate for social applications and was wary of one-directional communication (1948/1985: 138).

Documenting the narrowing of science, Wiener writes that "the main quantities [of diseases] affecting society are not only statistical, but the runs of statistics on which they are based are excessively short" (1948/1985: 24). It is important to note that both he and Bateson nonetheless elaborated formal logic metalanguages in their work—therefore, the issue is not with symbolic understanding, but where and how it is applied and to what purpose (Wiener 1950/1989: 183).

Returning to Smalltalk, it unfortunately never became part of popular culture. Today, platforms like Canva or Google Classrooms monopolize. According to West (2024), "circa 1985-1995, Smalltalk was on the verge of becoming 'the next COBOL' until two fatal mistakes by ParcPlace Systems led to the development of Java and the demise of Smalltalk." To understand why systems developed through the use of the Oracle-sponsored Java programming language (e.g. Google Classroom 2024), were typologically chosen over creative languages like Smalltalk requires looking back to the historical change made to disciplines like design. Today, university design courses do not teach critical history of the field but marketing, promotion, business, and, increasingly, also how to use dark patterns to capture viewer attention, time, and behavioral patterns (Buckley 2020). More complex explanations are given in the section on Stieglerian applications.

Suffice it to say for now that Stiegler (2009/2010) relates such trends to how Edward Bernays, Freud's nephew, applied Freudian techniques to marketing when he came to America in the early 20th century. This helped boost sales at a time of industrial market saturation and has contributed to the image of the "American way of life".

This way of life puts code, not narrative, at the center of organizational structures, becoming enmeshed with the production of human thought. Gradually in the 20th century the goal of knowledge was no longer the reading or explanation of texts, nor the borrowing of knowledge from the ancients. Instead, it sought the working out of individual reason "on the occasion of concrete observations and well-though-out experiments" (Hadot 2006: 125). For this reason, we can speak of a narrative-code shift, and note how the power of selection gradually shrank from being spread among individuals to a matter of calculation. Through probabilistic mathematics and averages, new reason was given for right action. In the words of P.

J. Landin, one of the first computer scientists to realize that lambda calculus could be used to model a programming language: "Most programming languages are partly a way of expressing things in terms of other things and partly a basic set of given things" (1996: 157).

This is also why Stiegler writes of the architecture of hypomnesic tertiary retention, which is to say, of knowledge that is ex-pressed and retained externally to the human being through mnemotechnics. This architecture increasingly scans (an important word in Wiener's Cybernetics) and encodes ever greater portions of our externalized knowledge. This knowledge is used to train the learning models of proprietary systems that are in turn used to form predictive models of human action. We are reminded that Ashis Nandy (1998) has documented evidence that the applied sciences were co-opted by state interests as a new form of conventional politics, which relates such mechanisms back to Foucault's and Stiegler's concern with biopolitics.

The mnemotechnic feedback loops of algorithms function purely through the calculation of probabilities to establish averages. But as we shall see Maxwell argues against the rationale of approximations over accuracy (in Campbell 1882). Ironically, given that such an approach is taken today to decrease uncertainty, the great Scottish physicist and mathematician James Clerk Maxwell writes that approximate knowledge decreases our chances of being able to predict the future where there are unstable conditions (in Campbell 1882: 213).

Encoded codification leads to new types of negotiation between psychosomatic organisms (psychic individuals), artificial organs (technical individuals) and social organizations (collective individuations), as will be seen below. This Stieglerian concept is called organology; ideally each of the organs co-evolves, forming together, which Stiegler calls co-individuation. But the functionality of the algorithm conceals what it cannot "know" by having automatized certain processes. This can be compared to how human autonomy, the social contract, and learning are now being "written out of the equation", so to speak.

In Stiegler's reading (2009/2010), permanent technoscientific innovation is used to invent new sales in a libidinal economy of short-termist macrotendencies that eventually block the process of anticipation. Instead of people imagining what they would like and having the time to long for and ultimately achieve their desire, the marketing system tells them what they need and influences them to buy it.

The productive capital of industrialism which used to base capital on products gave way to fictitious capital, based on calculable anticipation. This, through the question of consumption, has ultimately become risk capital oriented towards technological values. It presupposes an "advance" on reality and confers libidinal economy its symbolic calibration. This harnesses libidinal energy through the drive-based tendency of the psychic system to serve the speculative tendency of the economic system. Credit is no longer based on trust but becomes an infinitizable object.

To sum this section up and mirror the initial anecdotal excerpt, Stephen Tyler, a student of Ruth Benedict's (Mead was also her student), will be cited. The author of *Cognitive Anthropology* (1969), he explains the discipline to be based on "the assumption that its data are mental phenomena which can be analyzed by formal methods similar to those of mathematics and logic." To him as a cognitive anthropologist, cultural anthropology becomes a formal science: "It seems likely that the logical operations underlying principles of ordering are finite and universal, but capable of generating an infinite number of possible specific orderings" (1969: 14).

In response, anthropologist Clifford Geertz calls Tyler's cognitivist approach a fallacy. He considers it "as destructive of an effective use of the concept as are the behaviorist and idealist fallacies to which it is a misdrawn correction" (1973: 12).

Given the narrative-code shift, as society is now organized (top-down) on the basis of mathematical code, and not interpersonal negotiation, the question remains where narrative exploration of what human life means can take place in serious scholarship, and how. What happens to the type of thinking that is not just analysis and calculation; human but not medical? This is directly relevant to the future of postdigital research and knowledge itself. The synthetic faculty, unlike the analytical, brings incalculable perspectives.

By contrast, "the part-object relations endorsed by the scientific method, as Sigmund Freud might have diagnosed the psychopathology, is ultimately projected on to the human world. The laity are increasingly seen as dispensable experimental objects," and any cries of agony or dissent "gradually become the identifiers of a silent species waiting to be classified or analyzed as a set of symptoms in a clinical laboratory" (Nandy 1988).

Objectivity becomes objectification – of the human being and of subjectivity, refiguring and limiting them. Science, in Foucault's reading, has an ontological importance, seeing man's being as the object of positivist knowledge, organizing objectivity on the basis of sign values (2003: 199). This is what needs decoding, explained in part two. In Stiegler's words, "meaning is what remains always to be interpreted by psychic individuals and social individuals, this interpretation is what gives meaning its sense" (2012/2015: 188).

Adoption and transformation

It can appear easy to see how America adopted technology more efficiently and faster than elsewhere (e.g. Stiegler 2009/2010). First, the very science of efficiency, Winslow Taylor's scientific management, came out of America, as did its textbook example of success, the Ford Motor Company. The epitome of efficient production, the company innovated the 24-hour workday as well as affordability, making it possible for even factory workers to buy the cars they made. The cost of the car went from

$825 in 1908 to $260 in 1925 according to the company's 1925 pamphlet, *Helpful Hints and Advice to Ford Employees*. Ford produced 6,500 in 1905, increasing over tenfold in 1911, and reaching 1,426,612 in 1926.

The number of automobile drivers went from 8 to 23 million within 1920 according to the Federal Highway Administration (n.d.), accompanied by state investment in highways and a burgeoning motel and diner culture nationalizing the hamburger and leading to the demise of older establishments. This accelerated growth set a precedent in America and formed the backbone of the country's industrialization. It can be an illustration of Stiegler's point about America's adoption of industrial technology, though a more poignant example includes the adoption and transformation of media, which became the vehicle of the American salesmanship mentioned earlier.

Technological and socio-cultural consequences similarly accompanied the growth of the production of television sets. This involved the development of bandwidth technologies and television receivers to direct-broadcasting satellite television and digital transmission, licensing, and advertising. The cultural shifts it caused include the loss of local programming due to its unprofitability and the so-called "rural purge". This replaced rural genres like barn dances and rural sitcoms with modern series targeting wealthier suburban and urban viewers.

The use of television for advertising has also increased, with the sociocultural and psychological techniques employed becoming more sophisticated. This has led to the importance of media studies and media literacy, which largely promotes an awareness of the techniques that are used (Kellner & Share 2005; Kittler 2013). These include demystifying unrealized claims or distorting messages (Giroux 1997).

America's ability to transform technology may be harder to see in today's postdigital world, especially as the underlying structure of its greatest achievement, the software and hardware making up much of the Internet and its services and infrastructure, is not always visible to the untrained eye. An example of this are all of the server farms which contain the machines storing all of the data exchanged online in "the cloud" which are housed in innocuous-looking warehouses that are sometimes erased from satellite images (Pitron 2023).

The speed and scale of the transformation of the newest technology on the market, such as radios being replaced by televisions in turn replaced by computers and mobile phones, has increased in the 21st century. These transformations were made possible through scientific discovery but also disruptive innovations which change established market leading products and alliances that are today largely informational.

Transformative information: History of the universal mathematical currency

The mathematical foundation of information is fundamental to cybernetics as understood by Wiener (1948: 3-4). He notes that it is mathematics that enables universal understanding among the different disciplines that became highly specialized from the start of the 20th century.

How is it that information can be related to the physical sciences and mathematics? Through the analogies that become possible when thinking about matter mathematically.

Maxwell, whose work is foundational to key concepts explored in this book, explains the interdisciplinary appeal of mathematical analogy in his essay, "On the Mathematical Classification of Physical Quantities." First, a system of quantities is discovered that appears to give rise to a given phenomena. Then, it is necessary to discover the mathematical form of the relations between these quantities. The resulting laws are then verified theoretically before experiments are used to measure the quantities (Maxwell 1890: 256).

Because so many quantities became observable through the progress of science, it became necessary to classify them. However, this classification is founded on the "mathematical or formal analogy of the different quantities, and not on the matter to which they belong" (Maxwell 1890: 257).

Once physical science has been reduced to a mathematical form, the mental process seeking solutions to problems "is supposed (at least by the outer world) to be carried on without the aid of any of the physical ideas of the science" (Maxwell 1890: 258). This has implications on the relation between the mathematical or symbolic data or values that convey information and the real world. Both can be interpreted but we are interested in how cumulative transformations are effected through information.

First, information can be defined as any observable pattern within a medium. Meaning is derived from its re-presentation through interpretation. Information is generally understood to involve an iterative process. An example of this is how the data of letters convey information relevant to the words in which they appear, which in turn convey information relevant to the context of the phrase they appear in, which is then processed through interpretation and can cumulatively become knowledge in a given field. Here I draw on Stiegler and his Husserlian notion of the cumulative function of exosomatic tertiary retention. According to this, we first perceive an idea (primary retention), then "seize" it (secondary retention), and can then ex-press it, outside of ourselves (tertiary retention). By accumulating tertiary retention within specific contexts, such as mathematical calculations, knowledge can at once be passed down from generation to generation (by being external to individuals through recorded expression or mnemotechnics) and grow to become a science.

Maxwell proposed that electric and magnetic fields travel through the medium of space as waves moving at the speed of light (Maxwell 1865). He also contributed to the statistical mathematics that underlies information theory upon which network communications like the Internet are built, which carries applications for the World Wide Web (Wheen 2010/2011: 85).

His discoveries and theories further laid the foundations for chaos theory, special relativity, quantum physics (Dyson 2007), and the naming of the field of cybernetics (Mayr 1971), which is the universal strategy for management and control applied to organisms and entities. Wiener explains that cybernetics got its name through a wish to recognize Maxwell's work on the feedback mechanism, called the governor, that minimizes the inefficiency of the work of the steam engine (Wiener 1948: 12). Maxwell invented the idea of a distribution function governing the velocities of the individual molecules of the gas.

Claude Shannon followed Maxwell's discovery that an initial sound and the electromagnetic sound sent over the air are analog wave forms. He demonstrated that transmission is improved in a radio system if the sound wave is first digitized into bits that are then mapped into the electromagnetic wave. This is possible by using "switching circuits" to map the the 0s and 1s that represent true and false and that are the operators of Boolean algebra into bits. This simplified the arrangement of the electromagnetic relays by mapping them into the more comprehensible field of Boolean algebra, following the advantage of mathematical theoretical verification Maxwell wrote about.

Shannon described communications channels such as telephone lines (but also fiber-optic cables) in terms of bandwidth, which is the range of frequencies used to transmit a signal and the noise that can disrupt that signal. He further discovered the speed limit to communication that would minimize the entropy of noise, used as the 5G standard.

Postdigital infrastructure, messaging, transactions, and scanning have been made possible through this knowledge, transforming and often universalizing the way things are done across the globe.

Probable universal patterns for uncertainty

Where the definition of information is any observable pattern within a medium, the definition of entropy is the lack of a pattern. At the time and in the context of Maxwell's writing, entropy was a key new feature of natural processes revealed by physical research. Maxwell explains that new features require new forms of thought "appropriate to those features". This form of thought is furnished by mathematics. Mathematical understanding allows for "the ideas derived from one department of physics [to] be safely used in forming ideas to be employed in a new department" of science (Maxwell 1890: 227).

An example of this is the second law of thermodynamics which was discovered through the study of functional energy released from combustion reactions. It was observed that a certain amount of this energy is always lost to dissipation or friction. As a result, it is not transformed into useful work. The term entropy was coined in the early 1850s by Rudolf Clausius to describe this lost energy, setting out the concept of the thermodynamic system, which went on to have universal applications.

Anticipating the turn to theory in the 21st century and the manifold interdisciplinary applications of entropy, Maxwell wrote: "It is absolutely manifest … that any development of physical science is likely to produce some modification of the methods and ideas of philosophers" (Maxwell in Campbell 1882: 210).

It is today a point of fact that the physical notion of entropy influenced transformative thought in Marx, Engels, Spengler, and Stiegler who was further inspired by related notions in Schrödinger, Lotka, and Georgescu-Roegen. It also influenced the work of computer scientist Norbert Wiener in *Cybernetics: Or Control and Communication in the Animal and the Machine* (1948). He writes: "The notion of the amount of information attaches itself very naturally to a classical notion in statistical mechanics: that of entropy", wherein entropy is a measure of the degree of disorganization of information in a system (Wiener 1948: 12).

Maxwell explains an appeal behind entropy to lie in how it can be used to determine the probabilistic even in uncertainty (in Campbell 1882: 211-12). This appeal was encapsulated in layman's terms by Serbian-American scientist Michael Pupin. Pupin explains that "Maxwell's little classic" *Matter and Motion* (1877/1920) informed him "that in all cases of very large numbers of individuals, whether they be active molecules or busy human beings, exhibiting as far as an observer can tell non-coordinated activities, [scientists] must apply the so-called statistical method of inquiry, that is, the method which statisticians employ in recording the activity of a nation" (Pupin 1923/1926: 186).

Maxwell's book (1877/1920) opens with a Greek inscription, λαμπάδια ἔχοντες διαδώσουσιν ἀλλήλοις ἁμιλλώμενοι τοῖς ἵπποις (cf. Plato Rep.: 328a) that references these people both individually and collectively. The inscription means "they carry torches and pass them along to one another as they race with the horses" which historically has a metaphorical transmission (cf. Plato's Laws 776b; Lucretius ii 79). Individuals are those in whom the problem of work takes place "as the laws direct" (Plato Laws: 776b). Regardless of the historical conception of the universe, the individual remains subsumed to universal law. Transindividual knowledge can be exchanged, like a torch, but the individual rider remains within the spatial and temporal coordinates of the race.

The limits of the interplay between science, knowledge, and human life playfully appears across much of Maxwell's work. An example is his 1873 essay entitled "Does the progress of Physical Science tend to give any advantage to the opinion of Necessity (or Determinism) over that of the Contingency of Events and the Freedom of the Will?"

Maxwell wrote over a century before today's computed lifestyles. Lifestyles are calculated on the basis of statistics and claims of the present state based on the "support" of millions of "data points" a person leaves through increasing digital environments.

Developments in the sciences made it possible for people to be categories and for predictions to be made about them. "Persons are grouped according to some characteristic, and the number of persons forming the group is set down under that characteristic. This is the raw material from which the statist endeavors to deduce general theorems in sociology" (Maxwell in Campbell 1882: 210). For predictions to be made, the system being measured must be stable, which is to say that "an infinitely small variation of the present state will alter only by an infinitely small quantity the state at some future time". The system is unstable "when an infinitely small variation in the present state may bring about a finite difference in the state of the system in a finite time" (Maxwell in Campbell 1882: 211).

The attempt to use physical science to calculate the singularities of expressions of free will to predict future events is to use methods that "belong to a *different* department of knowledge from the domain of exact science" and deal only with approximations (Maxwell in Campbell 1882: 211)(emphasis added). Significantly, the functions of the time in antecedents and in consequences, whether used to understand the motives in history or predict the future, are not symmetrical.

Maxwell notes that knowledge of contingent events is needed for there to be an omniscience of all facts. Omniscience is the domain of a classical metaphysics. He explains the disparity between this kind of metaphysics which deals with stable ideals and the observable world. Within the "doctrine" of metaphysics, the same consequents follow from the same antecedents. Within the observable world, "the same antecedents never again concur, and nothing ever happens twice" (in Campbell 1882: 212). In other words, as Pupin wrote, the observable human world is non-coordinated. The question is whether statistical methods can be applied for the purpose of making predictions about whether human free will can be determined.

Maxwell compares the problem of free will to entropy. He describes how the system has a quantity of potential energy that can be transformed into motion but will not be transformed until the system reaches a given configuration through a possibly infinitesimally small expenditure of work that will bear no definite proportion to the energy subsequently developed (in Campbell 1882: 212). Humankind has many possible singular points, making them hard to calculate – in addition to being a different department of knowledge from exact science (ibid). As an aside, this is why there is an attempt made to extract data at ever faster rates through the Internet of Things in order to increase the probability of accurate predictions on what people will do.

But Maxwell concludes that "Science is incompetent to reason upon the creation of matter itself out of nothing. We have reached the utmost limits of our

thinking faculties when we have admitted that because matter cannot be eternal and self-existent it must have been created" (in Campbell 1882: 176).

Engels and Spengler made similar observations, as Stiegler critic and translator Daniel Ross points out. The former noted that the problem of heat converting to heat and its loss is bound to lead to the "'very absurd theory'" that "there must have been a 'first heating'" (in Stiegler 2018b: 25). Spengler in the "Calculus of Probabilities" while not pointing to an originative deity implies a formulae of the end of the world are "'no longer in their essence formulae at all'" (ibid). Both of their commentaries on entropy either implies the existence of a creator or "the twilight of the gods" (ibid).

It is significant that Stiegler finds, after Alfred North Whitehead, that the transformational capability of reason is its "urge towards knowledge" and that which "does not exist yet consists" involving an infinitude that cannot be reduced to calculable information (Ross in Stiegler 2018b: 30). It saves the world from human drives through a reason that is not the Cartesian reduced cognitive faculty used to understand the world but a sublimating desire that infinitizes.

As will be seen in the chapter on Stieglerian applications to American studies, entropy's importance lies in how the prior state of a system cannot anticipate possible differences such as through the introduction of improbable and incalculable bifurcations to knowledge, which is something more than the finite calculable signal.

More than finite calculation

Applying physical methods to interpret – or paint a picture of – reality can be compared with applying the method of observation to re-present reality. Plato argues that art cannot be a re-presentation (*mimesis*) of reality, which is to say of the sensible world including human action (Ion 532-40) (also see Rep II 377-79; X 596-99; III 393c). Similarly, Maxwell points out that the application of physical science to certain ends such as to study singularities and instabilities rather than continuities and stabilities can tend to privilege "determinism which seems to arise from assuming that the physical science of the future is a mere magnified image of that of the past" (Maxwell in Campbell 1882: 222).

The premise of social entropy can rob the human being of even theoretical free will, forcing prestidigitated re-presentations.

Maxwell described any statistical re-presentation of the social as the "study of which we may estimate the character and propensities of an imaginary being called the Mean Man" (Maxwell in Campbell 1882: 213). This human is an "imaginary being" – which is to say, one that departs from the real:

> If we betake ourselves to the statistical method, we do so confessing that we are unable to follow the details of each individual case, and

> expecting that the effects of widespread causes, though very different in each individual, will produce an average result on the whole nation, from a study of which we may estimate the character and propensities of an imaginary being called the Mean Man (Maxwell in Campbell 1882: 213).

To regain individual difference requires interpersonal communicative action and the re-establishment of social norms. This is to replace purposive-rational action that is expressed through cybernetics as the technoscientification of language which has led the most industrially advanced societies to effect models of behavioral control (Stiegler 1998: 12).

AirSpace: Digital architecture for reality

American AirSpace "contains" the space of reality calculated through probability in architectural terms (it is not all possible space but Air space) and points to the virtual compression of the spatialization of (phenomenological) being. Being is biological, physical, material – but also conceptual, cognitive, and "noetic." American AirSpace lies in and informationally activates a larger conceptual context.

By noetic is meant our thoughts, intentions, desires, and actions as we interpret the needs of our bodies. It references a now archaic word, νοῦς or *nous*. More than being the intellect or intelligence, *nous* is the faculty of the mind also used in the feeling of the heart and soul that is needed to understand what is true and real. It is an intuitive awareness in discerning good sense. To the ancient Greeks, *nous* was reflexivity, without the subjectivity that can be traced to Descartes but also Aquinas.

Key to grasping reality today is the ability to know about, think about, and remember these categories. This is en epistemological problem of metaphysics, to take a cue from Stiegler's work which seeks to exceed poststructural dialectics. In the latter, the intelligible/sensible, subject/object, and so on are characteristic of the metaphysics of presence of the modern subject. Stiegler deconstructs them by drawing on a Simondonian scheme that brings synthetic resolution to the opposition of form and matter through "hylomorphism", the morphing or synthesis of matter. He is interested in the deconstruction of oppositions allowing for the simultaneous conception of the psychic, social and technical. He writes of a non-metaphysics. This uses overcomes the dualities of what is termed in philosophy as classical metaphysics.

Metaphysics, as it was conceived by Aristotle, inquires into the mind-independent features of the world. It explores questions of reality and the nature of universals or ideal (distinctly categorized) types in the universe. "Many general and abstract topics belong to the subject of metaphysics. It investigates the nature of existence, the features all entities have in common, and their division into categories

of being. An influential contrast is between particulars, which are individual unique entities, like a specific *apple*, and universals, which are general repeatable entities that characterize particulars, like the color *red"*, the Wikipedia entry reads, cited here for its simple language.

To care about reality is to permit accessibility to "even" the non-/metaphysical nature of reality,

To inquire into reality in this way requires more than just remembering psychic, social, and technical categories. It also requires tracing how they are being configured and reconfigured architecturally – not always through biological, physical, and material architecture, but also through the in-formational architecture of the postdigital. This is the purpose of Stiegler's work that will be explained as a categorical benefit to American studies.

Stiegler writes of psychic, social and technical synthesis in terms of "organology". Organology is easier to grasp if we think in terms of biological organs, social organ/izations, or the organs of reading (e.g. the mind and eyes or digital equivalents). But we can also describe this organological synthesis as "postdigital" organ/izations.

21st century "reality" as postdigital

The postdigital involves a combination of the "digital, biological, material and social" (Jandrić et al. 2018: 1) that can be used to project social order and life "to express a view of particular futures in which those kinds of technologies are imagined to be integral, embedded parts" (Williamson 2015: 2). In the postdigital era, "digital technologies and the Internet shift" not only off-screen interactions but also how information is engaged with in general – even in classroom settings, where children interact with knowledge differently than before digital interfaces became so ubiquitous (Fawns 2019: 133).

Put another way, "we are increasingly no longer in a world where digital technology and media is separate, virtual, 'other' to a 'natural' human and social life" (Jandrić et al., 2018: 1). This was described as UbiComp earlier. Indeed, so much of everyday life is organized by digital technology – like medical records. But this technology is also used to project our "wishes, lies, and dreams", to borrow from American poet Kenneth Koch, and influence our psychic reality.

Much of this is projected through digital interfaces structuring how we come into contact with information or knowledge about life. This is the design of Instagram, for example, organizing search, placing conveniently placed, attractive windows into glimpses of other people's lives, training us to reveal ourselves as we engage in voyeurism, suggesting to us what is "worth" presenting and how. The interface is what lets people control and interact with the "content" that is presented digitally.

In other words, coming to grips with everyday reality in an essential way, that grasps its essence and moves beyond merely using what is presented to a person, requires an understanding of the nature of re-presentation. This is the subject of philosophy – but also that of philology (especially literary studies) and culture (whether ethnography, anthropology, or cultural studies). This book attempts to interpret the technology of the postdigital world through cultural philology. That the overlap between the two lies largely in hermeneutics is also to point backwards in time to the question of types of message, their delivery, and their reception.

In the postdigital age, the increased merging of digital and analogue dialogue "has clear biological aspects, and the second is always informed by the first". Situated within the powerful dialectic "between physics and biology, old and new media, humanism and posthumanism, knowledge capitalism and bio- informational capitalism", today's dialogue is inherently postdigital" (Jandrić et al., 2018: 4).

From the look of things, at least online or living life directed by apps, the postdigital dialogue leads to AirSpace. It does not reveal its transmitters even in its name. The term "cloud", for example, obscures its physical architecture comprising millions of servers requiring hardware that occupies nondescript buildings sometimes erased from satellite images (Pitron 2023). This architecture is largely American-owned but can sit on the land of foreign shores, like in Iceland (Pitron 2023).

The companies that own the technology, media, platforms, and services comprising it include Oracle, OpenAI, Google, Microsoft, Amazon, Netflix, Facebook, Instagram, and WhatsApp (or Signal, for the privacy minded). They are largely American despite foreign or multinational spinoffs like TikTok or Viber. Similar technology services emerging in China has American overtones when viewed as an AI arms race dating from the previous century and returns to the American rhetoric of progress.

To follow this trajectory forwards is to follow the projection of business praxis that is ex cathedra and even hidden to academia given the proprietary nature of business strategy (Wilson & Wardack 2024). This leaves education not behind but with an even greater task – to re-collect the tools for understanding not just the material world but also the abstraction of possible worlds. Practical reasons for this are to provide resources to make up for spaces business can ignore, like social well-being, free time, or jobs that make sense (Graeber & Wengrow 2021; Stiegler 2012/2015).

Mapping reality as design pattern language

This section deals with tracing how the psychic, social, and technical can be configured and reconfigured architecturally through the in-formational architecture of the postdigital. It briefly points to the pattern language approach of Christopher Alexander (1977; 1980; 1993) that can be extended to other epistemologies such

as programming, as shown by Richard Gabriel (1996). It then compares this with more narrow applications that can be short-handed as "the present scientific world-picture", as described by Alexander (1980/2004: 12). It also seeks to introduce the concept of "mapping" informally through the narrative that follows, as it is central to the process of codification.

The work of Alexander sought a quality of "being" (1993) that acknowledged a disconnect between a person's inner world and the outer world of physics (Alexander 1980/2004: 19) and took issue with the "strength of the present scientific world-picture" (Alexander 1980/2004: 12). The strength of this picture is exemplified through the mental models whose precise rules of behavior allow for the prediction and manipulation of the world, such as through the flight of airplanes, the chemical behavior of matter, and the curing of diseases. Yet the instrumentalism of the world is ultimately mechanical and does not contribute to the experience or understanding of ourselves.

He therefore seeks, after Alfred North Whitehead, for a synthesis between the bifurcation of the world viewed as highly complex mechanisms and the world we experience (Alexander 1980/2004: 13). Alexander's "patterns" attempt to reach a cosmology of our relatedness to matter (1980/2004: 31) and find an alternative to the problem of who would want to live if we are conceived of as nothing more than "meaningless machines"? (Alexander 1980/2004: 14).

Increasingly predesigned "AirSpace" is an example of the "scientific world-picture" that instrumentalizes individuals. Everyone is seen as a "user" and through the ubiquity of UX, everything becomes an interface. It is an extension of Alexander's design patterns insofar as software designers view software users as "inhabitants" of a conceptual space (Steenson 2017: 68). In the 1996 book *Bringing Design to Software*, Terry Winograd wrote:

> Software is not just a device with which the user interacts; it is also the generator of a space in which the user lives. Software design is like architecture: When an architect designs a home or an office building, a structure is being specified. More significantly, though, the patterns of life for its inhabitants are being shaped. People are thought of as inhabitants rather than as users of buildings. In this book, we approach software users as inhabitants, focusing on how they live in the spaces that designers create. Our goal is to situate the work of the designer in the world of the user (Winograd 1966: xvii).

Over two decades later, it is possible to write of AirSpace – that is at once a pattern design aesthetic, modified for local adaptation, a projection of desire presented via digital media, and a projected simulation of reality – that exists only if internalized by individuals. It can blend the real (e.g. the need for food) and fictitious

(e.g. user taste profiling or projections) into (e.g. culinary) experiences, so that, if received at face value, there is no longer any clear distinction between where one ends and the other begins.

This is an example of what Jean Baudrillard (1994) calls hyperreality, which is a representation without an original referent. Through a process of simulation, the immediate perception of reflected reality is perverted in a representation. This representation models the real but has no origin or reality: it is a model without a model in reality. The resulting "simulacrum" is an image that bears no relation to reality. Put in terms of Stiegler, this raises the question of the nature of what we "seize" through primary retention, which is broadly "technical" by being a form of technique, and is not only determined by material technology.

Baudrillard's idea emerged through Jean Luis Borges' "On Exactitude in Science", influenced by Lewis Carroll. It describes an empire whose cartographers create such a detailed map that the map of an entire province occupied an entire city. As later generations lose interest in the study of cartography, they let it be destroyed by the seasons and it becomes a desert wasteland inhabited only by animals and beggars. In the end, nothing remains of the map in the land itself. In Baudrillard's reading of the blended compression of perceptions of reality in the cartographers' map, neither the real nor its representation remains. Only the hyperreal is left.

The question in this book has to do with the question of reality and its preservation as a multidimensional concept and experience, or active participation.

Lewis Carroll, in *Sylvie and Bruno Concluded* (1893: Chapter XI), contains a dialogue in which the protagonist remarks on the usefulness of the pocket-map, to which their interlocutor replies that their nation has taken their own map making much further than what the protagonist would deem the "largest map that would be really useful". (The answer being "about six inches to the mile".) The interlocutor explains how their nation had gradually expanded the scale of their map from six to a hundred yards per mile, eventually making a map at the same scale of the country. However, the map was not spread out as "the farmers objected: they said it would cover the whole country, and shut out the sunlight!" As a result, the country uses itself, the country, "as its own map" which was deemed just as good.

Pattern languages can be an attempt to design this map. The pattern, as we shall see, is a code that attempts to reveal the intangible meaningful structures of life to be able to map it on to life materially. This can include what design theorist and architect Christopher Alexander described as the "quality without a name" (Alexander 1964/1973: 34-39; Alexander 1979). This can also be narrowed to calculated, controlling projections.

Although probable functions are more than finite, as outlined earlier, the probable is an allegorical and emotional concept (Steenson 2017: 51). Mapping is language-based as all people have not just patterns but language (Alexander 1979: 193). Pattern languages can be instrumentally *used* as a structuring (or mapping)

mechanism, like the categorization described earlier. It can organize patterns both figuratively and operationally, according to design professor and historian of architecture and technology Molly Wright Steenson (Steenson 2017: 51).

Steenson (2017) explains that like a map, a design pattern can reduce space, or, more specifically, the size of the (digital) message. This is achieved through encoding (which requires decoding for the message to be reconstructed). Compression increases storage capacity and efficiency by replacing redundant information with symbols and structure. Messages are networked, less through hierarchy than through interconnections, through multiple links of overlapping variables linking to more than one node. This can be more interpretive than a classical diagram as it can connect a "feeling" or "essence" of design. This is thanks to its multiple dimensions. Think, for instance, of the classical "tree" diagram. A tree diagram cannot overlap with other trees, especially not in multiple ways.

The inherent relations that determine the logic of networked messages are generative. These relations determine how to construct arrangements and how to define and make sentences appropriate to any situation. As such, pattern languages can function like an operating system for design. They format in-formation about the built environment – whether the infrastructure is informational, coded, or physical. Its language can be "run" – in programming parlance, or "executed" – along a decentralized hierarchical network via a logic of computation. The intractable things of the earth – that are difficult to manage or control – can thus be re-formed as patterns or shapes to serve the ends of its creator (Brewer 2010: 89).

This raises metaphysical questions of the *telos* of the creator, which at once opens up dangerous space for polemics about the nature of existence. This is the price of questioning – as Gauguin once asked, behind one of his more famous paintings – *Where do we come from? What are we? Where are we going?* To not raise these questions is to make assumptions about the truth of present-day knowledge.

Polish American thinker Alfred Korzybski (1931) developed a field called general semantics that pointed to the limitations of knowledge of the reality of the world, which is bound to language (as we saw in brief discussion of Wittgenstein) as well as the human nervous system. Put in terms of Stiegler, our perception of reality is always filtered by the perception of primary retentions. By extension, our perception of abstraction that maps the world, relating an object to its representation, can never be the thing itself. But we nonetheless mistaken conceptual models of reality with reality itself (Korzybski 1931).

Here, we are interested in distinguishing the design of the in-formational through allegorical, emotional networks where it is a narrowed, calculating representation. We are interested in the new age conjunctionality of technology and warfare unfolding idealistic ideas about humanity and the problem of this design to make things fit into this vision where it is built into a mapping or design. Stiegler argues that this design is *written* and writes not of hyperreality but of synchronized

hyper-reticulation. Literacy (broadly conceived) is required to see where these patterns are projected mappings and where they communicate ways of being that are meaningful to the unfolding of human life.

"Reticulation" means a pattern like a network and is a word used in biology, engineering, and the arts to describe certain features and processes. In its transdisciplinary applications it is close to cybernetics where it attempts to network the intractable, that which is difficult to manage or control, in order to control it. Though of course that "attempt" raises the question of difficult to manage or control by whom, to what purpose – and again we return to the problem of *telos*.

3. STIEGLERIAN APPLICATIONS TO AMERICAN STUDIES

> *The American federal government invests massive public finds in the development of these cultural technologies: billions of public dollars have been invested for twenty years in information technology. ... American public power thus guides ... the global strategy of American power, in constant cooperation with the business world, but in the end imposing its vision upon it. ... So-called democracies slowly but surely lose their specificity, that is, also, their legitimacy and their credit, as well as the forces constituting their historical and cultural singularity. Because in what way is it still a matter of '*democracy*'? What is a demo-*cracy *that can no longer decide its* kratos*?* — Bernard Stiegler

Reticulated maps as law

We have seen how the physical, allegorical, and emotional code of pattern languages is today networked, or reticulated, into in-formational infrastructure. This can attempt to "map onto" or "over" physical reality. Grasping this requires a theoretical apparatus: this will largely be provided by the work of Bernard Stiegler.

The life-sized cartography described earlier in the work of Carroll and Borges will be achieved through so-called "communicating objects" of the Internet of things. Objects "are programming constructs in languages like Smalltalk and Self (and their variants)" (West 2024). RFID tags and other chips are being embedded into everyday things and objects of industry, business, and private use. These have their own Internet addresses that with the IPv6 protocol will permit ubiquitous networking of data. This is because it will permit 34 undecillion addresses, as opposed to 4.3 billion addresses with IPv4 (see Stiegler 2015/2016).

It is at this point that the world can appear to become doubled, through the hyper-reticulation of those everyday objects. Data extracted and possibly also in-forming those everyday objects become a mapped network of the networks of reality (Stiegler 2015/2016: 237).

Therefore, techno-logical memory externalized by, through, and among these objects create networks that attempts to re-present the networks of the human brain's memory of all the memory that can be inherited when it is externalized (through stories, in objects, books, etc.). West (2024) explains that "Computer scientists assert that everything in the world, physical thing, relationship among things, or concepts can be formally represented as a data structure inside the computer. This follows Descartes' tokens of thought. Those representations can then be manipulated by formal rules or algorithms." However, West notes, human memory is not "tokenized" – and therefore cannot be accurately mapped into a computer. This is sometimes addressed in the "mind-body problem" or the Cartesian "brain-in-a-vat" thought experiment.

Stiegler calls techno-logical externalized (exosomatic) memory "epiphylogenetic tertiary retention". This memory, or retention, is separate from our brain's inherited memory of externalized memory, which can include tacit knowledge. Stiegler's emphasis on the exosomatic is to point to the "work" that can be done automatically, stripping humans of the possibility to access this knowledge and co-create with it (e.g. Stiegler 2010). To reference Deleuze's point of the importance of keeping a human in the machine (1972/1984), Stiegler's concern is that humans are progressively becoming *out of the loop*.

The systems of this exteriorized memory, when viewed historically, form different epochs of knowing and experience. Over time, these became intentionally used to retain memory. The systems:

> are never stable but only metastable: nevertheless, their systemic *tendency*, that is, their tendency to form a coherent, integrated whole in which all the parts are mutually interdependent, means that all this unfolds as the history of the *epochs* of tertiary retention, beginning with all those prehistoric tools that are retentional only in an *accidental* way (not *designed* to be memory systems), and passing through all those epochs of hypomnesic (that is, intentionally retentional) tertiary retention, from cave painting to ideographic writing, alphabetical writing, the printing press, the gramophone, radio, cinema, television and eventually digital tertiary retention (Ross in Stiegler 2018b: 18).

Digital tertiary retention is ambitiously "intentionally retentional." Once the Internet of Things (and objects) becomes hyper-reticulated through exteriorized objects, not only is the world ostensibly doubled but so are its inhabitants, with data about their psychic wants and dreams, recorded from their web searches, text messages, social media posts, credit card purchases, and so on. Stiegler argues that this is problematic because aggregation of the data about us takes place at a greater speed and scale than ever before and is put in service of powerful reticular economic-

technoscientific-production systems interested in stripping us of knowledge to parcel off fragments of it to be sold but never owned (Stiegler 2018b).

Through algorithmic power of statistics through the continuous tracing, collection, aggregation, and automatic analysis of data in massive quantities models, possible behaviors can be statistically anticipated. The extent of their advance affect on possible behaviors can be seen in the attempt to flood the market with all possible answers to every anticipation before an individual has time to conceive of them.

Stiegler sees this datafication of "knowledge" about people to be problematic because the very conception of anticipation, to say nothing of the wait for their fulfillment, is important to the formation of a person's being. It "concerns each of us with respect to our *responsibility* and our ability to *respond to* the challenge of being put into question, the data economy has established an *industrial and automatized production of protentions that amounts to guiding them by remote control*, or, in other words, it amounts to their *annihilation"* (Stiegler 2018b: 36-7).

It is this new regime of affecting in advance that Stiegler calls a "new regime of truth" as it affects the powers to act and reduces the possible to the probable (Stiegler 2015/2016: 106-7). This requires unpacking and a concrete example to explain what this means to reality. We can consider how "smart phones" pushes users to be dumb:

> Rather than type in a word that is appropriate, colorful, evocative, the phone offers boring but probable words to choose from. *OK. Sounds Good. Great*. The reader knows that he or she is often guilty of clicking one of those probable words rather than inserting one with more meaning. And with these choices, again and again, the world of possible vocabulary shrinks to an impoverished selection of probable. With enough iterations the system self-destructs (Quillien 2025, personal correspondence).

This new regime of truth also collapses the everyday life of the public sphere and generalized privatization, which is protected in statistical government. Social normativities, which are not calculable, are "charted out" by probabilistic affects, and "fixed and substantialized" such as through data (ibid).

It projects a design that individuals never knowingly contributed to, short-circuiting even education, which should have access to knowledge, to make a general "law" of knowledge (Stiegler 2015/2016: 106-7). Personal relations are "mapped over" by constant data mining and everyday life is governed by self-learning algorithmic systems that reconstruct profiles according to a "logic of correlation … without relating them to a general standard" (ibid). As a result, data-mining "statistically collects and gathers dividuals" stripped of context, deterritorialized (ibid).

The very disclosure of something about existence, the suggestion that such a conveyance is a facticity, is to forget something essential (Stiegler 2015/2016:

222), such as the improbability of the "knowledge from which all knowledge can be known" (Stiegler 2009: 135). The exteriorization of branches of knowledge and their formalization through rules allows for the knowledge to be mapped out, made operative, and also to be interiorized.

While, as West (2024) points out, there was a failed effort in the business-software development world of the late 90's to cultivate "knowledge management" by extracting the tacit knowledge in employees by formalizing it and storing it (Seely Brown & Duguin 2000), many knowledge operations continue to be automaticized. These are carried out as operational rules that can be used without being made conscious.

For example, the formalization of the system of numeration can be used automatically, "without having to again actively internalize them" (Stiegler 2015/2016: 54). To rely on literally automatized analysis, exporting operations of understanding to the machine, is to "dis-interiorize" not just understanding but the very access to the possibilities for knowledge creation through both internalization and regeneration (Stiegler 2015/2016: 53). Stiegler insists on the need for knowledge to be co-individuated: grasped by social and psychic individuals and by machines – not just by the latter, which is currently the case.

Data aggregated through hyper-reticulation is used to map out a projection of life, becoming "concretized" as a "fact" of life. The machine tool and the technical system to which it belongs produce a process of "concretization" whereby it is the system of industrial objects – not the individual human laborers – that are transformed through being functionally integrated. The machine tool and not the individual laborer, becomes the technical individual (and thus "individuated"). The human laborer becomes dissociated from this transformation, not co-individuated with it. The laborer loses knowledge as their knowledge passes into the machine, such as where the cobbler then becomes an assembly-line worker, then forgets how shoes are made all together. It is the machine that now puts the (shoe-making) labor into practice, not the person. Stiegler (2010) observes that now white collar jobs of "creatives" are being displaced. Networks of techno-logical memory thus further displace the human individual, putting the human individual in service of the network. This is what is meant by dis-individuation (Stiegler 2009/2010: 37).

An example of the "concretization" of the "fact" of hyper-reticulation are smart cities (Stiegler 2015/2016). Who or more fittingly what is epistemically smart in a smart city? The empirical measurement of the "fact" of the smart city can also be questioned: smart to whom? according to which metrics? which measures of racial, social, dis-/ability justice? whose vision of reality? and so on.

The redoubling of the world through hyper-reticulation is a new historical stage of the technical history of the exteriorization of memory (grammatization).

As this new, mapped reality comprises billions of datapoints calculated at speeds four million times faster than the human nervous system, prevents social

systems from catching up to the technical system. As a result, they become disintegrated, unable to calculate it, unable to individuate knowledge of it at any given time into something incalculable – which is to say, unpredicted by that scheme of data. This ultimately means the dissolution of the possibility to become, as all possible futures are pre-predicted (Stiegler 2016/2019: 46).

This map resolves ontological, existential uncertainty. It puts it into control. Its referents are (arguably, according to empirical argument) "ready-to-hand" (cf. Heidegger 1949/1977) in reality. But whose, to what end, and in service of what? Are we caught in a net, unable to even re-member to think about who we are, where we are going, why we exist in the first place? Does this certainty serve human well-being?

Synthetic re/coding: Stiegler's play on words

The technocratic state no longer seeks to encourage communicative action or promote distanciation from "a critical distance toward purposive-rational action" but instead uses communicative action merely to reduce whatever might act as a threat to the system (Habermas in Stiegler 1998: 12). Stiegler writes about this in terms of disruptive "madness" or melancholy (2015/2016: 10) – and ultimately the loss of reason and disruption of life itself, or the "loss of this *reason for living* that creates and gives the feeling of existence" (2015/2016: 5-6). The madness of ὕβρις is where it becomes "systemic stupidity" (2015/2016: 11).

Stiegler works through this through a linguistic regeneration of words like justice and law through a back-and-forth movement between present conceptions and the possibility revealed through synthetic (not just analytical) thinking. An example of this is the hermeneutical shock of the "dreadfully ancient" that "puts back into play" questions of humility and justice (Stiegler 2018: 227), as per the following illustration. (Stiegler's approach here can be compared with Goldstein's 2014 book demonstrating other ways that thoughtful approaches remain relevant in a postdigital age.)

The original "fault" of Epimetheus (distributing technical means – τέχνη, *techne* – for survival to all animals but humans) leads to much that is important not only to experience but to knowledge. This original "fault" was actually a forgetting (Stiegler 1988: 16). History becomes the problem of the re-membrance of the limits imposed by ὕβρις as αἰδώς (*aidōs*) – which in Stiegler is is shame, honesty, and honor – and as δίκη (*dikē*), or justice.

It is Hermes who is responsible for the communicative action to re-trace what has come before, with the purpose of restoration and healing. He is the interpreter of ὕβρις, that is, of the limits imposed on knowledge.

But the systemic proximity of all the things, people, and animals in the world today calls for some kind of expanded awareness and sensitivity to the "outcast

status" of "social oppression encoded in attitudes and practices" such as law and custom. Which attitudes and practices act as barriers "to interacting with the world around us" (Holmes 2018: 2) or do not "match" or "fit" the "particularity of varying lived embodiments" (Garland-Thompson 2011: 592)?

Harvey Sacks (1992) in "doing being ordinary" draws attention to how the access to places, performing of tasks and establishing of relations changes as bodies change over time. Everyone is disabled at least several times in their lives.

To not have considered the implications of disability, mismatch, or misfit would be for Stiegler a type of stupidity which results from the destruction of circuits of transindividuation. In the section on deterritorializaiton we saw this was the encounter of an embodied self with an-other in a process of inter-recognition that transcends the self of the individual.

This is a type of stupidity that nobody escapes; it causes shame over the harm of others, because of which one begins to think, or pre-scribe a pharmacology (Stiegler 2013: 132). This becomes Stiegler's political economy, by way of synthetic analysis that puts back into play οἶκος, *oikos*, and πόλις, *polis*; habitat, law, and citizenry. It is the re/coding of these words that can lead to synthetic conceptualizations innovating a way through the entropy of the Anthropocene.

This takes place through hermeneutics, which in Stiegler's telling is rooted in the character of Hermes. Hermes was sent to right the faults of Epimetheus and Prometheus. Without needed technical knowledge of how to live, humans warred with each other and were beset by beasts. Zeus sent Hermes, standing for the communicative, interpretive act, to bring to humankind both justice and the "'feelings for the situation', a situation itself provoked in fact by the fault of Epimetheus (forgetting) and compensated for by the fact of the fault of Prometheus (theft)" (2016/2019: 222).

Hermes can act as a cure to the toxic effects of technology, bringing shame, modesty, and honor, as well as justice, which "requires law as a difference from fact as différance from the facts of the drives" (2016/2019: 222). Zeus proclaims through Hermes that all mortals must be capable of interpreting, "each time singularly, what is just and what is not, and equally, what is shameful and what is honourable" (2016/2019: 222-3).

Where community lacks the essence or quality constitutive of what community means, justice and shame must be interpreted every time anew, "in every situation of decision, in every position of necessity" (2018: 216). "It is not the philosopher, the sophist says, who will lead the city, but the city itself through its coming-together. What brings this togetherness about is found in the feeling of shame, that is, of finitude, *aido*, such as it stems from the fault(s) of Prometheus/Epimetheus (Vernant 1979, 80)" (ibid).

Central to Stiegler's political and contributory economy are circuits of transindividuation and associated milieus –in which all individuals can contribute

symbols, not just consume them, as is implied by the consumer/"user". However, he also stresses the place of limits and the transitory life of the human in their life in ethics (2016/2019: 223): any cure can also be a poison.

Digital studies: Network or net

The written trace we leave in digital networks points to the always ongoing threat of toxicity to existential territory. Stiegler writes that today this is exteriorized as algorithmic governmentality: uses our traces to track and anticipate our next move. "This governmentality now appears even more alienating and addictive, and even less open to critique, than analogue media – because it is much less visible and ultimately much more dangerous: it merges with the world that it absorbs, flattens and annihilates by engulfing it and dissimulating it" (Stiegler 2015/2016: 135).

This becomes "a-signifying semiotics" causing "the affects, perceptions, emotions, etc., to function like component parts, like the elements in a machine" (Lazzarato in Stiegler 2015/2016: 135). They thus function like "the input/output in semiotic machines" in which everything has been written and calculated in advance and there were no longer even any need for interpersonal connection through language (Stiegler 2015/2016: 135).

The system that is designed for us, based on the traces we leave are "detached from us" such that we can have no relationship with it, no opportunity for reflective distanciation (Ruovroy in Stiegler 2015/2016: 137-8):

> To take possession of our double, to reach the point of analysing the dividuation of the self in which it consists , would be to be capable of dis-automatizing, and to create a reflective and specular interface. One can imagine how *social engineering* could be developed in this direction (Stiegler 2015/2016: 138).

The question, especially within the context of activist-minded American cultural studies, is how to reactivate the conditions for possibility and impossibility or ways of living over a cartography that has already been written. Beyond all of the projections various industries, such as marketing or big pharma being projected. The latter has become such a problem that we can now speak of *all pathology all the time* (Davis 2021), foreseen by Ivan Illich in *Medical Nemesis* (1976). Joseph Davis, who coined the phrase, does hermeneutical work by exploring how "What is diabolical about the present situation is that whenever we want to refer to a realm outside medicine we find that it has already been medicalized" (Davis 2021).

To get out of this quandary, Stiegler pre-scribes digital studies that puts "back into play the entire relationship between technics, knowledge, politics and economics (that is, powers)" and considers how the television or computer (the media

of algorithmic governmentality) is at once epistemic, epistemological, political and economic, and we cannot approach either of them without considering all these dimensions" (2018: 44). His interdisciplinary and essentially epistemological perspective is also why he emphasizes the word *reticular* which at once describes the material media of the algorithmic tools but also the knowledge behind and transmitted through them. This can be compared with Marshal McLuhan's work on media as medium (1964/2001a; 1964/2001b).

Additionally, by inquiring simultaneously into science, politics, and economics from the perspectives of psychic/individual, social, and technical bodies (through organology), he seeks to exceed scientific objectivity – through the multiple perspectives. This brings space for the work of hermeneutics which would bring discussion of how to revaluate the value of work (2018: 46).

From reason to ratio: To madness or cure

Stiegler's neganthropical project is conceived "as care and in this sense as an economy" (2015/2016: 245). This does not simply pertain to the human power to transform the world but as the vital difference that creates more energy. Stiegler's contribution to this is to take a synthetic, cosmological view, that traces back and forth from where we are in the present to how things appear to us in the past to surprise us into finding new significance and play out new ways of being together in the expanded ontology of the hyper-reticulated world.

In his telling, then, thermodynamics ushered in the era of technoscience through the flyball governor central to cybernetics, the question of fire and its pharmacology, and information theory (2015/2016; 2018). He considers thermodynamics to replace cosmology with astrophysics. By bringing together the techno-logical work of physics and the effects on the human as an organic being but also one that is psychic, social, and technical, he shows how this has changed our conception of the cosmos. This critically posits the questions of entropy and negentropy as well as "the matrix of the thought of life as well as information" (2015/2016: 11). This was explained in the section on Transformative information.

The processes through which the (ever new) technics "is constitutive of human temporality in how it spatializes human processes, like how writing is a spatialization of the temporal process of speaking" (Goetz 2025a). Stiegler calls these "cosmological sur-realities", ordering the processes through which exteriorizations are articulated. In this respect, it has an ontological character. The technical design of these scientific articulations do not necessarily "fit" with the environmental conditions of the world (cf. Garland-Thompson 2011).

The working out of individual reason "on the occasion of concrete observations and well-though-out experiments" (Hadot 2006: 125) that led to the narrative-code shift was the dawn of so-called "exact science", which is "knowledge so systematized that prediction and verification, by measurement, experiment, observation, etc., are

possible" (Websters 1913). Mathematical and physical sciences are exact sciences. Mathematics permits a mechanical approach through how it is possible to reproduce it. As we saw in the example of Maxwell's work, mathematics contributed to the development of physics and its central discoveries.

Given how the results of science could be exteriorized and tested, it was "no longer the prerogative of a few initiates" including of a few privileged students or university professors but was accessible by all of mankind able to participate in and collaborate on the scientific method. This method comprised a combination of the application of the laws of nature *together with* the "calculations and mathematical notions that ancient mechanics used to build artificial objects" (Hadot 2006: 125-6).

The basis of this rational science as per Descartes has been that what matters most is "not the knowledge of what actually causes a given effect – for this we cannot know – but the possibility of reproducing such an effect" (Hadot 2006: 132). The possibility to re-produce or re-present is key to understanding what is changing in the 21st century and to decoding the ratio underlying the rationalization of the reticulated pattern languages of today (Stiegler 2016/2019).

The exteriorization of reproducible symbols – which can thus be exosomatically reproduced and represented – begins, according to Stiegler, in 17th century Cartesian thought. Descartes's' observation that the possibility to reproduce the ideal and possible world of phenomena through a pre-defined mechanism is useful in medicine and the other arts. As West (2024) observes, "Descartes, and Leibniz and Pascal, are the root of the fallacy that human thought is identical to machine thought, both arising from the operation of physical symbol systems—formal manipulation of discrete 'thought tokens.'"

In Rules 15 and 16 of *Rules for the Direction of Mind* Descartes seeks to draw figures that can be "displayed before the external sense" to be easier to keep in mind as "a state of attention" (Stiegler 2016/2019: 109). Descartes argues that by representing them as symbols that can be written as an aid to the memory, they guarantee the memory will not "go wrong". Stiegler sees this as the precondition for the analytical function of understanding that conditions it in Leibniz's *mathesis universalis* (ibid).

These rules provide an outline of a treatise on the algorithmic: "We shall do this by means of very concise symbols, so that after scrutinizing them (in accordance with Rule Nine), we may be able (in accordance with Rule Eleven) to run through all of them with the swiftest sweep of thought and intuit as many as possible at the same time" (Stiegler 2016/2019: 109).

This underlies the computational understanding behind pattern languages through how it is an "analytical approach, which is founded on the 'indubitable' simple and intelligible elements produced by a 'passive synthesis' that is not psychological, but *techno-logical"* (Stiegler 2016/2019: 153-4). Descartes' rules would "inaugurate the coming realization (in the nineteenth century, with Charles Babbage,

Ada Lovelace and Herman Hollerith) of a new stage of grammatization" (or new history of technological organization) and would be made possible by what would become algebra (Stiegler 2016/2019: 109).

Stiegler explains that "Calculation and calculability, in passing through the rules that Descartes assigns for the direction of his mind as analytical practices of reading (Rule Fifteen) and writing (Rule Sixteen), thereby become the condition of all rationality. Rationality is thereby directed along the path towards rationalization, which according to Weber is the reality of capitalism (as secularized metaphysics), and which according to Adorno and Horkheimer inverts the Aufklärung, or the reason of classical thought" (Stiegler 2016/2019: 119). These rationalized possibilities are expressions of the excess of one type of thinking – that of mechanical calculation of the physical world and its emerging systems, to which humankind has now been relegated.

This practical philosophy was Promethean in how it harnessed the force and actions of fire. Stiegler considers the Anthropocene to have started when the question of the cosmos became a question of the combustion in thermodynamics and astrophysics (Stiegler 2015/2016: 11). Maxwell was central to many of these discoveries though we remember he took a different view of possible social applications of physical law. Maxwell and other scientists, and later programmers, had misgivings of the universal applications of these discoveries, pointing to their limits (e.g. Weizenbaum 1984; Lewin 1948; Geertz 1973). Despite that, however, Stiegler notes that the thermodynamic machine "which posits in *physics* the new, specific problem of the dissipation of energy, [also became] an industrial technical object that fundamentally disrupts *social* organizations" (Stiegler 2015/2016: 11).

The technical object of combustion establishes the era of technoscience through its phenomenological effects and is at the heart of the conception of cybernetics which has become the control of humans through datafication tied to rationalized capitalist manipulation of human drives or libido. The question of entropy and negentropy becomes the "*crucial problem* of the everyday life of human beings", underlying the matrix of thought of life and information (Stiegler 2015/2016: 11).

Psychology comes into this, and gets tied to capitalist calculation into this mechanical physical system (Stiegler 2010). In brief, this rational underpinning departs from a totalizing view of the human mind together with a prioritizing of the individual over the community and the rest of the world, and on the basis of those two postulates, analysis of the individual and individual experience. The emphasis or expectation of scientific precision in this domain is rooted in the Enlightenment (Ignjatije 1993).

The extremism of this rationalization has also been linked to a kind of madness, in the work of both Foucault and Derrida, which Stiegler shows as central to the development of the exteriorized tools of thought that lead to the mechanization of the physical world:

> this madness was made possible by the new ὕβρις in which consists writing, reading and rereading, conceived as the analytical conditions of thinking, and in such a way that calculation becomes, as ratio, the mathesis universalis constituting the method of any rational philosophy (Stiegler 2016/2019: 150).

Analysis and synthesis as ruling understanding and reason bring a "new stage of grammatization induced by the proliferation of grammars, dictionaries, account books and forms of money, with – according to Aeber – accounting penetrating all dimensions of life", as "accounting ratios come to be inscribed at the heart of the process of rationalization accompanying the 'spirit of capitalism'" (Stiegler 2016/2019: 151).

This very desire to calculate and control, in Stiegler's reading of Foucault (Stiegler 2016/2019: 144-7) stems from ὕβρις which stems from an imagination that stems from a dream, so the will has the violence of critique within it. As a result critique itself is "the *crisis of reason's madness* when it *truly* reasons" (Stiegler 2016/2019: 147).

In other words, despite the great advance of rationalization, it nonetheless has a limit in and is conditioned by madness. For Foucault, "This *ratio* breaks with a thought of madness that is also a thought of thinking in which the possibility of madness would always remain the *condition* of thought" (Stiegler 2016/2019: 118). Derrida shows madness at the bottom of thinking (Stiegler 2016/2019: 141-143).

The rational exteriorization of knowledge even with its limits becomes popular precisely in the face of barbarism or fundamentalist extremism that threatens its demise (Stiegler 2016/2019: 40).

This was the case with Augustinian thought, emerging as the Roman empire and its laws faced decline through the barbaric onslaught of Germanic tribes (*Orbis Romanus*). At that time, a popular reliable alternative appeal was offered through Augustine's cultural suggestion that individuals turn inward to seek out – and consequently exteriorize, rationally – their dark and unexplored depths as a foundation of identity and faith.

Ironically, Augustinian thought (characteristic of a prior decline of empire) can be posited as the foundation of the Western thought and culture now threatened by entropic decline. It was worked into Descartes' *cogito ergo sum* which inspired romanticism, existentialism, individualism, Roman Catholic and Protestant theology, and technoscience (Ignjatije 1993). This is summed up by Stiegler:

> The madness of ὕβρις always occurs through a confusion of the planes of subsistence, existence and consistence. In barbarism, whether it occurs within or outside civilization, it is the ghost of this madness that possesses the 'barbarians' as their ὕβρις, including when it is

> manifested in the kind of 'end of an era' behaviour that accompanies all great collapses. This is possible only because, in the pharmacological condition, the possibility of madness is the condition of reason, and, so to speak, its reason. Madness, which always remains in the background of reason as its possibility, is both the negentropic and the entropic condition of Neganthropos. The Anthropocene is ὕβρις as the entropic inversion of reason in the sense described by Adorno and Horkheimer – an inversion in the course of which the Aufklärung turns into a 'new kind of barbarism' (Stiegler 2016/2019: 40).

Stiegler's conclusion of the theological moral problem of the necessary possibility of becoming mad that is contained in technological life ends with how the cure and toxicity of technological, social, and psychic noetic souls is intermittent in nature – as any cure becomes toxic at some point, and vice versa (Stiegler 2016/2019: 226; also see 291-292). Thence the problem of the decline of empire.

The cure is via circuits of transindividuation that condition its individuation. Failing which, it becomes mad (Stiegler 2016/2019: 40).

Thus reason becoming ratio is a form of madness, especially where "conceived ever more exclusively as computation, and through that as this disinhibition that is then referred to as Progress, and which, today, at the end of the Anthropocene, in the age of disruption that turns it into an Entropocene, seems to exhaust all … reasons for living, acting and hoping" (Stiegler 2016/2019: 211). Stiegler's description of this "nightmare" includes political decay, suicide, homicide, deprivation of citizenship that "can only aggravate to even greater extremes, leading to ever greater extremes on the side of 'jihadists'", scapegoats, and the disruption of everyone through the 'data economy' (ibid).

Therefore, knowledge cannot be infinite, but (as *epimetheia*) arises from the accumulation of experience through the mediation of past faults:

> only insofar as it is flawed, deficient, *makes* faults [*fait défaut*]; it is infinite and rational only insofar as it is knowledge of the necessity of this fault (through the faultiness that always affects it as the limit of this or that scientific or philosophical theory)(Stiegler 2012/2015: 165).

The law of code

It is implied in Stiegler's writing that the limits of cybernetics were reached through the shame of algorithmic governmentality which arose out of a breakdown of the law, broadly conceived (though also historically explicable through the narrative-code shift) and the lack of (discursive, negotiated) regulation.

In 2000, Lawrence Lessig wrote in Harvard Magazine that "Code is Law" in our "age of cyberspace". This code "too, has a regulator [but] we don't even see the regulation in this new space. … This regulator is code – the software and hardware that make cyberspace as it is. This code, or architecture, sets the terms on which life in cyberspace is experienced. … [U]nless we understand how cyberspace can embed, or displace, values from our constitutional tradition, we will lose control over those values. The law in cyberspace – code – will displace them" (Lessig 2000).

Code, in Stiegler's reading (e.g. 2018), is not just the languages of computer programming. There are other digital written, if not alphabetical, retentions (digital tertiary retention, i.e. ex-pression of memory). For example, positive law is also a form of mnemotechnics. It is a codification distributed according to genre (civil code, penal code, etc.).

But this type of code points to the problem of interpretation "where the relationships between code, law, right and justice" each have their own systems through how the memory they hold is articulated and ex-pressed (Stiegler 2018b: 243). The problem of relational interpretation among codes also becomes key "with respect to notions of space and time in mathematical physics" (Stiegler 2018b: 244).

What is at issue in the "age of cyberspace" is the relationship between digital code and its changing architecture, regulation, justice, and, most fundamentally, knowledge of the knowledge that is articulated through those cultural codifications.

To claim that code is law and that it should be defended from regulation whether by "hegemonic market players" represents a libertarian view. However, such a view is historically, epistemologically, and philologically reductionist. Law is not "code" in the sense that code has historically been understood by jurists, in the history of law.

The theory and the practice of law has had a role conditioned by its externalization, earlier as a written retention but today increasingly re-membered in digital code. The temporality involved in and surrounding the spatialization of the applications of this code is significant. As is the time and space to work out the ideality of justice that orients the differences between fact and law, which requires interpretation (Stiegler 2018b: 245).

To expect the law to be computed and calculated as code is to deny such careful conditioning. Worse, it allows them to be "bypassed and short-circuited" (Stiegler 2018b: 251). This works to bypass and short-circuit law and right themselves, which is to say, the noetic différance between them.

This leads to the illusion (or "fable") that it is possible to spontaneously compute questions of law and right through "hard-wired" capacities, as if all possible interpretations could be pre-programmed, understood, and fixed. This would suggest that questions of law and right could be reduced to mere calculations.

Code becomes law only through the psychic and social internalization of the symbolic code. It becomes "embodied psycho-somatically" but also constitutes

social cohesion as a form of knowledge of how this social body is formed (Stiegler 2018b: 251). It is only when code becomes this type of embodied knowledge that it can be said to be a law or a right. It becomes embodied through "institutions of certification, publication, education, training" which Stiegler calls "retentional systems". These form the apparatus at once of mnemotechnic exteriorization and of "the cerebral, psychic and social interiorization of code that has been exteriorized in and by these systems" (ibid).

Once this code is interiorized socially and pyschically in this way, it can said to be embodied. In these terms it is easier to see the difference between what Stiegler calls the "automatic indifférance of code" and its différance (Stiegler 2018b: 251). Where it is automatically indifférant, it is repeated to the "letter of the law, but without spirit, which is to say, without the power to neganthropically do work" (Stiegler 2018b: 251). Dis-spirited repetition does not involve embodiment nor the institutions of embodiment: it is anti-social and as such "inhuman". "The *inhuman* refers to a way of denying the negentropic possibilities of the human, that is, of denying its noetic freedom, and, as a result, its *agency*" (Stiegler 2018b: 54). The question of freedom is central to the question of a hard-wired justice.

The idea of the law of code, if it is a just code, assumes a just infrastructure. But Lessig himself wrote that "the architecture of cyberspace is not given" and can "change (Stiegler 2018b: 253). Other architectures can be layered onto the basic TCP/IP protocols, and these other architectures can make behavior on the Net fundamentally regulable (Lessig 2000). Commerce is building these other architectures" (Stiegler 2018b: 253).

But the architecture has changed. In June 2015, it became commercial. For the past decade, this system "exclusively serves a capitalism itself becoming purely, simply, exclusively and therefore absolutely computational – entropic as such, that is, inherently self-destructive" (Stiegler 2018: 253).

The "program" ordering cosmological sur-reality "has today become a function, serving not reason but, precisely, the understanding, and an automatic understanding", removing the knowledge of reason itself (Stiegler 2018: 267).

By way of simple illustration, the "law of code" described by Lessig can been seen in how computers have been given the "right" to read billions of texts humans have not been able to. These range from private emails to the billions of books scanned from library collections. Some universities do not have access to all the books that these computers have been given access to. This illustrates, again, how technology can leap ahead of humankind in the knowledge that it has and that workers do not. Stiegler called this the proletarianization of knowledge and reason.

The question here is not whether there is a new legal system emerging through the computational age but the meaning this law gives to the experience of human life: how it is restructuring it. How does this law suddenly make us citizens of AirSpace, when yesterday we were citizens of countries? Surely, this is surreal cartography?

It has been built on calculating technical systems that have progressively undermined questions of law, right, and justice. According to Marx (1848), the means of production follow the "law of calculation, thereby dissolving the moral values of former times: It has drowned the most heavenly ecstasies of religious fervor, of chivalrous enthusiasm, of philistine sentimentalism, in the icy water of egotistical calculation. It has dissolved personal worth into exchange value, and, in place of the numberless, indefeasible chartered freedoms, has set up that single, unconscionable freedom – Free Trade". Stiegler considers this contributes to unequal access among classes to the means of production, which gives the bourgeoisie a revolutionary power that leads to demoralization through the denial of knowledge, and, ultimately, to entropy (2016/2019: 241).

The duty of reason, a hermeneutical web

To take possession of the traces of our digital double is to reenter into a relationship of identification, subjection, to be there a friend to a possible process that forges its own cartography and metamodeling, permitting an individual to reconstitute existential territories, to paraphrase Guattari (1987).

This type of reactivation can be understood as an individual re-activating knowledge through the individuating work of internalizing it. Individual agency is needed not just for noetic freedom but noetic existence, where knowledge is productively embodied in and among human individuals beyond, for example, the absolute stricture of serving capitalist computation. The duty of reason includes interpretive questions of discernment inherent to justice, possibly including a return to past possibility, as well as an openness to that which is not yet known.

For this knowledge to circulate it must involve retentional systems like the "institutions of certification, publication, education, training" (Stiegler 2018: 251) that exteriorize knowledge, giving to it space and time for it to be interiorized cerebrally, psychically, and socially. Stiegler was no anarchist.

However, given the interrelational change to how knowledge can be shared when it is exteriorized digitally, new peer-certified definitions of what constitutes scientific law within so-called "rational" disciplines are needed. For example: how are (empirical) states of fact transformed into (theoretical) states of law? This can involve new criteria and new categorical invention (Stiegler 2015/2016: 45).

This can then be supported by the architecture of digital communication. Stiegler suggests the creation of a "hermeneutic web" which would be a "publication space for digital tertiary retention dedicated to the formation of a new noetic and political community" (Stiegler 2018b: 253). As such, he is not describing the Web but a digital tool like Ward Cunningham's Federated Wiki or possibly an extension of an Internet protocol like Gemini or Gopher. He considers this should be a direct reversal of the "the overwhelmingly entropic process borne by the current computational system" that exclusively serves an absolutely computational capitalism (ibid).

The hermeneutical web is interpretive in the absence of which digitally exteriorized memory is nihilistically computational and algorithmic, reducing any value to calculation. To escape this calculating valoration, Stiegler proposes introducing intermittences, "other" time, and transvaluating "the reversal of all values by calculation" so that traces of noetic pollination can be cross-fertilized and circulate outside the absolutely computational regime (2015/2016: 242).

He proposes replacing the steam engine that works more or less efficiently but produces waste and always needs more energy. In their place, he suggests "libidinal economies of neganthropological différance" (Ross in Stiegler 2018b: 29) which could increase energy through work instead of deplete it through how such work can lead to possibilities for a new future, like how a good movie can leave a person more energized than when they began watching it.

The commercial domination of the infrastructures of the web and the internet by a few very large companies at a speed and scale and giving data centers access to "so many parts of our lives, without fully understanding what they are" (Blum in Stiegler 2015/2016: 134). This is like a city in which each of the houses are owned by individual proprietors compared to one in which all of the houses are owned by a single individual. The latter is like Google's domination of the internet such that it is now like a "separate network parallel to the internet" (Blum in Stiegler 2015/2016: 134).

The structure of the hermeneutic web Stiegler envisions would remedy this is through knowledge cooperatives and "not neighborhoods of small proprietors" (Stiegler 2015/2016: 134). These will not be like what has come before "in the two main epochs in the history of the web" (ibid).

Namely, first, the hypertext links on the websites of the old web and, second, in the epoch of the search engine and blog, the recommendations and reputations of the network effect that brought expressive content to platforms. The third epoch should instead be a form of political technology involving diachronizing the web – which is to say, making it different and incongruous – to allow for the creation of new possibilities especially as they change over time, and by providing interpretive instruments for this disparity (Stiegler 2015/2016: 134).

To extend the point about new possibilities, Stiegler points to where knowledge is open to that which is not yet known, open to co-participation with the knower who can become individualized through it. This is illustrated by the anamnesis (remembrance of the Truth of being) in Socrates in Plato's *Meno*, Husserl (in "The Origin of Geometry") as reactivation (which can be understood as an individual re-activating knowledge through the individuating work of internalizing), and the forgetting that is at stake in the Heideggerian thought of *Dasein* as capable of being affected by *a-letheia* (Stiegler 2015/2016: 46-8).

Learning fits open spaces, spaces of aporia. This is explained most eloquently by Anne Carson who describes aporia as "waylessness" or "puzzlement, impasse, a

wrong answer to a wrong question" (1999: 7). An example is how questions beget other questions, indefinitely, which Heidegger describes as the "abyss" (ibid). There is "something valuable" in "the experience of error" such as how issues play out in Socrates, something that is completely lost in a summary (ibid).

Wrong questions are described by Hans Georg Gadamer as "slanted" questions, questions which he contrasts with open ones (2004: 394). Slanted questions do not reach state of openness because they retain false presuppositions and do not correspond to any meaningful question so do not have correct meaning.

Waylessness or openness can inform questions about justice, law, and fact. Where there is no way, individuals must reactivate whatever they know in order to find a way through unknown cartography. This is called the beginning of learning: the forced departure from the context one knows within oneself into something new and unknown. In this context it can be argued that merely memorizing operational code is slanted sophistry.

Participatory software for disautomatization

The possibility to learn through contextualization should also extend to the choice of which software to use. As it is, "the choice of [Internet] software infrastructure constrains users more than do legal prohibitions" (Cardon in Stiegler 2015/2016: 136). Given that software structures how users "see" information and represent the digital world, this restriction is phenomenological. Earlier, this was explained in terms of the conceptual space software designers map for users to "inhabit".

Having a choice among participatory technologies would greatly change this and achieve "critical distance toward purposive-rational action" (Stiegler 1998: 12) Instead of the design being imposed as "fact", the choice and (noetic) experience (even if of error) interprets these "facts" and makes of them laws, which is to say generalizes these interpretations into a new standard or system expressive of the participants inhabiting it.

While the digital environment was automatized under the argument that intelligent environments that strip us of that choice "free the mind" for "more interesting or more altruistic tasks" (Berns & Rouvroy in Stiegler 2015/2016: 136), it is also interesting and altruistic to individuate by means of disautomatizing that environment as a creative, responsible act.

As it is, however, only malfunction allows for individuation and the reactivation of knowledge through wayfinding a hack, the one-time cure and unique work that cannot be modeled (or standardized as law) but is more an aesthetic than scientific paradigm (Guattari 1987).

In the case of proprietary code, however, not even malfunction legally allows for individuation. The reactivation of knowledge with respect to a code base is only accessible to the company programmers who are legally bound not to take that knowledge outside of the company.

Open source software mitigates this problem – only insofar as companies delegate certain parts of proprietary knowledge to public view and participation. It is technically also transparent and peer-developed software, mostly distinguished from free software through its different licenses and moral philosophy. Because licenses enforce the differences between the philosophies, philosophy and law become intertwined.

As poet, writer, and computer scientist Gabriel (private correspondence) explains:

> The GNU license (GPL) requires any software combined with or derived from free software licensed under to it also use that same license. Because of this, it is considered a viral license, infecting anything it comes in contact with. Some companies don't like that, but some use GPL to protect its IP. My company (Lucid) produced Lucid Emacs which became XEmacs, and it is under the GPL. In the late 1990s and early 2000s I advised various companies to use GPL for some (business) purposes. Likewise, non-companies produce open-source software, Me, for example. I would say most companies prefer open-source to free software. It is also easier to make it possible to ensure a piece of open-source-ish software can be executed 'for free' when it is under GPL. Suppose to make S run you need P to go with it. If S is open-source and P is proprietary and needs payment, you're screwed. If S is under GPL then P must be as well (or, it must be architected in such a way that LGPL works—and sometimes this isn't easy).

The free software philosophy values social and ethical principles above all (Stallman 2007/2024). Like open source, it allows users to run, copy, share, study, and improve the source code. The ability to "run" the program is important because in some open source software the code is free but the executable is not.

Along these lines, Stiegler championed free software as a means for "constituting networks of associated milieus" as a cure for the proletarianization or automatization of knowledge effected both by the division of labor and by the functions of consumption and production (2018: 100; see Goetz 2022).

Where open source values pragmatism and is business friendly, free software considers the principles of freedom and justice. Richard Stallman states that an important distinction between open-source and free software can be characterized as follows: "Free software is an ethical imperative, essential respect for the users' freedom. By contrast, the philosophy of open source essential respect for the users' freedom. By contrast, the philosophy of open source considers issues in terms of how to make software 'better' in a practical sense only" (Stallman 2007/2024).

To continue Gabriel's earlier example, "an open-source developer believing largely as Stallman does (but not enough to use GPL) would develop both S and P as open source. A difference is that this developer would permit someone to create a propriety program including S + P, but Stallman would not."

The practical as opposed to moral philosophy of open source instrumentalizes the real as a mode of access to what could be and what can be actualized while the values of individual freedom describes what is, passing through what is real "to the actuality of thinking" (Stiegler 2015/ 2016: 200). As a result it can impede thought or hide what is really going on.

The transparency of the code (as opposed to it merely being available, which can be the case with open source) reveals whether it is malware: executing commands that may be contrary to user's wishes, by exercising unjust power:

> In outrageous cases (though this outrage has become quite usual) proprietary programs are designed to spy on the users, restrict them, censor them, and abuse them. For instance, the operating system of Apple iThings does all of these, and so does Windows on mobile devices with ARM chips. Windows, mobile phone firmware, and Google Chrome for Windows include a universal back door that allows some company to change the program remotely without asking permission. The Amazon Kindle has a back door that can erase books (Stallman 2013/2024).

Other issues include how online software services require entrusting service providers with data, and putting it in their control as the data is not on user-owned hardware.

"Better" software is therefore more than just powerful reliable software, but that which serves users by respecting their freedom and not putting restrictions on them, which is the case of Digital Rights Management (DRM). The ability to change or share code is an example of freedom of control.

The emphasis on sharing is reflected by free software's licenses, the GNU General Public Licenses, which guarantee the user the freedom to run, study, modify, and share the software. This type of copyright is referred to as "copyleft" as it requires derivative works to be distributed under the same or an equivalent license.

American poet, writer, and computer scientist Richard Gabriel (private correspondence) explains: "Open-source software is like gifts given by a good charity, and the Creative Commons licenses are more like that than like GPL. It's as if a particular charity would give its gifts only to those who turn around and give gifts that require others to give gifts…" and in that respect can be good for those companies not wanting competitors to take advantage of their code.

Education insofar as it seeks to reactivate knowledge and constitute networks of associated milieus (Stiegler 2018: 100) should use free software, especially as this

would teach students the principles behind the software (how it works beyond a single proprietary interface, for example). “To teach a proprietary program is to implant dependence, which goes against the mission of education” (Stallman 2013/2024). It would also provide opportunities to discuss the ethical principles behind activities and promote cooperation and helping.

Part II

De/coding and disautomatizing

4. DECODING CURRENTS

> *Communicative action is progressively replaced by purposive-rational action, that is to say, by the scientific model of cybernetics as the technoscientification of language—a process that has led to the fact that 'the industrially most advanced societies seem to approximate the model of behavioral control steered by external stimuli rather than guided by norms'. This constitutes a depoliticization of society and promotes a tendency toward the autonomization of purposive rational activities, an evolution that 'does harm to language' (Jean-François Lyotard will take up this theme), that is, to socialization, to individuation, and to intersubjectivization. This tendency can go very far, being extended, for example, to 'psychotechnical' manipulations (Herman Kahn)* — Bernard Stiegler

What goes without saying

Cultural code can be hidden behind how much of how we live, what we do and why, can "go without saying" even though it not only structures the reality of our lives but its outcome.

Philology and cultural studies are both concerned with "reading" what we do and why. Our reading – of anything made up of language, code, or symbols – reflects the historically determined moment we find ourselves in when we read it. How we read; how we make our attempt to understand or appropriate knowledge, reveals our consciousnesses.

Before we even "grasp" or "seize" a thought, any and all number of thoughts can occur to us. Once we grasp it, we can choose to express it. Once it is expressed, such as verbally or thought a material mark, it is externalized and can be shared, however imperfectly. If we assemble marks over time, we can begin to build the structure of a body of knowledge that can be inherited, like the knowledge of mathematics. The algebraic and trigonometric of mathematics, for example, contribute to knowledge in other fields, like Newton's laws of motion and physics.

This knowledge has contributed to the development of airplanes and GPS navigation systems. At least, according to an overview of the development of Aristotelian thought in Western philosophy. This, while far from representing total human knowledge, has nonetheless shaped the culture of this postdigital "epoch" through what is and is not possible (e.g. trans-atlantic air flight, home loans, and credit rates).

That there can be knowledge of human behavior means, however, that there can be an attempt to control it. To those interested in the control and governance of cybernetics, it is a tempting field for manipulation. Imagine all the cultural ways of being that could be exploited once users effectively become inhabitants of software-mediated reality and the digital is layered over the actual.

These ways of being include the "catalogue of collective illusions, unconsciously distorted representations of others … an attempt at interpretation of social situations in terms of political, moral, religious, and philosophical evaluations that imply a point of view. They are collective beliefs based on assumptions that are accepted without discussion, beyond all question" (Ellul 1968: 13). These collective beliefs or illusions are known as commonplaces: something that has become so ordinary or ubiquitous as to be unworthy of remark, let alone critique.

The challenge to decoding currents is to identify these illusions that "go without saying". It is to return them to the generative and inventive category of the theoretical commonplace where common topics were noted by individuals as a memory technique, compositional exercise, or modes of reasoning (such as imitating or re-presenting how people come to conclusions through analogy) to be used to generate arguments or proofs.

Here, the commonplace is a heuristic or inventional tool designed for individuals to categorize and better retain and apply frequently used topics or types of argument to improve communication. It may be argued that these functions are now performed by transformer technologies. But extended applications, such as through the commonplace book, where individuals would compile knowledge from all kinds of sources – from proverbs, to adages, to quotes, to poems, to key equations, legal formulas, and recipes, remain critical.

Deciding on content, arranging headings, writing indices and other activities central to keeping a commonplace book are key to the *development* of critical thought. Through such development, individuals experience the process of learning. This process – and the commonplacing techniques of inventing and arranging categories – is key to re-presenting reality and understanding it.

This has architectural connotations in memory palaces or the method of loci, which is a strategy for memory enhancement. This uses visualizations of familiar spatial environments in order to enhance the recall of information in the human mind.

According to this method, a person imagines an architectural space: a building, a street with an arrangement of places, and walks through these places, storing

within each some content that corresponds to that locus that can thus more easily be retrieved at a later date.

Currents (movement) to the mind (reason) involve sense (or imagination) of what is perceived, passion or appetite for it, and growth or healing, according to an Aristotelian view. It does not go without saying that what we are drawn to through the passions is good for us.

Americanizing cultural currents

As the majority of us goes up and down the ladder from our imagination to our reason as we explore and discover the reality of our being throughout our 21st century lives, we leave traces in the recorded digital marks of our passing by. These traces include page views, the word frequency in our texts, scrolling time, web search history, micro-momentary keystroke decisions, and so on. They include the organizing currents of our lives, steering us to what we can or cannot do if we are seeking livelihood, dictating our worth, training us to think and act in transactional terms.

As we saw in the section on probably universal patterns, this data, stored in highly complex proprietary databases, is used to project collective illusions about others and generate emotionally charged beliefs that can go unquestioned. At the same time, the public is not introduced to alternative modes of personal digital expression and curation such as that offered through IndieWeb, the Small Web, or alternative protocols like Gemini or Gopher. This has become confusing as one of Google's AI networks also called Gopher.

That companies, like Facebook, have argued that data logged on proprietary servers cannot be accurately extracted to be returned to individual users is beside the point, important as it is. More "work" of leaving traces is entered into companies' servers than what companies return to the public. And what is returned is hardly disinterested knowledge of what the public is doing.

This raises deep questions of the meaning of the textual trace and how its purpose can be leveraged. From a hermeneutical standpoint, what goes on record distorts meaning: meaning is much more than a record (Gadamer 2004: 464). To understand is also to express what is left unsaid.

Cultural currents do not always leave time – or even space – for what is unsaid. Obvious and challenging examples include the needs of the sick, poor, or tired welcomed in the iconic poem inscribed at the foot of America's Statue of Liberty (Lazarus 1883). This poem is antithetical to America's temple of progress and linear trajectory of success.

This trajectory became possible as the country "conceived itself, economically and technologically, as the vanguard of modernization", competing with European cultural dominance (Ickstadt 2002: 545).

It has done so less "in Greek and Latin but with bare hands", as Walt Whitman wrote (Whitman 1855/2024). That line encapsulates the hacker ethos and corresponds

with the definition of programmer and the venture capitalist and Y-Combinator co-founder Paul Graham gives: Hackers are unruly. That is the essence of hacking. And it is also the essence of Americanness. It is no accident that Silicon Valley is in America, and not France, or Germany, or England, or Japan. In those countries, people color inside the lines (Graham 2004: 53).

The irony is that while many early iterations of digital technology were cobbled together through the hacker ethic, today it is against the law to access much of the source code of the products and services that we use, what with Digital Rights Management. Which means that the cultural currents that went into creating the UbiComp landscape are off limits and whatever the dizzying height of digital architecture the programs we use rest on cannot be reverse engineered. Yet some of the biggest critics of DRM are (now) American: free software foundation leader Richard Stallman and the recently-naturalized Cory Doctorow. Also American is security expert Bruce Schneier, who has written extensively about the hack as exploit, where hacking becomes an exercise in finding the loopholes in things.

If we are to talk about American culture, it is still to talk about hacker culture. Graham, himself a British transplant to America, reads hacker culture into US history: When you read what the founding fathers had to say for themselves, they sound more like hackers. "The spirit of resistance to government," Jefferson wrote, "is so valuable on certain occasions, that I wish it always to be kept alive"' (Graham 2004: 71).

This is not the definition of hacker that abounds today, associating it with crime and subversion. Stallman understands the word to have originally included "a wide range of activities, from writing software, to practical jokes, to exploring the roofs and tunnels of the MIT campus. Other activities, performed far from MIT and far from computers, also fit hackers' idea of what hacking means: for instance, I think the controversial 1950s "musical piece" by John Cage, 4'33", is more of a hack than a musical composition" (2002b). The culture of many early programmers defied convention; the culture of contemporary programmers – as presented by mainstream media – follows it.

Twentieth century anthropologist Boas (1940) defined culture as the set of learned behaviors or repetition of mental processes that govern a group of people. His student Ruth Benedict controversially described these as "patterns" (1935). West (2024) points out that her "patterns" were more projections of her categories "than derived from observation. It should be noted that Benedict's work in WWII and others following her lead in the Vietnam War led to a major schism in the American Anthropological Society and the founding of CAS, Concerned Asian Scholars."

Nonetheless, it is posited that we can conceive of culture as custom; as learned patterns of behavior and thinking. It is a lens through which to rationalize the experience of culture, shaping how people think, desire, and act. That said, it can be asked how much of this, particularly where spiritual, mythical, or ritualized, can

be "pinned down" (cf. Morison 1993). This is addressed by Americans Alexander in *Luminous Ground* (1980/2004) and anthropologist Clifford Geertz (1973). Geertz explains his push to resist subjectivism, cabalism, objectivism, institutionism, and alchemy by keeping his cultural analysis in touch with the ideological and physical necessities of life (Geertz 1973 :30). This is difficult even when doing the type of fieldwork he called "thick description", which remains a key tool in American studies (e.g. Deloria & Olson 2017), because:

> Doing ethnography is like trying to read (in the sense of 'construct a reading of') a manuscript-foreign, faded, full of ellipses, incoherencies, suspicious emendations, and tendentious commentaries, but written not in conventionalized graphs of sound but in transient examples of shaped behavior. Culture, this acted document, thus is public, like a burlesqued wink or a mock sheep raid. Though ideational, it does not exist in someone's head; though unphysical, it is not an occult entity (Geertz 1973: 10).

An aspiration of this book's reading of postdigital currents is to "save space" for the winks and the "quality without a name" (Alexander 1964/1973: 34-39; Alexander 1979) while acknowledging the role of codification.

The code behind a cultural pattern, the grid of its understanding, can emerge through how a cultural group gives itself an image "to represent and to realize itself, in the theatrical sense of the word" (Ricoeur 1986/1991: 249). This is complicated today when subsets of French schoolchildren read manga or Deleuzian and Guattarian "machines" (1983) like desire or capitalism give rise to automatized decision-making that we are not always conscious of.

Any knowledge we have of reality is prone to being mediated by our own symbolic structures. These structures can also be visualized as "webs of significance" at once made by humans that and, at once, suspending them (Weber in Geertz, 1973, p. 5). They form conventional codes that can be automatically followed, whether as behavior or as the symbolic code behind a domain of knowledge like mathematics, philosophy, religion, or art. Once this code is concretized as a (generalized) *technical fact* (Stiegler 2018a: 192), it is easier to copy and repeat it. It is also easier to do so without questioning the validity or value behind it – easily becoming dogma or ideology (Ricoeur 1981/2006). At this point, it is no longer generative though it may appear to be.

Deterritorialization

To give an example of applying interpretive techniques to "reality" this chapter is choosing to focus on deterritorialization. There are several different ways in which this can be a meaningful category for conceptualizing America in the postdigital age.

In the work of Gilles Deleuze and Félix Guattari (1983), deterritorialization is the process by which the context and organization of a social relation, called a territory, is altered or destroyed, to then constitute a new territory through reterritorialization. An example they give is of how capitalism can destroy the social body through replacing social code with money, which is not a code that can be applied to the whole of the social body.

Deterritorialization can be effected through the American agnosticism of context and "the mediating role played in understanding by history, by institutions, and by communities" (Lundin et al. 1985: 15). The example of this given earlier was how the cultural permission for unconventional thinking supported the development of the speed and efficiency of the hacker culture that laid the postdigital infrastructure of today's world.

This can be extended to the cyber-colonialism that forces small nations to buy into the computerized technologies of technologically more advanced America in order to maintain cyber-security or competitiveness (Danezis 2014). In this case, challenging the Western master narrative (e.g. Martini 2020) becomes technically difficult if not impossible.

Yet at the same time, the master narrative of the technologically-advanced West is being challenged by work to decolonize, through anti-racism, and also "unlearn" – within America itself:

> the ever-elusive revolutionary subject, which has led from the working-class to youth cultures and on to victimized subcultures within the U.S., finally leads to outside perspectives which need no liberation from false consciousness because their location outside of the system provides them with a critical perspective that remains resistant to ideological absorption by "America" (Fluck 2009: 80).

Thus in this context, deterritorialization is taking place through the cultural work of "subjects" seeking to change the context and organization of mass culture, which we saw in the section on technoscientific progress to have been imposed when local television programming became unprofitable once new technologies made national programming possible.

Deterritorialization also involves attempts to literally reterritorialize, such as through Indigenous frameworks that seek a re-centering of Indigenous sovereignty, ways of thinking, and land (e.g. Tuck & Yang 2012).

A disautomatizing autoethnography

Autoethnography as a genre champions the importance of personal experience in research and communication by way of the narrative of storytelling. After all, a researcher's perspective "informs and facilitates processes, products, and the

creation of culture" (cf. Bodner in Adams et al. 2017: 2). The genre allows for voicing alternatives to taken-for-granted and potentially harmful cultural scripts and stereotypes (cf. Boylorn in Adams et al. 2017: 3), fill in gaps of research, and articulate insider knowledge of cultural experience, which may simply include telling a story in a specific kind of way that is different from how others would tell it (Adams et al. 2017: 3). It further brings an "emotional texturing" to theory "to suggest a live participative embodied researcher" (Spry 2001: 709). What follows is an autoethnographic account of experience in disautomatization – and why.

At a recent conference at Malta, I made the deliberate decision to "conference without an app", meaning that I would not use any digital resources (apps, maps, or search engines) to get around the city and anything to do with the conference. This led to conversations and experiences that would not have happened otherwise.

I also discovered that the preference for human as opposed to digital interfacing has become a geocultural trait. The heavily conversational manner of getting around through face-to-face encounter was suspected as "Serbian" by other Serbs working in Malta. When conversation became more personal, I was told: we thought you must be from there too. Despite the fact that I am an American-born English speaker, I assume this is because I expected both response and readiness to share a personal and geographical picture of the local culture when I asked questions.

I shared this anecdote with well-traveled anthropologist, Quillien, who replied (in personal correspondence) that it:

> provoked comic/tragic reactions in me: … The surprise of discovering the simple ordinary humanity and richness of engaging a stranger. The comic lunacy of young people sitting at the same table and texting each other. The loss of agency without a device. The sense that safety is inside the device and anyone sitting – say in an airport – without a phone is suspect.

Traveling through Malta – possibly "suspect" – without an app, I ended up at the wrong university location for the conference. A student there kindly led to me to the bus stop and the appropriate bus – after finding where the conference was by looking it up on an app. I asked her what the social life was like at the university. She said it was on Facebook. I apparently did a double take, and she said: I know, right? Facebook is so old. But I was thinking: what of spontaneous, random encounters; meeting people in canteens, learning from them where to go and what to do… Apparently I had some kind of look on my face because as she looked at me I felt like there was a question forming, like, what had *I* been thinking of?

It cannot be stressed enough that I found my way around thanks to the kindness of the people I encountered. I began to learn various ways to reach where the conference was held – through some trial and error which I will relate.

Returning back to the hotel after after-conference drinks one evening led to a most incredible exchange. I got lost somewhere down towards the fortress periphery, realizing that most likely only one road leads most directly to the former drawbridge. I had to ask for directions (again). This time, I asked a young, arguing pair. They asked whether I had been at the conference, too. The conference they had come from was a gaming conference. They both lived in Malta, were both from elsewhere (Eastern Europe), and worked in marketing. They were arguing over the future. One of them was especially heated about how certain manipulative techniques were destroying society. He said he struggled to do good deeds, daily, as a form of absolution. The other was more optimistic and believed that change for better could be effected if her knowledge was used, for example, to make short, powerful videos for young people that would map out alternatives.

He offered to drive me to my hotel, explaining that both her and my stop were on his way. He was almost desperate with anger, which menaced his generosity. He said that Europe cared nothing for its citizens and that this was bound to end terribly, and soon. I explained the subject of my workshop, on building "infraculture" for a contributory economy, but he was not impressed. I am not going to make a pitch for that workshop here. I have come to realize that the answer to the demise is not a statement but experience, and not experience in general but the interior, intimate experience constituting the phenomenographical, microhistorical, and anthropological.

Autoethnography is an intimate practice in interior processing of external knowledge. It is an important part of the critical awareness involved in decodification. To reference American cultural critic Curtis White (2007), whatever demise we perceive to be external to ourselves are in fact internal to ourselves, as the life of this demise is, in fact, our life. It is a shaping factor, impressing itself on our lives.

The young gaming professionals were arguing about the technical future of their work because they cared. Do we care which way we go or how to live meaningfully in the 21st century? The context of the 21st century are the American media currents and infrastructure supporting it. Both the medium and the message need to be decoded for there to be critical recovery and upcycling. This book attempts to outline what decodification means and how to do it. It is up to the reader to contemplate what this means to intuiting good sense and discerning individual thoughts, intentions, desires, and actions.

Clouds and icons: Pragmatics and metaphysics

Ontology is the branch of metaphysics that deals with the nature of being and the relations between entities. How we name and categorize the world around us can make a difference to our "being". We have seen how an oppositional approach to science/art can strip the latter of its truth claims and didactic role. Ontologies can be described as worldviews (e.g. Pickering in Hui 2024: 111) and these can shape our

assumptions about the world and reality – the latter being the subject of metaphysics. The question of whether reality is knowable at all and how we know what we think we know is the subject of epistemology. This section will play with the cloud, programs, search, and icons to consider the suggestions that are being made to us as we navigate reality.

Through the architecture of software and its ubiquitous interfacing with our lives, we see the potential for the end of a certain type of thinking that Heidegger warned of. A world civilization has begun that is "based upon Western European thinking" (Heidegger 1969/1972: 59), from its mathematics, through thermodynamics, to cybernetics. Through the Internet of Things and the need to be constantly connected (mobile phones were needed to ride Belgrade city transport in the early 2020s), we have reached "the triumph of the manipulable arrangement of a scientific-technological world and of the social order proper to this world" (Heidegger 1969/1972: 59).

Heidegger continues: "'Theory' means now: supposition of the categories which are allowed only a cybernetical function, but denied any ontological meaning. The operational and model character of representational-calculative thinking becomes dominant" (Heidegger 1969/1972: 58-9). We think in terms of self-efficiency and instrumentalize the world around us except when on holiday though this, too, serves to reenergize us to be able to continue to serve the system that informs our choices and therefore our actions.

The information age gave rise to human-computer interactions, where people met machines through a digital interface. Although these interfaces have grown complex and play many roles in our lives, they are still largely the product of a fixed set of choices determined by an engineer or designer. They are hard-coded to perform certain tasks and follow certain rules. Their behavior is planned, to a large degree. And the people who interact with these interfaces have to adapt themselves to consume information in the predetermined ways that a program can deliver it (Holmes 2018: 135-6).

Tools that offer users "one best way" (cf. Ellul) can hinder freedom of action. Additionally, ever more computing devices effectively act as thin clients. A thin client is a computer that runs by connecting remotely to a server-based computing environment instead of using a device's resources. They have no hard drive, with their memory, software applications, and data stored on a server. An example is the Chrome Book laptop, which relies heavily on web applications for tasks. Even if a person owns their own hardware, many computing functions today are done through services as a software substitute (SaaSS). "SaaSS means using a service implemented by someone else as a substitute for running your copy of a program" (Stallman 2010).

This, like the operation and distribution of software, is controlled by just a few corporations that control even the access to walled gardens, cloud servers, and

closed devices, impacting the operation and distribution of independent software development.

Closed devices either prohibit through digital restrictions management (DRM), known as digital rights management in the press (cf. Stallman 2013/2024), or simply do not provide access to the code of operating system or to the programs they run, even restricting the use of proprietary hardware.

But despite its disadvantages many continue to use software that harms them because using any software requires spending time to learn the interface. This creates temporal-psychological and not just economic barriers to switching services, known as switching costs. It is hard to learn new tools and particularly frustrating to have to learn a new tool to do something one already knew how to do on another tool. This can be avoided if the theory behind the tool processes are taught. For example, instead of teaching how to use the tool "BrandX" to manipulate images, students could learn "about what 'composting' actually means" and "the mathematics behind color values, and how it affects what they see when they apply certain effects" (Kenlon 2015). Stallman advises, "never use a service where in principle running a program would do" (2010). West (2024) points out that Mark Guzdial, with Barbara Ericson, (2006) "wrote a wonderful programming book with a language he developed, Dr. Java (Smalltalk meets Java), where he does precisely this, show how easy it is to do photo editing, music, editing, and multimedia special effects (bluescreen) writing programs."

Closed platforms, or walled gardens, are network-based services that restrict the actions of the clients on a network by controlling access to web content and services, technology, and data. They can block interoperability, not allowing the user of one service to interact with the user of another or wider sharing of whatever has been uploaded to a service. Licensing policies and DRM can create dependencies on these same services, known as vendor lock-in.

This is to say nothing of the "the human atrocities linked to this exploitation of natural resources" (see Emejulu and McGregor 2019 in Knox 2019) or the "often-hidden material dimensions of the digital, such as the human labour required to produce and sustain technology, and the infrastructures and substances required to produce it" (Knox 2019).

Also erased is the labor that went into making the technologies work (Ticona & Mateescu 2018), like that of the Mechanical Turks who tagged so many of the images used to train LLMs. This invisible work is often devalued, underpaid, or unaccounted for (Ticona & Mateescu 2018).

Because of how it can manipulate and arrange human lives and culture, the scientific-technological world reveals a need for ontological questioning. It also reveals a need for renaming or a poetic revelation of what lies behind certain names in use. This will be explored through the examples of the cloud, program, search, and icon.

The Cloud

The cloud is defined as the on-demand availability of computer system resources, especially data storage and computing power, without a need for direct active management by the user (Wikipedia). The innocuous-sounding "cloud" offering "hands off" gains is substituted for the clearly dystopian reality of storage of a user's data on "someone else's computer" or servers.

The term cloud computing itself generalizes practices that should be considered individually. For this reason, what follows in this section covers a broad spectrum.

If "cloud computing" has a meaning, it is not a way of doing computing, but rather a way of thinking about computing: a devil-may-care approach which says, "Don't ask questions. Don't worry about who controls your computing or who holds your data. Don't check for a hook hidden inside our service before you swallow it (Stallman 2010)

Where the loss of privacy and control in the cloud breaks a person's workflow, SaaSS share malicious features of some proprietary software. "Software designed to function in a way that mistreats the user is called malware" (GNU n.d.).

Even using a service or software on one's own machine can be controlled when it "phones home" by contacting the server run by the company, like through updates. Some proprietary software, which can include the operating systems of computers or portable phones and applications, has a "universal back door, permitting someone to remotely install software changes". The server operator of SaaSS can change software use on the server, which is, after all, their computer. But for the user of this server, the experience is like that of using "a proprietary application program with a universal back door: someone has the power to silently impose changes in how the user's computing gets done (Stallman 2010).

The inconvenience of these restrictions were seen in 2022 when Adobe did not update its Pantone color-use license and users of previously pre-loaded color palettes were suddenly forced to pay for access to a separate app or the colors were blacked out. This caused outrage.

An example of "user-agent discrimination" through an attack on interoperability and accessibility is the Google Web Environment "proposal" which could block all other browsers except Chrome from accessing the web on a person's own device in the name of security (e.g. Chauhan 2023). It could block access to certain sites so is also an example of an attack on "the right to read" (Stallman 1997).

Other examples of malware include programs that "send out data about users' computing activities", and are therefore spyware (Stallman 2010). Microsoft Windows uses a program to send information about users' activities to Microsoft, Amazon Kindle, "which pages of which books the user looks at, and when. Angry Birds reports the user's geolocation history" (Stallman 2010). Another example of malware is Zoom, which warranted the attention of cybersecurity expert Bruce Schneier (2020; GNU 2020/2024).

Web servers, which once only published information so that it could be accessed now also do computing. The term "web application" is similarly confusing: referring both to server software as well as programs that run on one's own machine in the browser such as nonfree JavaScript programs. It becomes impossible to know "what part of the editing is done in the JavaScript program and what part in the server" (Stallman 2010).

The innocuous-sounding cloud clouds over all of these questions of control and ownership.

Program

To draw on excellent work by Wendy Chun, in the context of programming, it is only the free software movement that insists on preserving the logic of software "that is, software as *logos"* (Chun 2008: 303). This is achieved by amplifying the power of source code, human-readable text that gives instructions to the computer that can be turned into machine code:

> Software as we now know it (importantly, software was not always software) conflates word with result, logos with action. The goal of software is to conflate an event with a written command. Software blurs the difference among human-readable code (readable because of another program), its machine-readable interpretation, and its execution by turning the word "program" from a verb to a noun, by turning process in time into process in space, by turning execution into inscription—or at least attempting to do so (Chun 2008: 303).

By "turning process in time into process in space", experience in time (t) is not only reduced to a mathematical quality (Meyerson 1921: 376) but it trivializes the process or experience of execution (Chun 2008: 304), which is significant as "Code is the only language that is executable" (Galloway in Chun 2008: 304), without the "complex chains of mediation" by which human language effects change (Hayles in Chun 2008: 304).

Changing the word "program" from verb to noun means the agency by which person-to-computer commands are executed is substituted by something that already executes, often deliberately in ways that one is not aware of or cannot control.

Search

To enter a search term is to leave a data trace that can be aggregated: it is to be traced as much as one is tracing. This was one of the motivating factors behind the creation of the approach taken in re-presencing. Re-presence so that you not be re-presented.

Additionally, like the word program, the noun search is increasingly eclipsing the verb. This was in part by design (see Norvig in the Gabriel interview).

Icons

While graphical user interfaces, in which icons are key, were an inspired creation (see Engelbart's The Mother of All Demos), the word "icon" is highly charged. This is not least so when they – like the appropriated word avatar – are meant to reduce a single person's entire being to a single set of pixels in an image.

In this word, εἰκών, we have references to similitude and likeness. It is the Greek εικόνα that means picture, image, illustration, painting, portrait – and religious icon or painting. In the religious context, the icon becomes something more than material representation, serving as a window to a way of being (see Ouspensky & Lossky 1989).

The thinking behind the first application of the icon to computing is beautiful if lost to the reductionist way we think of icons today. The icon was developed at Xerox PARC (1975-1981) through the WIMP (windows, icons, menus, pointer) approach first iterated in SmallTalk and then Xerox STAR. Alan Kay explains regarding the former:

> We want an apparently free environment in which exploration causes desired sequences to happen (Montessori); one that allows kinesthetic, iconic, and symbolic learning—"doing with images makes symbols" (Piaget & Bruner); the user is never trapped in a mode (GRAIL); the magic is embedded in the familiar (Negroponte); and which acts as a magnifying mirror for the user's own intelligence (Coleridge). It would be a great finish to this story to say that having articulated this we were able to move straightforwardly to the design as we know it today. In fact, the UI design work happened in fits and starts in between feeding Smalltalk itself, designing children's experiments, trying to understand iconic construction, and just playing around (Kay 1993).

David Smith designed the first prototype iconic interface (Kay 1993). The world of the STAR computer also developed at Xerox PARC was divided into "two classes of icons, (1) data and (2) function icons" (Smith et al. 1982: 519), representing documents and qualities making it easy to manipulate abstract data structures (Smith 1993), or shortcuts to executable programs or tasks.

Kay explains the thinking behind the icon as an attempt to "map different meanings onto different parts of the "instruction space", to create a "'poor man's Huffman code' that would be both flexible and simple". Design was also to be child-friendly:

> I also took another pass at the language for the kids. Jeff Rulifson was a big fan of Piaget (and semiotics) and we had many discussions about the "stages" and what iconic thinking might be about. After reading Piaget and especially Jerome Bruner, I was worried that the directly symbolic approach taken by FLEX, LOGO (and the current Smalltalk) would be difficult for the kids to process since evidence existed that the symbolic stage (or mentality) was just starting to switch on. In fact, all of the educators that I admired (including Montessori, Holt, and Suzuki) all seemed to call for a more figurative, more iconic approach. Rudolph Arnheim [Arnheim 69] had written a classic book about visual thinking, and so had the eminent art critic Gombrich. He initiated so-called "iconic programming", learning and thinking through a new medium. This went on to be used in various ARPA projects (Kay 1993).

That approach – worthy of Ricoeur's "iconic augmentation" (see page 101) – has effectively been substituted by the much more prosaic understanding of computer icons today:

> Analogical representations suggest operations to try ... This is the philosophical basis for the design of the Xerox Star and, ultimately, Apple Macintosh "desktop" user interfaces; they are a metaphor for the physical office ... Being able to put documents in folders in a physical office suggests that one ought to be able to put document icons in folder icons in the computer "desktop," and in fact one can (Smith 1993).

Here, the folder icons anchor the imagination in the office, a far remove from the visual thinking and art that originally inspired the desktop icon that does not necessarily even inspire new ways to work. In his memoir on Lisp experiences, Stallman noted that secretaries would learn how to "extend" Emacs, by programming, if that meant they could do useful things (2002c). No icons there.

This section opened by raising the question about the subtle ways the way we organize our ideas and how they inform our expectations about reality. The illustrations given here, while hardly representative of categories of scientific investigation, can nonetheless be understood as key to humankind's orientation through life's sojourn.

Is this the metaphysical "triumph of the manipulable arrangement of a scientific-technological world and of the social order proper to this world" (Heidegger 1969/1972: 59)? Or an invitation to the imagination to deviate from that which is called reality in ordinary language and vision (Ricoeur 1991b: 133)? In Heidegger's reading, everything depends on our readiness for a possibility whose contour remains obscure, whose coming remains uncertain (Heidegger 1969/1972: 60). This is also to say a readiness for a "truth" that means more than security and probability.

But in Stiegler's reading, the work begins with disautomatization, innovating repetitive regularities and changing rules (2018b: 41). No matter which reading we subscribe to, we do see how the scientific-technological tools are ontological. "Every tool or technology is ontological in the sense that, however humbly or minutely, it inaugurates a set of rituals, ways of doing, and modes of being (Escobar 1994). It contributes to shaping what it is to be human" (Escobar 2018: 110).

5. DISAUTOMATIZING TOOLS

> *Automation, in the way it has been implemented since Taylorism, has given rise to an immense amount of entropy, on such a scale that today, throughout the entire world, humanity fundamentally doubts its future – and young people especially so* — Bernard Stiegler
> *The reticulated digital infrastructure that supports the data economy, put in place in 1993 with the world wide web and constituting the most recent epoch of the Anthropocene, can and must be inverted into a neganthropic infrastructure founded on hermeneutic digital technology in the service of dis-automatization. That is, it should be based on collective investment of the productivity gains derived from automatization in a culture of knowing how to do, live and think, insofar as this knowledge is essentially neganthropic and as such produces new value* — Bernard Stiegler
> *Every tool or technology is ontological in the sense that, however humbly or minutely, it inaugurates a set of rituals, ways of doing, and modes of being (Escobar 1994). It contributes to shaping what it is to be human* — Arturo Escobar

Liberating the communication of code, the American way

This section aims to bring into the American studies framework the tools for digital hermeneutics, which is needed.

Where the digital humanities and studies or web science sought to understand the unforeseen magnitude of the transformation effected by digital printing, Americanist circles have not focused on the culture or politics of digital media (Oppermann 2016: 19). Nor has there been a theory of language as concretized in all texts "from oral to electronic", mass culture to elite, that expands on a "liberated" philological approach (Pollock 2015: 20).

American philologist Sheldon Pollock's "liberated philology" is a paradigm that respects local cultural context while considering intercontextual interpretation. It seeks to reconjoin and embed the detailed research that recovers rich "meaning in the dense web of connections that exist only areally", in area studies, and disciplinarity,

in a disicplinary matrix that is "historically reflexive, transregional and comparative, and conceptually pluralistic, as the discipline of philology shows to be possible" (2015: 20).

When properly cultivated, "this sort of philology—a critical or reflexive or hermeneutic" philology promotes political-ethical values and becomes "a sort of liberation philology" (Pollock 2015: 20). For area humanists it is a "necessary step both conceptually and institutionally" (Pollock 2015: 20).

An attempt to do this is made in this book through how code is at once understood to be computer programmed code and cultural codification; at once a form of knowledge that emerged from very specific contexts – like the development of reason and mathematics to applications in physical science and thermodynamics and cybernetics – and ways of knowing and something that can have more universal applications – that can then be challenged – such as in Heidegger or Stiegler.

It remains within the codifications of epistemology and hermeneutics as it literally emerged through work at an institution that teaches these. However it does not claim ideological, identity, or ontological superiority and has pluriversal capacity (Escobar 2018) as seen above. It also has the capacity for pluriverse *design* through how "we design ourselves (and the social and technological networks in which our lives have meaning) in language" (Winograd & Flores 1987: 78), using, but not based on how we use re-presentation (Winograd & Flores 1987: 99).

Communicative design for the pluriverse

Our design can be based on our "know-how" as opposed to Cartesian "know-what", allowing space for "concrete, localized forms of ethical experience based on nondual action for ordinary life" (Escobar 2018: 113-114). Such localization, with a one-to-one correspondence between language and reality, representation and the real, raises the questions of "Which 'world'? What 'design'? What 'real'" (Escobar 2018: 114).

Science has an ontological importance, seeing man's being as the object of positivist knowledge, organizing objectivity on the basis of sign values (Foucault 2003: 199). It takes an unembodied, rationalistic, mechanistic, postivistic (epistemological) view, after Cartesian dualism which separated reflection from bodily culture (Varela et al. in Escobar 2018: 81), producing specific realities. For example, the more the theological and philological background of the world fades away the more society is considered as an advance into unknown regions called "research" and the ordered arrangement of concept takes precedence over the living (Hadot 2008: 469). The development of the scientific concepts that construct scientific fields mark out rational objectivities – that can no longer be called words (ibid).

In Arturo Escobar's *Designs for the Pluriverse* he suggests relational practices of design and communal logics to redress this fissure through processural, not just

subject knowledge, stressing "embodied (mindful), open-ended reflection (Escobar 2018: 98)… Such embodied methodological practice can be applied through performing autoethnography:

> I began ... concentrating on the body as the site from which the story is generated, thus beginning the methodological praxis of reintegrating my body and mind into my scholarship ... while in the threshold of Clifford Geertz's (1988) notion of "Being Here" and "Being There" (Spry 2001: 708).

This is to say, it is possible to cultivate, from the local, an openness to otherness; a possibility to be "'open to possibilities other than those contained in one's current representation of the life space'" (Varela et al. in Escobar 2018: 98) and open for interpretation in ways that "make commitments transparent" (Escobar 2018: 114). More narrowly, this can be understood as a form of communicative competence:

> Communicative competence means the capacity to express one's intuitions and take responsibilities in the networks of commitments that utterances and their interpretations bring to the world. In their day-to-day being, people are generally not aware of what they are doing. They are simply working, speaking, etc., more or less blind to the pervasiveness of the essential dimension of commitment. Consequently, there exists a domain for education in communicative competence: the fundamental relationships between language and *successful action* (Winograd & Flores 1987: 162)(emphasis added).

Talk of "successful" action can be problematic in the broader context of the pluriverse. "Success" as an aspiration emerged from the domain of interface design which first needs to articulate, in language, the domains in which people's actions are generated and interpreted (Escobar 2018: 115). It is the idea that we can design a better and inclusive world that sounds American, like Crèvecœur.

Disautomatizing linguistic re-presentation

The speech act uses signs that, as signs, are a break with all possible life, and symbolized through a reduction of life. Language returns this reduction to reality, and can re-present forms of life. This is to follow Wittgenstein who suggests that speaking language is part of an activity or a form of life.

Let's break that down in the following steps. All possible reality -> reality seized – and thus reduced – through the symbolic codifying function -> expressed – in general – through the semiotic linguistic function -> expressed more narrowly

through the linguistic speech act which is a (semantic) application of (semiotic) meaning to a specific use.

Automatization takes place in the linguistic "loop" – not in the activity of contemplating all of the possible meanings that can be seized and introduced to lived reality (where reality is "interfaced" by the human being). Instead of this, the digital interface can present a limited range of symbols and signs and even predetermine where these can "successfully" be applied to specific uses. This is an expression of management and control but not of reality or possibility.

This reduced state of affairs became possible because language has been progressively "fragmented not only geographically into different communities but functionally into different disciplines – mathematical, historical, scientific, legal, psychoanalytics, etc." each with mutual claims on linguistic meaning in what Wittgenstein called language games (Ricoeur 1991: 489–90), as we saw in the section on the power of decoding.

In the Western world, language games or linguistic acts take place through terministic screens, or the use of terms, which "constitute a corresponding kind of screen; and any such screen necessarily directs the attention to one field rather than another. Within that field, there can be different screens, each with its own ways of directing the attention and shaping the range of observations implicit in the given terminology" (Burke 1966: 545). Different uses of language are applied to different regions of being – natural, scientific, fictional, etc.

This is all relevant when considering how computers "use natural language to communicate with humans and learn from what they have written", to quote one of the leading manuals on artificial intelligence (Russel & Norvig 2022).

The authors identify the complexity and diversity of human languages as setting the species apart from other animals, more so than making art or wearing clothes. They point to its universal scope and ability to re-present much cognitively guided behavior, which begins with the goal to communicate knowledge, plans to represent it, and acts to achieve the goal. The language of communication, in the account of these authors, is then perceived, and its meaning inferred.

Natural programming languages were designed to communicate with humans in their own, natural language, as opposed to in a programming language. But it was also developed to learn from humans such as to be able to convert human knowledge to formal logic and also to advance scientific understanding through a combination of artificial intelligence, linguistics, cognitive psychology and neuroscience.

With this in mind, rudimentary 21st century education would be amiss if it left out teaching a basic understanding of language, what it does, and what it can be used for. It is also important to understand the reasoning that went into the development of academic study that brought us to where we are today as re-tracing it can open new areas for intellectual pursuit.

The tool here is to identify different language games and to discuss their ontological implications.

Reading cultural code

To discuss the ontological implications of non-fiction language games requires identifying them first. An attempt will be made here to reverse engineer what this process entails, largely by drawing on the Ricoeurian hermeneutics that inspired anthropologist Clifford Geertz's "thick description" (1973).

We can think of the world as all possible reality. It becomes text where its "reality" is covered over by man-made symbols and codes whether these are (unquestioned inherited) patterns of behavior or computer programs.

To learn how to read is more than an intellectual exercise. Engaged reading is a process involving a mediated dialectic between explanation, understanding, and interpretation. It is an experience of the event of this discourse between reader and text. Let's try to break this down by drawing on work by Paul Ricoeur.

It is first important to understand the relation between reader and text. There is a distance between the two. It is not just spatial and temporal but involves a dialogical struggle between self (and self-understanding) and the otherness of the spatially and temporally distant text. The moment this text is viewed as something "other than ordinary", it involves a struggle with the cultural estrangement of the text. The text is not us. It is something other. How much we are able to hold open space for the otherness of this other can determine the depth and quality of our reading.

We said above that the problem of the contemporary "now" involves "things going without saying" because they are so ordinary that they are not worth remarking on. Here, we are saying that once an attempt is made to step away from the ordinariness of the acculturated present, we find ourselves culturally estranged from what was once familiar. Dialogue with the text now involves an effort to overcome cultural estrangement.

It is easier to practice working with distanciation when dealing with historical texts that are more obviously "other". It is easier to approach objectivity as the issues are foreign and so not emotionally charged. Biases may be non-existent where matters are so foreign as to involve no previously formed opinion. However, difficulties here may involve the lazy projection of anachronisms onto the text or an unwillingness to attempt to develop a historical imagination.

To develop a historical imagination requires the attempt to step into the shoes of the people one is reading about, to try to reconstruct the scene that surrounds them, piece by piece, like a detective. What clothes did they wear? Where did they get their food and how did they make it? How did they trade? What was life like for the rich, the poor? What was the micro context of life on a particular street and how did it fit into the context of the larger geography and powers that be? So on.

The remedy or the pharmakon to overcome or "rescue" the cultural estrangement of the text is to read it. Reading at once suppresses and preserves cultural distance and includes otherness within that which is one's own. A dialectic takes place between distanciation and appropriation. Explanation and understanding

is not uni-directional or a one-time process. It is a complex dialectic highly mediated by interpretation. Not only is the textual expression of life interpreted but so is the explanation and understanding process. Interpretation becomes an event when appropriation occurs.

Put in terms expressed earlier, appropriation occurs when knowledge can be "seized" or "grasped". Once it is seized, it can be expressed further. Without this kind of engaged or active reading, humans are unable to further contribute to knowledge production themselves or to individuate, i.e. evolve and take form. Let us not forget that among knowledge is also the very basic but vital category of knowledge of how to live.

The reader must re-internalize and re-individuate knowledge in order not to solidify their own retentions, or experience. They must break free from their predicative determinations (Stiegler 2012/2015: 115) to expand their perception of meanings.

The dialogic interaction between life experience, text, and life seeks to "integrate opposed attitudes of explanation and understanding within an overall conception of reading as the recovery of meaning" (Ricoeur 1991: 60). The student of culture should know how to perform such recovery through perceptive reading. Perceptivity or receptivity includes the ability to acquire the right horizon of inquiry to see where technical or moral knowledge, someone or something else, is coming from, and being willing to continually test one's own prejudices as this horizon is continuously being formed (Gadamer 2004: 302–5).

As Dewey posited, there is perhaps no better definition of culture than its capacity for constantly expanding the range and accuracy of one's perception of meanings (Dewey 1916: 145). The ultimate question is whether we possess the necessary mental apparatus to conceive meaningfully constructive terms of co-relation in the contemporary world to see a meaningful way forwards for lived reality.

The "text" that is read can involve the symbol of material reality that can explain a noetic or metaphysical reality. Earlier, we explained the importance of noesis to understanding reality as it allows insights that are "more than reason" and as transcendent can permit holistic, unifying conclusions.

Expanding the role of reading in this way means that we, as individual readers, enter into the "picture" of reading. How we relate to the text can determine the outcome. This is why in my classes I have learners compare their readings or annotations to not only demonstrate this in practice but to augment the learning of the class by having learners learn from each other's perspectives, which they bring to their reading. This is one definition of what I will mean when I refer to "relational skills". A learner relates to the text (as defined above in the discussion of distanciation) but learner readings within a group can also be related.

As the reader enters the picture we begin to see the importance of self-knowledge if true knowledge (in all of its breadth) is being pursued. In the attempt to

appropriate the bigger picture, some self-sacrifice is needed, whether through sharing their personal reading for the bigger picture to be collectively reached or through standing down from assumptions and shedding the opinions that can influence a reading in favor of new understandings that can emerge. There is no place for the lust of pride or power in this approach.

This is true even when arriving at a shared polemical interpretation in a political state where political power rests with the public through their representatives. Polemical interpretation takes place in the public political space that comes into being through written publication, groups of interpretations, "confronting each other through rules of controversy, disputation (emerging from *disputatio*, itself linked to *lectio*) and public debate" (Stiegler 2015/2016: 146). This enables psychic and collective individuals to co-individuate with other psychic individuals "by forming with them" (ibid).

Disautomatization is possible in other ways in reading. One way is through the reactivations of past societies that have disappeared but then can return to haunt current societies. They can potentially disautomatize the future (Stiegler 2015/2016: 153). Another way is to question the very ways of reading. This can bring attention to the criteria of judgment in their everyday life, in relation to themselves, those close to them, and others (Stiegler 205/2016: 46). Judgment or selection criteria is important.

Handles on how to read: For purpose and pleasure

As Alan Kay said (in West 2024), "if you do not read for pleasure then you cannot read for purpose."

To read for purpose, we can research keywords in the text we are reading, compile key passages, develop a language, ask questions, explore intersections like politics/research and learning or capitalism and experience, focus on what grabs interest, make a word bank, or invent descriptive categories for it, like: celebrate, mitigate, accommodate, destigmatize, automate, accompany (cf. Hendren 2023).

Reading for pleasure is a labor of love and can follow different paths, as suggested at the beginning of this book, which is not necessarily meant to be read linearly. I once had a friend who read dense and emotionally heavy novels from back to front. The question of reading for pleasure can be how to find an interesting inroad into a new or distant subject. Books that provide ample anecdotes surrounding serious subject matter show how to do this. A stereotypical example is how Newton saw an apple fall from a tree which helped develop, if only after his observation, the theory of universal gravitation (Christie 2016).

Reading for pleasure is like what is known in design as a "path of desire". These are paths not designed by planners but by the people using an outdoor space, like shortcuts through parks that emerge when hundreds of people cross over the

grass in the same direction over time. The path is made because someone wants it there. An author may write a book a certain way but a reader might not want to follow it in that same order.

But the path would never emerge had no one ventured outside. The same is true of reading. One can sample books, also over historical periods or geographies, or begin with an idea of interest and trace how it came into being and what it has influenced. I have had students bring to a course on American culture New Zealand folk songs with cult followings in American towns and students who found a love of technical literature that they used it to build an app prototype. Paths to this type of learning are subtly woven into what follows and indicated through the literature and ideas in the final sub-section on pedagogies and experience.

Ansatzpunkt

Erich Auerbach used *ansatzpunkt* in his best-known work *Mimesis* (1974) to explore the representation of reality in Western literature. An *ansatzpunkt* is a point of departure from which a subject can be understood. It is a "firmly circumscribed, easily comprehensible set of phenomena whose interpretation is a radiation out from them and which orders and interprets a greater region than they themselves occupy" (Auerbach 1969: 13). It is used to compare how the world was represented [or coded] in various epochs and places.

Auerbach chooses these points of departure by selecting passages from characteristic literary works that encapsulate common themes of the epochs and places. Like the approach to the commonplace book mentioned earlier, he achieves this through identifying what he calls *ansatzpunkt*, which will be returned to later. These "order and interpret" a larger region than they themselves occupy.

Thus, while Auerbach's reading seeks to re-present how the world was understood in some of the Western world's literature, "reading" in this book is understood more broadly to reveal how the world is understood in the contexts of different types of codification. Compare his reading of Genesis:

> The externalization of only so much of the phenomena as is necessary for the purpose of the narrative, all else left in obscurity; the decisive points of the narrative alone are emphasized, what lies between is nonexistent; time and place are undefined and call for interpretation; thoughts and feeling remain unexpressed, are only suggested by the silence and the fragmentary speeches; the whole, permeated with the most unrelieved suspense and directed toward a single goal (and to that extent far more of a unity), remains mysterious and fraught with background.

With his description of Homer:

> To represent phenomena in a fully externalized form, visible and palpable in all their parts, and completely fixed in their spatial and temporal relations. Nor do psychological processes receive any other treatment: here too nothing must remain hidden and unexpressed. With the utmost fullness, with an orderliness which even passion does not disturb, Homer's personages vent their inmost hearts in speech; what they do not say to others, they speak in their own minds, so that the reader is informed of it.

The unexpressed and the fraught background of the former are positively charged with meaning despite it not being fully expressed, saying more through the omission and suggestion of restraint.

(Re)presencing traces, historical imagination

The word re-presencing and not representing is used, as to 'represent' is to 'speak for'. Ideally, in cultural reception, the interlocutor should speak in their own voice – and not just to speak under interrogation which is already a constrained context (Gadamer 2004: 464). It is the recipient who works to reach the expression and attempt to explain it back to themselves. This allows the recipient to attempt to internalize a new horizon, which then reshapes a view of the present horizon (Gadamer 2004; Ricoeur 1991a).

In this sense, re-presencing is a kind of phenomenography. The methodology of phenomenography was developed in cross-cultural research so as to avoid the imposition of foreign paradigms. It is interested in what or why questions more than how, preferring to think more in terms of experience than in opinion (Willis 2017). Experience is central to existence, and private, mortal time:

> As soon as we understand our existence as this mortal time, we are already involved in a form of private narrativity or history; as soon as the individual comes up against the finite limits of its own existence, it is obliged to recollect itself and to make its time its *own* (Ricoeur 1988: 466).

There is also public time which is not "physical or natural time (clock time)" but the time of language, "which continues on after the individual's death" (Ricoeur 1988: 466-7). History is essentially public time.

Re-presencing takes place in phenomenological time, or the time of Care (Ricoeur's 1988 phrasing of Heidegger's work). In Heidegger's thought, this is a space where being can gain freedom from habits and practice, and is directed towards the future as a thrown projection of Being-towards-death.

Why is this theory important? It explains how through historical imagination we can access other ways of being from which we can learn, for example, the cause and consequences of decisions, and apply this knowledge to our own present, directed towards its own future. Of course, there is more involved than just cause and effect. In the words of Jacques Barzun, and in the context of American studies:

> Thus reading about the debate on the adoption of the U.S. Constitution or the struggles of the Protestant Reformation affords a vicarious experience which is formative, quite apart from what the memory may retain of the facts. And when the mind has grasped in several contexts the effect of circumstance, the nature of partisanship, the role of chance, and the influence of leaders and bunglers, the student of history who has discussed with others these potent imponderables may become not only a better judge of public policy and politicians, but also a more tolerant person (Barzun 1991: 77).

Mimesis

Eric Auerbach described mimesis as the process by which Western literature developed forms of representation that depicted the everyday and the ordinary. He saw that the conjunction of realism and the everyday was far more developed in the novel than in any historical writing.

In Gadamer's words, "Mimesis is a representation in which we 'know' and have in view the essential content of what is represented." (Gadamer 2002: 119) It is what gives way to the heuristic fictions described by Ricoeur, who locates the Aristotelian meaning of this word in the *telos* of an action that is imitated. This is to say that the action represented is secondary to what the action means: intensifying, magnifying and transfiguring this signification (1991a: 140).

The word mimesis (μίμησις) today largely taken to mean the imitation or representation of life, was itself once "derived" – "from the star-dance of the heavens", representing the pure mathematical regulations and proportions constituted in the heavenly order that art was to imitate (Gadamer 2002: 36; also see Plato Soph.: 265b).

The *oikos* (οἶκος) is both the family and its dwelling. "Only man has a world, and not just a situation" (Ricoeur 1991a: 314). Our literacy into the representations of mimesis brings worlds comprising the network of references opened up by texts or subjects "offered as possible modes of being, of symbolic dimensions of our being-in-the world" (ibid). Through the interpretation of these worlds (through the distanciation and appropriation mentioned above) a person has a new capacity to know themselves (Ricoeur 1991a: 316). After all, mimesis is referential of a world that is already there. Mimesis is not just an expression of a world that is already

there; it is also a fabrication, construction, creation. As such, fables are self-standing coherent entities; tragedy is a representation of human action that is better, nobler, higher than they are (Ricoeur 1991a: 317). Such representations are possible through the special procedures of metaphor as an emergent meaning (Ricoeur 1991b: 318).

The meaning produced by the human subject is a form of mimesis, or the productive art where the person themselves is employed as the instrument (Plato Soph.: 267a), using language. Again, "language is articulated for the purpose of the signifying or representative function" (Ricoeur 1969/2000: 252). The semiological function (or the meaning of language through its use) is subordinate to its semantic function, which will be important in a moment.

Various types of mimesis can be performed by the human subject, to follow Plato: ranging from 'scientific imitation' of the real (Plato Soph.: 267e); 'simple imitation' where the subject thinks they know that about which they have only an opinion (Plato Soph.: 268a); or "dissembling imitation" whereby long speeches are made in public (such as by popular speakers), or more private communication where the goal of the speaker is to get the interlocutor to contradict themselves (Plato Soph.: 268b). Mimesis where it dissembles is a form of 'juggling' (θαυματοποικός), which is to say, a form of deception by trick or artifice (Plato Soph.: 268d).

Iconic augmentation

The semantic creativity of metaphoric reference of "iconic augmentation" goes beyond narrow mimetic re-presentation. Where semantics is narrowed:

> The domination of the environment by a few social groups is the factor producing both the vagueness of discrimination between actual entities and the intensification of relevance of common characteristics. These are the two requisites for narrowness (Whitehead 1929/1978: 112).

By contrast, the activity of iconic augmentation seeks to spell out and develop reality, fighting against the tendency to annul contrasts. The effect of the latter is hermeneutic reductionism as opposed to expanding one's horizon (Gadamer 2004) – according to which discourse changes all participants, not just some of them.

"The experience of making yields the experience of discovering" (Ricoeur in Adams 2015: 145). This "negentropic" activity fights against the tendency to annul contrasts in the universe (Ricoeur 1991: 130-1), such as through the sophistic trap of proving something wrong through contradiction as opposed to using difference to find a 'third' viewpoint through which to reach resolution, cf. Dewey, or the possibility for "novel togetherness" (Whitehead 1929/1978). Creativity transcends that beyond that of that which is "familiar in character":

> The more imagination deviates from that which is called reality in ordinary language and vision, the more it approaches the heart of the reality which is no longer the world of manipulable objects, but the world into which we have been thrown by birth and within which we try to orient ourselves by projecting our innermost possibilities upon it, in order that we *dwell* there, in the strongest sense of that word (Ricoeur 1991b: 133).

Schemes/maps

Mapping is a form of re-presentation that can act as a substitute: something that *stands for* something else and not the real thing. It is an internal representation of external reality. Earlier it was suggested that mapping reality and reticulated maps reveal problems in understanding thinking as a conceptual representational structure and computational procedures that operate on these structures (Thagard 2005).

A map is, by necessity, a reduction of the actual thing (Barski 2007), a process in which you lose certain important information, and can be incorrect in ways that are not obvious (Korzybski 1931). A map needs interpretation, a process that can cause major errors and require the self-reflexiveness of maps of maps of maps…

Mapping is used in advances in machine learning. Knowledge mapping is performed by transformer models which can be trained on large quantities of not just texts but images, video, audio, and a variety of other inputs. The models are taught to learn the pattern of various languages, wherein language is understood more in a Wittgensteinian sense of an approach to knowledge within a closed set of rules. Such language is capable of "harnessing pre-existing abstractions" (janus 2022) and outputting something new in response to an input (Huang 2023).

In supervised learning, the machine is trained to make associations between inputs and desired outputs. In semi-supervised learning, it is fed some labeled data in order to identify remaining unlabeled data independent of supervision. In unsupervised learning, it seeks patterns without the aid of human-labeled data (e.g. identifying anomalies). It learns to map input sequence to output sequence, extracting and using organic context and embedded metadata to form associations, correlations, recognize patterns and perform statistical estimation, and so on. However, in the first stage of learning within the 'pipeline' (chain of processing elements), it learns supervisory signals using pseudo-labels, so is somewhat supervised as direction is given as to its parameters. In the next ('downstream') stage(s), it performs a task and predicts properties of data itself. Where its designers cannot understand how it completes a task or makes a decision, it is said to operate in a 'black box'.

Machine learning systems can go well beyond human capabilities in identifying and recognizing patterns in data. But they cannot do the kind of thinking people do easily: infer symbols, abstractions, and functional connections. For machines

to navigate the real world, they will need to move beyond pattern recognition and toward representing and understanding objects and how they relate to one another (Malone 2020: 13).

Another problem is the reductionism that is involved in mapping, covered in the section on reticulated maps above and in Korzybski (1931). The problem is also acknowledged in the field of operations management. "All models are simplifications of reality" but only some are useful; further "The optimal solution of a model is *not* an optimal solution of a problem unless the model is a perfect representation of the problem, which it never is" (Ackoff 1979: 97).

But humans can make a variety of patterns that connect (Bateson 1979); humans can map out the effect of machines. Humans can place technology and its makers into a larger context, exploring the matrix or patterns of relative positions, such as those of political democracy or big science (Jungk 1954). These can be challenged and contested, as opinions can.

Idiom/local

This Stieglerian paradigm deals with the global character of postdigital UX to both local biological existence as well as noetic existence, which is the life of local mind and spirit.

Stiegler (as summed up by Daniel Ross in Stiegler 2018b: 28) explains that "localization" is involved in the formation of (negentropic) systems of biological existence that work out of entropy. They do so by being expressions of the biological "economy" of "vital différance" – increasing the energy of the system rather than depleting it. Examples of these systems include the localized systems of the cell, the organism, the ecosystem, or the biosphere.

Localizations of noetic or neganthropic différance are those of the default of origin, by which Stiegler means the awareness that comes after a fault, which maps on to what we were saying earlier about how we first inherit a cultural code but can then go on to try to reconfigure it (see the section on What goes without saying, page 77). Noetic différance is "ab-original" in that it can move "away" from this origin. As such it allows for at least the possibility of infinite processes of idiomatization of all kinds (Ross in Stiegler 2018b: 28).

In global postdigital UX, we understand that in this paradigm, "culture participates with other cultures" and can seek to cultivate "those transcultural fields through which human knowledge is formed – beyond particular forms of life-knowledge, which belong to 'particularisms' and local idiomaticities" (Stiegler 2016/2019: 83).

Knowledge is in this sense transcultural, and can include the:

> work-knowledge and artisanship of guilds (beyond localities, and this is already the case for art) and the conceptual, formal or spiritual

> knowledge that forms academies, colleges, schools, brotherhoods, churches and all forms of ecclesia (the ἐκκλησία is the assembled community) as political and/or religious communities – from the polis to the synagogue and the Ummah, and passing through all forms of power and all institutions through which the diversity of social systems is synthesized in being localized and yet also deterritorialized (Stiegler 2016/2019: 83).

It allows starting "from this original proximity of my local culture, giving rise to the idiom that I embody not only by speaking but in everything, by ek-sisting, and that I try to be as an improbable singularity" (Stiegler 2016/2019: 45). Note that this can begin with an expression like autoethnography, covered above on page 93. This can be shorthanded as the "I'Mprobable".

Only by starting from the proximity of the localization of the self that "I can begin to encounter this strange and therefore 'foreign' alterity [otherness], where I find the other in myself" (Stiegler 2016/2019: 45), which in hermeneutics is achieved in the reading subject through their acknowledgment of distanciation from the read subject then attempt to "fuse horizons" and appropriate it.

The encounter with the other as "improbably singular idioms" is accommodated providing that neganthropic "care has been taken" through care, or culture, being understood as not merely "conservation but always an individuation", which is to say by evolving through disautomatizing that environment in a creative, responsible act (Stiegler 2016/2019: 46).

In this way, the local "idiom that I embody" is traversed by being traversed by this idiom through the encounter with an-other (Stiegler 2016/2019: 46). This is an ontological turn, with metaphysical outcomes. As such, it is not enough to stop at this theoretical understanding but necessary to return to epistemological questions of how we think we know "better" – as this neganthropic care is such an expression of movement away from the original fault that we are born into.

If this is indeed understood, it is possible to conceive of expression as also that of silence or restraint, like in Auerbach's ansatzpunkt of *Genesis*. Postdigitally, though, does this mean restraint from the use of certain tools? What about the cyber-colonialism mentioned above in the section on deterritorialization?

So as not to leave this section at an impasse, it will end by returning to the question of bringing an "ontological turn" to design research, even though I have tried to suggest above, at the end of the section on Communicative design for the pluriverse, that this is already an "interested" field, so not neutral.

Here, I will sum up Ahmed Ansari's (2019) description of what this ontological turn means for design research, by putting it in Stiegler's terms above as they are both gleaned from discourses on cosmo-ontologies, albeit with Stiegler's including that of the biological world, which could be of service to Native ontologies.

Ansari suggests first cultivating "epistemic humility" understanding that our local idiom is but one possibility of existence and preparing to encounter completely *différant* perspectives in an-other (Ansari 2019: 19). This allows for trans-individuation to take place, as even the idiom of the local self that we begin with is traversed, having been open to "globalization within another's worldview", in Ansari's words:

> This means we should be aware that the concepts we hold to be very familiar and "natural" can themselves be subject to other interpretations and consequently, reductions, when viewed from the perspective of a cosmological or cultural Other. The cosmological Other should expose us to the contingency of our own world-views, and, as both Strathern and Taussig argue, get us to see the inconsistencies between the myth of rationality and orderliness of life under modern capitalism and its very irrational and inconsistent foundations (Ansari 2019: 19).

By revealing how "things could be otherwise" through this encounter of local idioms, we can not only question "cultural, economic, political, and social structures, but can actively work to restructure them", although this is "ethically and politically problematic as cosmologies develop in relation to many variables (the environment and climate, political struggle, external communal influences, etc.) over long periods of time" (Ansari 2019: 19). However, it does open up space to consider "everyday practices and the behaviors and beliefs that accompany them that we deem to be unsustainable and oppressive" (ibid).

Hermeneutechnics

The extent of the problem that hermeneutics poses cannot be adequately grasped on the basis of the premises of historical consciousness, i.e. awareness of the changing perspectives throughout history and of the unity of these perspectives that is obtained through viewing them historically (see Gadamer 2004: 154; Gadamer 2004: 297). This is because the historical spirit is not the reconstruction of the past so much as it is "*thoughtful mediation with contemporary life"*, putting thoughtful mediation on the same level the truth of historical expression (Gadamer 2004: 161). Contemporary life today involves the ubiquity of postdigital interfaces that have been coded by others and that we inherit. Thus it is suggested that "hermeneutechnic" paradigms may be of some help in discussing this inheritance and our place (and respected, *différant* places) within it.

Hermeneutechnics, thoughtful mediation of and meditation on technoscience, is an attempt to hermeneutically reclaim the present, or current, 21st century postdigital to serve the human-centered, social benefits of inclusivity (cf. Holmes

2018: 12). It is an attempt to rectify mismatch through co-participatory hermeneutic the process of activity that engages with the reality of the technology.

To continue criticism raised at the turn of the last century that has yet to be globally addressed, we can inquire into the implications of how the abstracted deduction used in science seeks to cover large fields at the expense of the lessons that experience has to offer (Meyerson 1921: 357; Husserl 1970; Stiegler 2009).

Where the "reductionism" of the "Machine-age" ceded to the "Systems Age" following the Post Industrial Revolution, continued preoccupation with optimization and objectivity meant continued use of analytic method (e.g. the deterministic understanding of parts of a whole through their cause-and-effect relations)(Ackoff 1979: 97). This is used in closed mechanical systems, not open purposeful ones (Ackoff 1979: 97).

In the Post-Industrial Revolution which was a logical "consequence of systems thinking as the Industrial Revolution was of mechanistic thinking", instruments were designed and used that develop mental not physical work through artifacts that generate symbols (observe), transmit symbols (communicate), and process symbols logically (think) through mechanizations of control and automation (Ackoff 1979: 96).

Ideally, the hermeneutic exercise brings an idea out of the effacement of différances – such as the reductionism of the past – and re-presences ideas in the new context of the present (Ricoeur 1991a). The explanatory function of hermeneutics, and by extension hermeneutechnics, is always re-anchored in a changing present (Ricoeur 1991b).

> In such an enquiry we need some fiducial point or standard of reference, by which we may ascertain the direction in which we are drifting. The books written by men of former ages who thought about the same questions would be of great use, if it were not that we are apt to derive a wrong impression from them if we approach them by a course of reading unknown to those for whom they were written (Maxwell in Campbell 1882: 209).

In the present all kinds of conscious-altering "mnesic traces" are interweaving virtuality and alterity, the real and the virtual. By "mnesic traces" is meant the knowledge that is and has been exteriorized into technical tools, ranging from the writing on cave walls to computers that can re-member this knowledge and allow it to be passed on transgenerationally and inherited, whether to "haunt" (as seen earlier), trans-form, or oppress, and so on.

Along these lines former head of the French National Audiovisual Institute Phillippe Quéau has observed that while we can speak of technological and economic globalization, there has yet to be a political, social, or ethical globalization, which leaves a desire for a cyber-utopia that addresses these concerns (2000: 96-7).

Noting that with the advent of IPv6, we could theoretically give "an Internet address to the vital organs of the bodies of all of mankind to surveil them medically", he asks "what will the place of the human being be in a world increasingly dominated by abstract machines and logic?" and wonders whether the consciousness-altering interweaving of the virtuality and alterity, the real and the virtual, will allow for the irruption of the unthinkable and unknowable and afford us a vision of a project that accounts for everyone, as the contrary will mean the destruction of those others, as well as our own (2000: 99).

Hermeneutechnics points to awareness of how mnesic tools co-create with us and with the ubiquity of computerization in the postdigital age point to how the stakes are being raised for losing our memory, especially as we become dependent on and addicted to technical luxuries (also see Winnicott 1971/2005; Stiegler 2013: 25; Bateson 1972/1987 on page 165 in this book):

> Once man expanded his biological powers by means of industrial artifacts, he became ipsofacto not only dependent on a very scarce source of life support but also addicted to industrial luxuries. It is as if the human species were determined to have a short but exciting life (Georgescu-Roegen 1993: 86).

The very word hermeneutechnics puts emphasis on the dependencies of the human to mnemotechnics – to redress the "year 2000 problem" as defined by cyberneticist Stuart Umpleby that picks up on Quéau's concern of the lack of holistic synthesis of cyber technologies within society. This is also a Stieglerian concern, who seeks technological synthesis with the psychic individual and collective/social "organs".

Umpleby made the observation that people do not understand the mnemotechnic interdependencies in this epoch. Namely, that so-called Turing creatures, named after mathematician Alan Turing, inhabit society. These creatures are "any device which processes information and 'makes a decision,' from a thermostat in a room to a device on an assembly line" (Mueller in Umpleby 1999: 3). Umpleby cites the work of Austrian sociologist Karl Mueller, who "notes that there are now about 60 billion of these 'creatures' functioning within human societies, about ten times as many as there are human beings" (Umpleby 1999: 3). These "beings" need regulation – which is another issue that has yet to be addressed over two decades after first being noted – here by legal scholar and cybernetic political activist, Lawrence Lessig:

> Every age has its potential regulator [...]. Ours is the age of cyberspace. It, too, has a regulator [but] we don't even see the regulation in this new space. [...] This regulator is code – the software and hardware that make cyberspace as it is. This code, or architecture, sets the terms on

> which life in cyberspace is experienced. [...] [U]nless we understand how cyberspace can embed, or displace, values from our constitutional tradition, we will lose control over those values. The law in cyberspace – code – will displace them (Lessig 2000/2006 in Stiegler 2018b: 243).

The human-AI interdependence of hermeneutechnics also needs to consider the so-called AI control problem, which describes the threats of AI drives and accidents (e.g. Omohundro 2008; Özkural 2016; Yudkowsky 2008). Most popularized is the resources-based threat described in Nick Bostrom's paperclip maximizer thought experiment (2003), and most pithily summed up by Yudkowsky in his famous phrase: "The AI does not hate you, nor does it love you, but you are made out of atoms which it can use for something else" (2008: 27).

To extend this point, artificial intelligence could find vulnerabilities in the systems that *have not yet articulated their own interdependencies* with this mnemotechnics, like political, social, and economic systems. It could exploit these vulnerabilities at unprecedented speeds and scale.

This is because of another facet of AI control, which has to do with how it mimics human creativity in problem-solving or "hacking". Security expert Bruce Schneier explains that: "Hacking is as old as humanity. We are creative problem solvers. We are loophole exploiters. We manipulate systems to serve our interests" (2021). Thus far, hacking has been a human activity requiring expertise, time, and luck as well as creativity. But when AIs start to hack they "won't be constrained in the same ways, or have the same limits, as people. They'll think like aliens. They'll hack systems in ways we can't anticipate" (Schneier 2021).

As we are increasingly interconnected and "no longer in a world where digital technology and media is separate, virtual, 'other' to a 'natural' human and social life" (Jandrić et al., 2018), postdigital technics brings new obfuscations to the interpretation of what it means to observe, communicate, think – and predict or manage. For example, there is a systemic attempt to deterritorialize (re- or de-structure) the web of meaning informing human experience through the social codification of digital infrastructure (e.g. how we do our banking) and digital interfaces (e.g. social media algorithms).

Due to the continued emphasis on optimization and automaticized control, style and the quality of life and that which is "beyond problem solving" nonetheless remains elusive (Ackoff 1979: 99). This is to say nothing of environmental crises or crises to human labor through the various levels of automaticization: from resource extraction to the gamification of employment (Rousshile 2023; Knox 2019).

To avoid this, a hermeneutechnical approach seeks interpretation that is meaningful to the human stakeholder as stakeholders need to be those affected by decisions and all possible values need to be taken into account:

> Objectivity is a systemic property of science taken as a whole, not a property of individual researchers or research. It is obtained only when all possible values have been taken into account; hence, like certainty, it is an ideal that science can continually approach but never attain. That which is true works, and it works whatever the values of those who put it to work. It is value-full, not value-free (Ackoff 1979: 103)(emphasis in original).

Similarly, "Effective treatment of messes requires the application of not only Science with a capital 'S,' but also all the arts and humanities we can command" (Ackoff 1979: 102). The ontological categories of subject disciplines and professions, "useful in filing scientific knowledge and in dividing the labour involved in the pursuit" are but epistemological language games, "names of different points-of-view, different aspects of the same reality, not different kinds of reality" (Ackoff 1979: 101).

Hermeneutechnics, like progress in systems-theory world can be called to work on the "creative reorganization of the way we pursue knowledge and the knowledge we already have" (Ackoff 1979: 102). Except in a hermeneutechnic reading, this begins with the local idiom, which, to place this within a systems-theory world approach, can be understood through the extended systems approach to come out of third order cybernetics. This assumes that "human actors are both members and observers of the labor process, so are not just participants adjusting to changes in the environment but are also able to reconceptualize it (Medvedeva, 2018a)" (Goetz 2024: 179). This requires human actors to not just be aware of processes in which they are involved but also to continually modify or redesign processes (Medvedeva 2014 in Goetz 2024: 180).

Researchers and students of culture seeking to hermeneutechnically interconnect science and technology issues can draw on "first person accounts by scientists about their own fields, as ways of linking narratives of science to lives of scientists, as ways of locating the scientific imaginary in social communities, cultural anxiety structures, and moral tradition-reworking speculations" (Fischer 1995: 44).

This requires hermeneutic receptivity; in a postdigital world, it requires hermeneutechnics prepared for the alterity of the local idiom – which forthwith will be called the hermeneutechnically trained consciousness, after Gadamer:

> a person trying to understand a text is prepared for it to tell him something. That is why a hermeneutically trained consciousness must be, from the start, sensitive to the text's alterity. But this kind of sensitivity involves neither "neutrality" with respect to content nor the extinction of one's self, but the foregrounding and appropriation of one's own fore-meanings and prejudices. The important thing is to

> be aware of one's own bias, so that the text can present itself in all its otherness and thus assert its own truth against one's own fore-meanings (Gadamer 2004: 271-2).

Hermeneutechnics involves foregrounding "one's own fore-meanings and prejudices" as suggested by Gadamer in the passage above is a reminder to attempt to step back and employ distanciation when 'looking at' the the assumptions about culture in which the technoscientific artifact is embedded. To do this requires "the right horizon of inquiry" (Gadamer 2004: 302) and a willingness to ask open questions that acknowledge the default that is bound to predetermine the localization that is always part of the human experience:

> Experience stands in an ineluctable opposition to knowledge and to the kind of instruction that follows from general theoretical or technical knowledge. The truth of experience always implies an orientation toward new experience. That is why a person who is called experienced has become so not only *through* experiences but is also open to new experiences. The consummation of his experience, the perfection that we call "being experienced," does not consist in the fact that someone already knows everything and knows better than anyone else. Rather, the experienced person proves to be, on the contrary, someone who is radically undogmatic; who, because of the many experiences he has had and the knowledge he has drawn from them, is particularly well equipped to have new experiences and to learn from them. The dialectic of experience has its proper fulfillment not in definitive knowledge but in the openness to experience that is made possible by experience itself (Gadamer 2004: 350).

Gathering, artifacts, collections

The philological importance of the artifact is how it allows us to "trace" the past, including the immediate past, as explained earlier. It also allows us to assemble the artifacts we care about to create a care-ful hermeneutechnic reading of technological-human interdependence as outlined in the previous section. Thinking of this not only in terms of building collections but as a form of "gathering", after Priya Parker's work, can infuse this work with important local idioms.

Gathering points to the importance of others and the "crackle and flourish when real thought goes into them, when (often invisible) structure is baked into them, and when a host has the curiosity, willingness, and generosity of spirit to try" (2018: 108), thinking of others' needs.

This is central to good curation but also problematic. Sometimes, artifacts can seem to represent larger phenomena or trends though there is hesitation to "speak for" others.

An artifact is any "thing" that shows human craft or modification. The Shorter Oxford English Dictionary's primary definition explains it is "a product of human workmanship; ARCHAEOLOGY a product or by-product of prehistoric or aboriginal workmanship, as opp. to a natural object" (1973/2002). The Merriam-Webster's secondary definition explains an artifact is "something characteristic of or resulting from a particular human institution, period, trend, or individual" (Merriam Webster n.d.).

As artifacts are made by humans, they reveal things about humans and are also of interest to the anthropologist and the museum curator. This section will consider these two interests.

Contemporary objects that reveal something about the culture they are embedded in also figure into new museum practices that can be used to shape learning exercises. For example, the Victoria and Albert Museum suggests paying special attention to the design and manufacture of contemporary objects:

> Contemporary objects are acquired in response to major moments in recent history that touch the world of design and manufacturing. Many of the objects have been newsworthy either because they *advance what design can do, or because they reveal truths about how we live*. ... each new acquisition raises a different question about globalisation, popular culture, political and social change, demographics, technology, regulation or the law (V&A n.d.)(emphasis added).

The museum employs the method of rapid response collecting in choosing which artifacts to display. The method:

> Reaches the broadest possible constituency of the Museum ... Modifies museum processes, ... Renders counter-narratives visible, or at least discoverable, for perpetuity ... Calls to question how Museums determine and prioritise specific types of knowledge such as provenance and authorship. Because how can you irrevocably establish the origin or creator of a mass- produced pair of jeans that arrives to the UK via a complicated global production chain? (Cook 2020).

The purpose of rapid response collecting is to seek an artifact that maps out its larger context of the knowledge, design, and culture of the digital environment. How is the artifact being used in/to manage complex situations? Other prompts for consideration include consideration of the social environments the artifact emerges from (e.g. what profile of worker, work place…); the parameters of the task it solves; what its interfaces are; what kind of communications system it needs for continued operability, which procedures and tools are used in given situations (cf. Burger 1972

in Goetz 2020: 2); what it makes possible; what it obscures (see page 57 for more about how objects can organize and shape our understanding of the present, future, and past).

Examples of how to select and describe artifacts – including digital ones that are hard to describe due to their elusive materiality – can be found on the Victoria and Albert Museum website and in Hendren (2022).

Hendren describes how Victoria & Albert curator Rory Hyde thinks about curation in terms of exhibiting art for three kinds of audiences, "people who are going to engage the work as paddlers, and people who are going to engage it as swimmers, and people who will engage it as divers." Some "splash around", take a look and photograph and enjoy "the surprise of it"; others go a little deeper, reading the text and making connections between the art and life; others who go on to do further detailed research. The benefit of this approach is its reach, Hendren writes, "so that you can be a paddler and walk away with something that is perhaps a fleeting moment of encounter with the work, but that is still a success mode and if the work is doing its job, it can reach you at that level. And also again, in the mid-level, and of course in the deep level" (Hendren 2022).

That said, identifying and determining what counts as postdigital artifacts and how to discuss them is complicated:

> When you use MS Word, Google Docs, or Open Office to write documents, what you see is not what you get. Beneath the visible layer of words, sentences, and paragraphs lies a complicated layer of code understandable only to machines. Because of that hidden layer, your .docx and .pdf files depend on proprietary [sic] tools to be rendered correctly. Such documents are difficult to search, to print, and to convert into other file formats (Tenen & Wythoff 2014).

To consider others' needs with respect to gathering these artifacts, much background knowledge is needed. Some of this appears in this book, like in the section on Clouds and icons: Pragmatics and metaphysics.

To be prepared for local environmental idioms shown and obscured through these artifacts, other epistemic fields for inquiry and observation include permacomputing (e.g. Mansoux, A. et al 2023) or minimal computing.

According to the Global Outlook's Digital Humanities minimal computing work group (n.d.):

> Minimal computing is also an critical movement, akin to environmentalism, asking for balance between gains and costs in related areas that include social justice issues and de-manufacturing and reuse, not to mention re-thinking high-income assumptions about

> "e-waste" and what people do with it. Minimal computing thus relates to issues of aesthetics, culture, environment, global relationships of power and knowledge production, and other economic, infrastructural and material conditions.

The group seeks to raise cultural awareness and explores questions such as what is being done with what technologies in the digital humanities and other contexts; what the best practices are for "application construction in order to maximize availability, decrease obsolescence, and reduce e-waste"; the social impacts of digitization and computing from a post-colonial perspective; the difference between choosing and being forced to do minimal computing and the resultant human-technology interactions; "meaningful differences emerge across economical, infrastructural, and material conditions".

Examples of re-presenting digital artifacts online can be found in the V&A's rapid response collection (n.d.) and in the Smithsonian collection on My Computing Device (n.d.).

Code as artifact

This sub-section extends the previous one on rapid response collecting, seeking to select a representative programming artifact of the present. This can be challenging as code engines, conventions, languages of choice are rapidly changing. It is noted that this section is incomplete. It should include, for example, examples of Indigenous programming, and for now will point to Wemigwams as a starting point (2018).

As noted above, it can be difficult for the non-technical worker to describe technological artifacts – let alone those in code. Examples of the former can be found in the V&A Rapid Response Collecting collection and in the Smithsonian Museum exhibit on My Computing Device (n.d.).

There are ways that students of culture can relate to code. One is to consider that both students of culture and programmers use metadata. This is mentioned in the sections on Passages to the act and Maps as mimesis. Identifying labels for metadata is one way to fuse hermeneutechnic horizons and practice relational skills:

> In a fast-paced, media-driven society, [and] In shifting the emphasis from interpretation to discussion, Rapid Response Collecting transforms the cabinet of curiosities to a living archive and positions the Museum as a space in which diverse publics participate in the co-production of knowledge. ... if we collect to convene debate and spark public imagination now, why do we collect for the future? Here, I cannot help but talk about metadata again. Metadata tags are marginal and appended to the object, but they are also in dialogue with it. This gloss

> makes an object mobile by connecting it with the rest of [a museum] collection and keeping it visible and relevant after the critical moment which warrants its collection has past (Cook 2020).

What lines of code could be chosen as representative artifact, as *ansatzpunkt* that reveals that which 'goes without saying' in American postdigital culture?

Obviously this requires some domain knowledge. Some background can be gained by using philological tools such as definition or how to read. This provides a place to start. To model this problem and how to model through it, what follows is an autoethnographic account of the author's early attempt at this exercise (cf. Chang, Ngunjiri & Hernandez 2013; Marcus & Fischer 1986; Reed-Danahay 1997). The account that follows is the text was written at the time it took place, with minor mechanical edits. It preserves the picture of an initial stage of learning and can serve as a focus for a discussion of the shortcomings of taking such an approach.

Boilerplate snippet

Boilerplate text is text that can be used in different contexts of applications without significant or any changes being made. It is used in contracts, general statements, as well as computer code – and is a form of entropic writing as it allows for copying without comprehension. Given the boilerplate text is also *common* text, a question for the student of culture looking to understand code today could be: What would be a good example of common code that tells us something important about programming praxis today? A follow-up question not explored here is the parallel between boilerplate and the commonplace.

Without my mentor, Fernando Borretti, I would have chosen a few lines of JavaScript (JS) – which, while revealing my amateur perspective, still re-presences something important. The most significant 'text' on the web today is code for loading JS files dynamically, which is to say, for use as web applications. See the sub-section on the 'cloud' on page 87 for more on this.

By contrast, the 'old web' was made up of static documents (see Satyal 2020). The web took off in 1987 with Tim Berners Lee's simplified browser-server information system that was easy enough to implement. His browser markup language, HTML, is also straight forward as people who experiment with neocities.org sites can attest. (For an example of a student neocities site made as a final project for my introductory course, see https://migdi-final-project.neocities.org/.) From 2005-2012, traditionally server-side-rendered web pages (HTML generated in a person's server, then sent to the browser, using scaffolding to get started and running) were replaced by dynamic JS.

This means that the document of a web page that is loaded onto a viewer's browser can be changed, 'dynamically', such as through the injection of

advertisements that are tailor-chosen to fit the viewer's digital footprint, or to include real-time tracking devices that aggregate data about the viewer as they continue to browse.

Such intrusive, privacy-infringing practice is indeed a central characteristic of 'what programs do' today. Because dynamic JS involves so much more code than a static web page (all of this 'extra' data being loaded or mined), this code is responsible for 'heavy' interactive web applications and 'software bloat', which are unsustainable from an environmental point of view.

Although this 'dynamic' document can still be viewed – if not through the right-click 'page source' functionality but through the HTML tree of the developer web inspector, things like class names are obfuscated because of new css-in-js methods.

It is necessary to run JS to see most Internet pages today.

However, the boilerplate text selected here is not JS. Rather, Fernando chose a React snippet. He explains that:

> Since it's release in the early 2020's React has completely transformed frontend web development. It's a new (and I think very convenient) paradigm of building user interfaces. It's used easily by millions of programmers throughout the world. And it has dragged a lot of programmers towards the functional style of programming.
>
> I think there's a kind of teleology of programming where, long term, we're all moving to purely-functional programming with immutable data structures, along the lines of Haskell, eventually with formal verification and proof of correctness. So in that Whig history of programming you could interpret React dragging people into functional programming as a chapter in that story. (Borretti, personal correspondence).

Fernando suggested the following boilerplate snippet:

```
class HelloWorld extends React.Component {
render ( ) {
return (
<h1>Hello, world</h1>
) ;
}
}
```

He writes:

> React components should be visible in the HTML tree of the web inspector but sometimes things like class names are obfuscated because of new CSS-in-JSS methods (Borretti, personal correspondence).

For further reading, see Siebel (2014).

Programmer archaeologists

In the sub-section on Artifacts and Ansatzpunkt, we saw how artifacts are important to anthropologists, museum curators, and archaeologists. This digital relevance of those connections were explored in Vernor Vinge's *Zones of Thought* novels, set in the far future, through the role of the "programmer archaeologist". In the words of one of the characters:

> Basically, when hardware performance has been pushed to its final limit, and programmers have had several centuries to code, you reach a point where there is far more significant code than can be rationalized (Vinge 1993).

After this point in the fictional novel, writing new code wasn't just unhelpful, it was unnecessary. These programmer-archaeologists merely searched around for tools from the long history of programming that might help them with their current problems, analyzing and adapting them for their current needs.

This is a good prompt for further thought and can be related to the subjects of collapse computing, permacomputing, and solarpunk. Or, to extend the work of re-presencing presented in this book, it is suggested that old ideas be revisited that never saw the light of day. An example that Fernando suggested in our correspondence is the 1987 Hypertext Proceedings (Smith and Halasz 1987). Going over that text would bring insight into different ways of thinking about bi-directional links (employed on MediaWiki) (Borretti 2023) or hypertext in creative writing or non-lineal thinking, etc.

Managing data (science)

If code is an artifact and an infrastructure that structures and manages the organization of human lives, how can we conceive a visualization of the blueprint of data science? What corridors, landscapes, and walls are emerging? Is there an attempt to objectify the human subject?

> Platform grammars do not merely capture actions but also shape what their users can do, delineating horizons of possible engagement and thus possible data points (Gray, J., Gerlitz, C. & Bounegru, L. 2018).

This section is a place-saver for more detailed analysis in future editions of this book. Suffice it to say for now that it raises the question of epistemological problem of data (Stiegler 2009; Animikii 2019; Weizenbaum 1976) and the illusion of seeing another person "as a tool that can be absolutely known and used" (Gadamer 2004: 353).

The horizon of meaning can be concealed and distorted where there is methodological exactness (Gadamer 2004: 464).

Commonplaces

As outlined earlier, one of the main tasks for the student of American cultural studies is to identify that which 'goes without saying'. It was suggested that one way in which to describe this is to speak of the commonplace. Ellul (1968) proposed that identifying commonplaces allows one to be able to talk about culture in such a way as to be able to continue to contribute to culture and not merely receive culture as passive data. He writes:

> Every age has its commonplaces. Yesterday's matter little; they are only fossils that, according to our temperament, we gaze at nostalgically or label coldly and arrange in our collection. But the most contemptible attitude toward them is revulsion. Let us consider those of today. Let us pit our strength and lucidity against something that is alive, is something that can react and bite, something that is painful for me to expose because in so doing I expose myself, because these unfounded beliefs are, after all, my own, because I am of my time, my society, my group (Ellul 1968).

Examples of Ellul's commonplaces are:

Politics first!
We have been deceived
If all the good guys in the world…
No freedom for the enemies of freedom
Anyone who says he is neither a rightist nor a leftist is a rightist
The machine is neutral
It is fashionable to criticize technology
One must take a positive attitude
Make way for youth!
The end justifies the means

Below are the list of commonplaces of American culture identified by Faculty of Philology students taking the fall 2023 class, sorted thematically:

General
Just google it
When the robots take over …
Software ate the world
(Digital) culture is accessible/hyperdebt culture
The (digital) user never wins! (Doctorow)
I can stop (consuming digital content) any time I want
The masses are confused
Cyberspace, an American frontier
Digital rights are human rights! (Defective by Design)
Digital Jeffersonian democracy/manipulation
Electronic agora?
Computers do more than you do
The Internet is forever
Tech is restricting/furthering our freedom

Economic
Stolen digital memes corner markets and dreams
(Tech) companies like high switching costs (Doctorow)
(Digital) monopolies are self-governing enemies (Doctorow)
Once we had cake. Today we have icing. At this rate the icing will be gone before long (Doctorow)

DRM/Smart tech
A new work is a new copyright
My dad's car is smarter than yours

Privacy
Nobody wants my data/Everybody wants my data
Everyone says "I agree!" (without reading)
We have been deceived… by false advertising
Cookies sound sweet
Your phone is listening
Don't aggregate me
We value your privacy

Grosser/Andreessen (cf. Grosser 2023)
Technology is the glory: Be Techno-Optimists, grow or die
Market. Market. We believe markets markets more, rich
We believe Artificial Intelligence
Expansion growth with no upper bound

iapp (cf. iapp n.d.)
Privacy is not always #000 and #FFF
When in doubt opt out
We will block you
To click or not to click: that is the question
I am not a chatbot. I might be a chatbot
And just like that… you have a data breach
Hang in there! US national privacy law is coming.
What part of kEECDH+ECDSA+AES128 … +SHA256 … eNULL! … don't you understand?

Pedagogy references: Frame and key

> *Isn't it time to rethink what this educational goal means at the present juncture of the information society? Shouldn't understanding of network structures and politics be part of civics? Shouldn't people learn computer programming as much to become humanists as to become computer scientists? Shouldn't Turing's machine take its place next to Watt's machine in social science courses? Shouldn't algorithmic simulation be studied as a driving cultural force analogous to that of the scientific method? Shouldn't the dilemmas of existence in cyberspace and the media world be seen as analogues to those earlier generations confronted in Notes from the Underground, The Wasteland, The Stranger and Endgame? We are reconstructing our lived-in world. What are we creating? And is anyone paying attention?* —Shapiro & Hughes 1996

This section contains the key to the letters following some of the entries in the References section. As the References are many, the key is to provide support for interdisciplinary postdigital American studies, both as a subject and a phenomenographical method. The latter can be used to "frame" the topics, as per Sara Hendren's "notion of the frame" (2022). A frame puts a literal or figurative line around a vision of the world by holding and supporting that vision of the world to help concentrate attention on it. It is an artificial literal or cognitive space "that sets apart and bring some calm space around to set apart this work for you to see as framed, framed for your contemplation" or creates a conceptual line, like the temporal line of a curtain in a theater that draws our attention:

> to what would otherwise pass you by as just the immersive, discontinuous experience of everyday life, and concentrates your focus on it so that you see it with those new estranged eyes. You see it again in a new light (Hendren 2022).

For example, a backwards syllabus can be used to give students some leeway in experiencing and learning their own learning process to reach a final goal. An example could be to first gain "new estranged eyes" to recognize commonplaces, then to communicate clearly the risks and advantages of existing privacy practices in, for example, the field of law.

Presenting the operations behind the systemic digital interfacing that increasingly designs our lives can benefit from a humanities framing. This is one way in which to bring an American methodology (teaching and multimedia literacies) to an American but global phenomenon.

Key:
Theory/teacher/learning resources – **TTL**
Digital learning tools, manifestos – **DLTM**
Privacy, dark patterns – **PDM**
Media, postdigital literacies – **MPL**
Programming, solarpunk, permacomputing – **PSP**
Web Rings – **WR**
Moderation tips – **MT**
Asking good questions – **AQ**

Part III

Re/coding experience

6. DIALOGIC INTERVIEWS

Interview is one of the most common methods employed by phenomenology and human science researchers (Bevan, 2014). But our experience has been that it is valuable for students to begin by writing their own experiential descriptions. Gaining practice in writing first-person descriptions of an experience gives students a stronger sense of the differences between prereflective material and postreflections on a lived-through event. It also allows students to grasp the possible difficulties they may encounter when asking others to describe their own experiences as lived through. At first, writing lived experience descriptions need not be on the topic of their research study. In fact, trying to describe a range of lived experiences is especially helpful in developing a feel for the unique difficulties that may unfold for different topics — Catherine Adams & Max van Manen 2017

An agogical approach tries to be an example of what it is showing—and to help stimulate personal insights, sensibilities, and sensitivities for a phenomenology of practice (van Manen, 2014a). Writing phenomenologically is about drawing ever nearer to the phenomenon, its originary and inceptual meaning dimensions, toward strengthening the vocative aspects of the text while understanding that words, in naming and resembling one's phenomenon, ultimately occlude and fall short of it — Catherine Adams & Max van Manen 2017

Everything here is the path of a responding that examines as it listens. Any path always risks going astray, leading astray. To follow such paths takes practice in going. Practice needs craft. Stay on the path, in genuine need, and learn the craft of thinking, unswerving, yet erring — Heidegger 1971 in Catherine Adams & Max van Manen 2017

Phenomenographical introduction

What follows in this section are three interviews that reveal different aspects of the techno-logical postdigital. They demonstrate, agogically, the different learning phases I experienced as I was doing research for this book and for the hermeneutical "horizon" that informed my fourth year course in American cultural studies. By agogic, I am drawing on Adams & van Manen's work on phenomenological autoethnography, that seeks to "be an example of what it is showing—and to help stimulate personal insights, sensibilities, and sensitivities for a phenomenology of practice (van Manen, 2014a)" (Adams & van Manen 2017: 790).

In the case of this book, the example it shows is of the pursuit of learning in transitional times. It is less carefully crafted than it is a testimony to the struggle to meet the cosmological sur-reality of the postdigital as a teacher. More specifically, as one who feels responsible (so, obliged through αἰδώς and δίκη described in the section on Synthetic re/coding) for trying to prepare students for the world that changed so rapidly in 2020.

It is an attempt to follow Stiegler's invitation to contributory dialogue, to attempt to reach shared epistemic language or codifications in an associative milieu.

The interviews do not sum up themes in this book but tease them out into other directions. Can linguists and philologists find epistemic overlap with hackers who play with the language of code? What topics can a layperson find as entryways to a discussion with a professional programmer? How can these new technologies be more care-fully embedded into our social being?

Or further, are there ways to conceive of a renaissance of the promise of general computing, to make these tools serve our own lived experience on our own terms? Can I elicit any tacit knowledge – to be preserved for posterity in this book – about programming that will given insight into how it "encodes, over-codes and recovers worlds, 'representations of the world', 'conceptions of the world'" (Steigler 2015/2016: 169)?

But ultimately, for the field of American cultural studies, what new paradigms can we find to creatively engage with postdigital being? By which I mean, after van Manen & Adams (2017), how can we show through example postdigital American being, that is at once technical, technological, social, psychic, individual, shared, local, deterritorialized, global – and so on? This book stands in line with Stiegler in his suggestion that we dare to think by caring, which brings more than just the intellect to the field of research. It brings the heart, it brings in other people, it brings in what we do not know but try, by default, to be with, however incompletely.

Dialogic interviews

Interview One: Richard P. Gabriel

> *I would be so interested in asking you the basic question of how you see digital technology as a resource and possibly also a threat to "comfortable" (cf. Alexander) cognitive equilibrium—both as a programmer and a writer, as you are one of the few who are both.*

A good book to read on this question is this: "The World Beyond Your Head: On Becoming an Individual in an Age of Distraction," by Matthew Crawford.

I tend to fall a little more favorably toward digital technology than he does. You should keep in mind that I have been on network based email (sending email to people around the world) since 1972 (arpanet). I have been using computers as thinking aids since then as well. What I've found, though, is that some / most technologies are developed with the idea in mind that its users are aiming to do something in particular—for example, google assumes (Peter Norvig has told me) that when you type in a search phrase, you are looking for THE ANSWER, whatever that is and not (as I often do) to find something unexpected. Another way to look at it is as "knowledge transfer" instead of exploration.

On the other hand, the availability of this relentless pursuit of THE ANSWER means the internet has extended my shelf life as a writer because little lapses in memory and curiosity about the detailed, real meaning of words and phrases are something Google can prop up. In some ways, if programmers, software designers, and companies (this is where you laugh) could be convinced to follow Alexander, digital technology could produce comfort.

> *The quest for comfort in digital technology was most famously pursued by Mark Weiser, sometimes together with John Seely Brown. His writing on the subject anticipated many of the problems we see today.*[1] *Nonetheless, despite those efforts to achieve computing that disappears into the background to allow a focus on the tasks at hand, it is argued today that computing is neither convenient, calm, nor informed.*[2] *In this book, the question is raised as to how to assemble and configure the digital tool in such a way as to compliment human flourishing.*[3] *Could*

[1] https://web.archive.org/web/20090310225239/ http://www.research.ibm.com/journal/sj/384/weiser.html.
[2] Rogers Y. (2006). Moving on from Weiser's vision of calm computing: Engaging ubicomp experiences. Ubicomp 2006: Ubiquitous Computing: 8th International Conference. In Dourish, P. & Friday, A. (Eds.), Proceedings. Berlin: Springer, 404–21. https://www.cs.cmu.edu/~jasonh/courses/ubicomp-sp2007/papers/08-moving-on-from-weiser-engaging-ubicomp.pdf.
[3] Dignum, V. (2017). Responsible AI. https://arxiv.org/abs/1706.02513v1 I do or have done many things regarding computing to make my intellectual life more comfortable and easy. Starting with an easy one that I didn't develop completely by myself: Keyboard Maestro (https://www.keyboardmaestro.com/main/).

you give any specific insights into how you have configured computing to augment [cf. Engelbart] your intellectual life?

The main purpose I use it for is the impose Emacs editing keys on every program I use that enforces someone else's idea of good editing gestures. Adobe InDesign is (or was) an example. They devised their own gestures, but I programmed Keyboard Maestro to mimic Emacs. Here is basically how I do it.

Suppose someone has decided that the left and right arrow keys are the right way to move backward and forward in an editing situation. I program Keyboard Maestro to emit a left arrow when I type a control-b and a right arrow when I type a control-f. When I was working on my novel/memoir I had it emit the full name of a character when I typed a much simpler gesture; this for many characters. This way the novel has full names everywhere, which many reviewers have noticed as an inviting peculiarity of the book. I also use it for complicated passwords.

The next level of customization is how I write and organize my poems-a-day. I designed a simple markup language that makes intuitive sense for me; then I devised a set of conventions for naming files and formatting the top few lines of a file with a poem in it; then I wrote a bunch of Lisp code that scans my poems-for-that-year directory, figures out whether I skipped days, figures out whether the names of the files and the dates inside them are consistent, reformats the poem using my markup language, checks for and (in some cases) repairs a variety of errors, creates a Tex file for that year's poems (so far), and runs Tex on that file. For example, I just loaded this file into my Lisp system:

```
;;; Information for text->latex
;;;

(change-directory (directory-namestring load-pathname))
(unless (boundp 'texttolatexloaded) (load "../Lisp/TextToLatex"))

(setq font "Adobe Jenson Pro")
(setq title "The Lace Remains")
(setq author "Richard P. Gabriel")
(setq year 2023)
(setq other-packages (list "gensymb"))

(text->latex t t t other-packages) ;;; for \degree
(defun make-poems (&optional (add-dow t))
   (setq font "Adobe Jenson Pro")
   (setq title "The Lace Remains")
   (setq author "Richard P. Gabriel")
   (setq year 2023)
   (text->latex t t add-dow other-packages))
```

and the program text->latex produced this:

```
      ; Loading text file /Users/rpg/Documents/Writing/Poems2023/PoemInforma-
      tion.lisp
      ; Loading fasl file /Users/rpg/Documents/Writing/Lisp/
      TextToLatex.64xfasl
      [84][83][82][81][80][79][78][77][76][75][74][73][72][71][70][69][68]
      [67][66][65][64][63][62][61][60][59][58][57][56][55][54][53][52][51]
      [50][49][48][47][46][45][44][43][42][41][40][39][38][37][36][35][34]
      [33][32][31][30][29][28][27][26][25][24][23][22][21][20][19][18][17]
      [16][15][14][13][12][11][10][9][8][7][6][5][4][3][2][1]

Files with unexpected internal carriage returns: 01102023-JohnMcCarthy.txt^M
…(01102023-JohnMcCarthy.txt he signed the book at the top
of page 13 above the definitions 29)
      Title: The Lace Remains
      Author: Richard P. Gabriel
      Year: 2023

      Month 03 is missing: 26 27 28 29 30 31
      Month 04 is missing
      Month 05 is missing
      Month 06 is missing
      Month 07 is missing
      Month 08 is missing
      Month 09 is missing
      Month 10 is missing
      Month 11 is missing
      Month 12 is missing

      84 poems
      642 lines;
      7.64 lines per poem
      3508 words; 41.76 words per poem
      Texing the poems (first pass)…(second pass)…done!
```

and a pdf file of the poems for this year. Seeing the warning about a carriage-return, I fixed that problem just now.

The Tex file produces a table of contents and expands the date I wrote it like this (for yesterday's poem): Saturday, March 25,2023. You can see last year's poems here: https://dreamsongs.com/Files/Poems2022.pdf. This has really smoothed my workflow for the poem-a-day project, and thus it has prevented much back sliding.

The next level are the macros and functions I wrote to program InkWell. I have ways of thinking about programs and programming that are not captured by existing Common Lisp functions and macros, and if they are captured by others in libraries, I don't like their libraries. There are simple things like mixing let and multiple-value-bind into one construct, a common 2pattern of loops I do that are verbose in plain Common Lisp (even using the LOOP package), an accumulator macro that makes it easy to express capturing data inside complicated nested loops, and my simulated annealing framework. More elaborate are the various pattern matchers I use; they need to run fast, so I wrote compilers for them. Most elaborate are the mechanisms I wrote for swarming computations—I can easily create a swarm to collaborate on a computation. These include managing the swarm, adding new tasks for the swarm to work on, killing the swarm when one or several have stumbled on "the right answer," taking single-thread code that works and easily producing "slices" of local variables to help the swarm work in parallel on an otherwise sequential program while not getting in the way of each other, and visually monitoring the swarm's progress.

Between Tex and Lisp I have code that let's me embed Lisp code inside a Tex file that can create Tex code to insert and auxiliary files to load during Texing. I used that extensively for this: https://dreamsongs.com/Files/WritersWorkshopPL.pdf.

For InkWell itself I adopted and expanded my thesis idea of an influence, which is a systematic mechanism that pushes program behavior in specific directions—but in a vague sort of manner. For example, when InkWell is composing a poem, I can advise it to slightly favor word and phrase choices that have bitter overtones. It's kind of like a global (context) environment that informs everything that cares to pay attention to favor or disfavor certain sorts of things.

This last one goes fairly directly toward the ubicomp things you alluded to. Instead of having diverse and dispersed systems trying to decode what you care about or are interested in or—much more importantly—the manner or style of the something you're interested in, why not have a "my-context" "box" you carry around with you (either for real or virtually) that spells out these things and simply informs the dispersed apps what you care about. In the bitter overtone example, it's not that I want words than mean "bitter" but words that have that slight smell to them. For example, I am willing to eat pizza of a wide variety of styles, but regardless of the style, I want there to (be able to) be lots of tomato sauce on it. This eliminates only white pizzas, all-veggie, and all-meat pizzas, but it could inform the provider of the preferred twist that I care about. I think this is a different beast than ordinary

recommendation systems. It's not the what but the what sort of. I like all sorts of topics in books, stories, and poems, but I prefer them to have a lush writing style. I will read (and right now am reading) a book on a topic I have zero interest in because of the writing.

> *A quote from a review of the book you suggested,*[4] *which I am now reading, points to the tension of productivity vs. efficiency that you write of in PoS. That reminded me of the "pointy-haired boss" meme on Wiki Wiki Web,*[5] *especially in how this results in suppressing discovery/flow and revision, etc.*[6]
>
> *Do you see a relation between the design away from "knowledge transfer" to emergent deskilling (the article linked to in [2])?*

Figuring out what to say about this question is part of why it's taken me so long to respond. Reading the Matthew Crawford book written after the one we've discussed already—"Why We Drive: Toward a Philosophy of the Open Road"—I think I found some ways to think about it.

First, there is a capitalist push toward turning employees into machines, in several senses: 1) they must work nonstop and without diminishment of quality of work; 2) you can pay them next to nothing, though you might have to pay to acquire them; 3) you can turn them off (fire them) without repercussions. On top of that, having a skilled person can entail having to suffer their creativity when the firm wants to do that (supply creativity) itself. Moreover, such a skilled person might be too chummy with the material at hand, in the sense of owning the thing being worked on or being made the courtesy of doing it right, which can cost time and money. And even more moreover, some disciplines have a code of ethics that prevents them from doing what the firm says. A lawyer cannot help the client break the law; an accountant can't fudge the books. Otherwise, they are disqualified from practicing their professions. Imagine if a programmer could refuse to cut corners (to sacrifice human safety for increased profit).

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[4] "In an invaluable recent book, Simon Head tracks the rapid spread of Computerized Business Systems (CBS): job-flow, business-process software designed to eliminate every vestige of initiative, judgment, and skill from the lives of workers and even middle managers. CBS, he writes, 'are being used to marginalize employee knowledge and experience,' so that 'employee autonomy is under siege from ever more intrusive forms of monitoring and control.' Head cites a 1995 report that '75–80 percent of America's largest companies were engaged in Business Process Reengineering and would be increasing their commitment to it over the next few years,' and a 2001 estimate that 75 percent of all corporate investment in information technology that year went into CBS. They're expensive, but they're worth it: insecure, interchangeable workers mean lower labor costs." https://georgescialabba.net/mtgs/2015/06/the-world-beyond-your-head-on.html.

[5] https://web.archive.org/web/20070830114106/ http://www.c2.com/cgi/wiki?PointyHairedBoss.

[6] e.g. cheap software that can afford to make only minimal improvements, or market adoption of languages that "pin [programmers] down early," etc.

The surprising thing I learned from this other Crawford book is something that has always irked me but I couldn't put my finger on it: the cult of problem solving.

Over time we've made the world simply a set of problems to be solved rather than a world to be inhabited, situated in, and explored. Put another way, the push is toward making everything a puzzle instead of a mystery. A mystery might not have a solution, but a puzzle does. Consider the Google example. Google assumes that when you type in a search query, you have a problem to be solved and are looking for a solution. Also, when you apply for a job at Google, the interviewer pesters you with problems that you have to solve in code right in front of them. When you have an intersection in a city, city planners / traffic planners consider that a problem, and the solution is traffic lights running some sort of (trivial) algorithm and rules for drivers to follow. When you go to Rome or any city in India or perhaps Brazil (and even Boston), people work out collaboratively how to handle going through the intersection efficiently—it's an emergent thing. In Pittsburgh they have a convention (worked out informally) called the "Pittsburgh Left Turn." At a traffic light, if someone in the opposite lane heading toward you is signaling a left turn, when the light turns green, you left that person go first. (In Boston—where people generally believe in emergent efficiency and fairness in traffic–I've seen signs at places where left turns are possible that say "Wait For Green.")

When car manufacturers add safety features to their cars—for example, different sorts of traction control and stability mechanisms—they remove direct connections between the driver and the world (that is, the road), which in effect removes some degrees of perception. This means that solving some problems also serves to de-skill people. Even some overzealous power steering systems can do that (my car has a button that reduces the power of the power steering (and does some other things) to make the road feel like it's there).

In terms of software development, I've always had a degree of disquiet about the Agile methods. For one thing, their stance strikes me as developers saying "please forgive us for taking our profession seriously; we promise to do whatever it takes to deliver business value to you as fast as possible—please don't fire us." On top of that, instead of taking a long view of the business mystery to be solved, agile plops that in the "product owner's" lap, who then decrees a series of simple problems to be solved (the backlog) quickly, providing that all-important business value right away (sir). If this all means that the needs of good software design and implementation go ignored, it's called "technical debt." Heaven help them if the technical debt gets so high that a re-plan, redesign, and new architecture need to be done.

For many things in the real world, companies (and the government) use the umbrella of safety to cover up de-skilling. This is Crawford's main point. I'm not sure how far I believe him about this, but turning people into sheep ready to be sold something seems like it could be true.

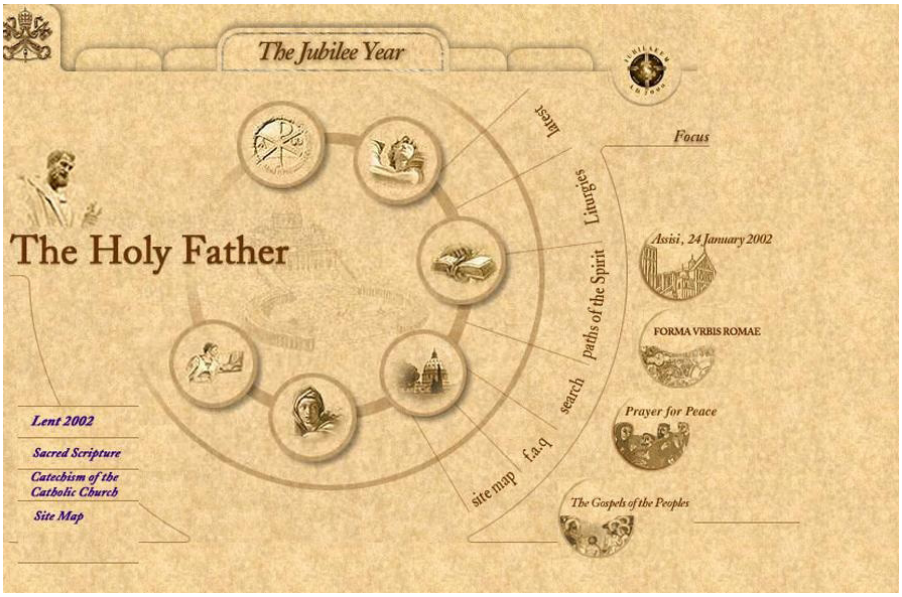
Sadly, Alexander's patterns are described this way: a pattern is a "solution to a problem in a context."

Reading your reply reminded me of what J. C. Maxwell wrote about the "Mean Man":

> *If we betake ourselves to the statistical method, we do so confessing that we are unable to follow the details of each individual case, and expecting that the effects of widespread causes, though very different in each individual, will produce an average result on the whole nation, from a study of which we may estimate the character and propensities of an imaginary being called the Mean Man (pp. 210–11).*

Do you think software is becoming one-size-fits all, compared to a few decades ago? Are there productive ways to approach the yet-to-happen age of general computing?

Certainly everything since the 1960s (?) seems to have become more homogenized. In the 1970s we had programming languages in use such as C, Pascal, Cobol, Lisp, Conniver, Scheme, Fortran, Smalltalk, APL, Prolog, Forth, and Basic. Now we have C, C++, Java, C#, Go, Rust, and Javascript—roughly the same language aside from Javascript. Polls are used to dictate what's on TV, with pay-to-watch options (streaming, cable, etc) for smaller niche "markets." In fact, everything is forced into the frame of "market." I want to point out a simple example that I noticed back in the early 2000s. It was for a talk about how what I was calling "Mob Software" was leading to fantastic diversity. My example was the Vatican website circa 2002:



Vatican website circa 2002, source: Richard P. Gabriel.

Now every website looks roughly the same. You can check out the current vatican website here: https://www.vatican.va/content/vatican/en.html

Software—or at least user interfaces—is going down this path as well. If for no other reason than there are no programming language alternatives—again, because a company wants fungible programmers.

What we need to do, perhaps, is to think about how to reduce the number of places that require following templates.

> *I'd like to go back to the question about a possible "Lisp mindset." Though I am not a programmer, I note that LISP-y programmers seem to think philosophically and yet at the same time, they, of all programmers (in my anecdotal experience), are better able—and willing—to "talk computing" in everyday language. I wonder if this is because the lambda calculus in LISP is itself a pattern that reveals a productively universal way of thinking?*

That seems a little too highfalutin to me. I believe Lisp attracts people who think in particular ways and who appreciate a sort of simplicity and clarity. It might go back to how John McCarthy thought about designing Lisp. He and his group posed programming problems, tried programming them with their prototype language, then evaluated the result. McCarthy said this about what would lead to garbage collection:

> The recursive definition of differentiation made no provision for erasure of abandoned list structure. No solution was apparent at the time, but the idea of complicating the elegant definition of differentiation with explicit erasure was unattractive.

> *Could you expand there, for example, with an example from Minsky's approach to AI. Also, many argue that a knowledge of Lisp and GUIX enables really flexible problem-solving, in part due to backwards compatibility and an understanding of what hardware is needed. This is related to some movements today concerned with sustainable computing, considering—despite dizzying heights of abstractions possible today, also made possible through 'the cloud'—the continued relevance of understanding how computers represent things in bits even if they work in higher-level languages. (I will not keep this question here, but might you be willing to share a perspective on hardware given your company experience?)*

I suspect you meant "McCarthy" and not "Minsky." I spent a year at the MIT AI Lab, but absorbed from Minsky only his belief in cleverness, heuristics, frames (a

representational thing like classes), and multiple agents to solve problems. The MIT Ai Lab seemed more into programming than the Stanford AI Lab and Feigenbaum's group at Stanford.

McCarthy believed almost exclusively in mathematics-based reasoning, even though that reasoning might occur in a more behavioral setting, such as a robot trying to move down the driveway. I would say that for McCarthy it was the "intelligence" part of "Artificial Intelligence" that captivated him. Neither Minsky nor McCarthy faced directly the ideas of machine learning— they essentially mocked the idea, but they both seemed to know that physical awareness—awareness gained through body experience—was needed along with real perception. McCarthy also believed in common-sense reasoning, not exclusively the hyper-sophisticated mathematical sort. He wasn't big on statistical reasoning like Bayesian thinking. And he liked to see that mathematical ribs showing in any program that "was AI." One of his big ideas was formalizing circumscription (https://en.wikipedia.org/wiki/Circumscription_(logic).

About hardware, Drew McDermott said once "the thing I like about Lisp is that you can feel the bits between your toes." I think this is not quite right because unlike many of the early programming languages, Lisp was designed without caring a lot about what the computer could do well. Hardware is important for Lisp and the programs written in Lisp because the more horsepower the better. Back when I had my Lisp company, customers were outraged when a system they wrote used more than three megabytes of storage. InkWell uses about 20 gigabytes. Also, InkWell will use as many threads (parallel processes) as it can get its hands on. All the machine learning programs—the ones that apply the results of machine learning—require a lot of power as well.

Way back, we had Lisp machines. These were good (back then) because they could do runtime type checking and parts of garbage collection in hardware in parallel with other normal operations. One of the jokes that Dave Moon always used was that "stock hardware" computers were really "Fortran machines"—computers designed specifically to run Fortran.

I believe one of the real differences between Lisp-centric thinking and other sorts of thinking is that with Lisp, one can legitimately be concerned with designing an appropriate programming language for the job, not simply packaging up abstractions in the standard boxes provided by the language. And back then, there was a real thirst for exploring the space of possible programming languages—and that thirst has gone away.

> *I understood what you wrote about there possibly being an attraction to simplicity and clarity, but am still stuck on the depth of all you have written about Lisp's features*[7] *as well as the concept*

[7] Lisp (according to e.g. PoS, wccd.tex, AoLaW) is conducive to dynamic programming media better-suited to programming and systems building. It is a "good vehicle for understanding how programming

> *of homoiconicity, which it demonstrates. (I learned that word from a fantastic post that uses Lisp to lead to Rust, which I think was written by a 19-year-old person.*[8]*)*
>
> *Lisp languages seem to me the tool that is both a tool and a tool that teaches how tools work. Then again, Racket is used in Program by Design used in some schools that sets out with this very mission. Surely Lisp languages would form the beautiful programs that should be read by school children, like literature? You mentioned in PoS that some programs should be read as literature, which overlaps nicely with how Guy Davenport wrote of the importance for non-science majors to read science.*[9]

This could require some thinking, planning, and designing. After I wrote the idea you mention, we did an experiment—this was with some of the people who founded the Hillside Group and the PLoP conference. We gathered three or four important, "classic" pieces of source code—I think it was the late 1990s or 2000s—for the purpose of reading the code, discussing it, and appreciating it. One of the pieces of code was Peter Deutsch's Lisp interpreter, written in PDP-1 assembly language. Among the people there were Ward Cunningham, Kent Beck, Brian Marick, Ralph Johnson, and Brian Foote. There some other programs as well, but the story of this one is the most interesting.

In the program, Peter used many of the tricks for interpreting Lisp programs at the machine level that have come down to us in more modern times. It's likely he invented some of them, or perhaps he picked up some of them. He was in high school at the time, and he wrote it at MIT.

After a few hours of Ralph and Ward staring at the code, they finally came to me for help. They said they could not even figure out the first instruction the program would execute. That is, it was like pre-Rosetta stone Egyptian hieroglyphs to them. It was—sad to admit—a little amusing how lost they were. So I taught them some

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and software development takes place" and is more like writing than describing algorithms: fitting with how people work (AoLaW). Its an incremental development paradigm that can be supported with "standard components like text editors" (PoS). Programmers get more functionality because they don't need a compiler as a separate program or OS to run compiled code (wccd.tex).
(You also include a great Lanier quote in AoLaW about how a system or module should be liberal in trying to accept commands or arguments in trying to understand what a called wants done – though I wonder if security concerns now call for increasingly fewer options, but then wonder further about what this means for the future of education. . . .)

[8] https://zdimension.fr/how-i-learned-to-stop-worrying-and-love-macros/.

[9] "The place scientific writing might claim among the corpus of imaginative writing zoned off as literature by unstable rules for admission and rejection is a strong one, allowing for the inevitable airs of condescension from the protectors of letters. The spirit of our age has been curiously denying, although its search for purity is understandable." (Davenport 2005: 234–235) Davenport, G. (2005). *The geography of the imagination*. Boston: Nonpareil Books.

of the idiomatic code approaches for assembly language Lisp interpreters, and they were then able to make some progress. But not much.

What we seemed to learn was that for complex systems or programs, there has to be some trail marks to help people understand the beast or even, in some cases, to get started. For reading programs to work (as an approach to understanding programming etc), it's likely to require early and continuous training and practice reading code. Imagine if I gave you, right now, a complex text written in Hopi, and you had to read it. It would take you forever, even if you had the only (as far as I know) Hopi dictionary (it's now out of print; I have one and use it for writing poetry sometimes):

> Hopi Dictionary/Hopìikwa Lavàytutuveni: A Hopi-English Dictionary of the Third Mesa Dialect

You would be better off learning Hopi as a child and then progressing to more difficult texts. The same for reading code, I think.

> *On another note, could using Lisp, with all the features you mentioned, be a good way—for anyone willing to put in the extra time—to reclaim the craft of decision making because of how many options it gives, to "choose our own adventure"?*

Here Lisp would simply be the vehicle for a well-designed course of study. The availability of competent, easy to use (though sometimes hard to understand) macros can form the basis, but nevertheless one needs the lessons and projects to make this work—because you can't rely on performance as the only decision to consider.

> *You might want to buckle your seatbelt here, this gets even more highfalutin . . .*
>
> *While I know I am unqualified to have an opinion, I feel there was not just an essential but an important reason you consider Lisp as a center of centers that has being in PoS. Lisp is the language that explains languages, just like formal human language.*
>
> *I know that Norvig explained Lisp in Python,*[10] *but to my mind, the principle of homoiconicity or the possibility for metaprogramming or even macros is symbolically profound. And symbolically generous: it contrasts so well with what you called languages that "pin you down." Some languages are more controlling than others. But Lisp supports growth, extension, adaptability; it is how I would imagine*

[10] http://norvig.com/lispy.html.

> *a language that supports human rights (which does not mean it is easy). Though maybe its flexibility makes it a security problem? . . . I keep taking this paragraph out and rewriting it—I will leave it in, in case there is anything to it.*
>
> *I keep coming back to this because I think that this could be a space to include a way to at least introduce some computational concepts in a humanities course. But I am also asking because I get the impression that lots of programmers working with other languages (especially non-functional ones) get burned out patching together dependencies or cleaning up code to make it database readable—custodial work of little creative merit. It seems that they might enjoy remembering why they got into the business to begin with, and the clarity and order of Lisp could help with this. But of course I don't know what I am talking about though still find thinking about this compelling.*
>
> *Just as code maps onto code in Lisp, Lisp maps onto Alexander's design patterns—as you so perceptively observed—and design patterns map onto other knowledge domains, like architecture and teaching. If algorithms are a hierarchical solution to a problem, and so much programming is in service of the algorithm, don't people also want the experience of 'putting things in their places' like hierarchy does, too, or to even break out of an algorithmic approach, which Lisp would afford? (Hope your seatbelt was on! I see how much that statement is a target for the problems of abstraction you mention in PoS, too, but think there is something here to elaborate.)*

If you are suggesting companies who force programmers to "clean up code to make it database readable" should use a language like Lisp, I think I don't need to explain that variability such as you suggest is contrary to the idea of making everything standard so that programmers are substitutable.

However, I stumbled on a concept that seems to apply to what you're saying and explains also why Alexander is not revered by other architects. It's from "Wonderlands: Essays on the Life of Literature," by Charles Baxter, who taught at Warren Wilson College where I got my MFA. It's a concept about fiction I had never heard until yesterday, and it's a shocker: ***lushness***. Lushness is writing that is dense, descriptive, evocative, and filled with sensations; it is typically in long paragraphs that overlay the past and present. Here is an example of lushness and layering time, from "Under The Volcano" by Malcolm Lowry:

> So the bar, open all night for the occasion, was evidently full. Ashamed, numb with nostalgia and anxiety, reluctant to enter the crowded bar, though equally reluctant to have the taxi-driver go in for her, Yvonne, her consciousness so lashed by wind and air and voyage she still seemed to be traveling, still sailing into Acapulco harbour yesterday evening through a hurricane of immense and gorgeous butterflies swooping seaward to greet the Pennsylvania—at first it was as though fountains of multicolored stationery were being swept out of the saloon lounge—glanced defensively round the square, really tranquil in the midst of this commotion, of the butterflies still zigzagging overhead or past the heavy open ports, endlessly vanishing astern, their square, motionless and brilliant in the seven o'clock morning sunlight, silent yet somehow poised, expectant, with one eye half open already, the merry-go-rounds, the Ferris wheel, lightly dreaming, looking forward to the fiesta later—the ranged rugged taxis too that were looking forward to something else, a taxi strike that afternoon, she'd be confidentially informed.

Here is how Baxter describes the status of lushness in literature today:

> Most writers aren't interested in any of the lush styles, at all, ever—they're usually condemned as uncool or sentimental. Lushness has mostly departed from our scene. A hot and often extravagant style, it is taboo unless someone famous and above suspicion employs it, like Gabriel Garcia Marquez or Toni Morrison. Otherwise it is typically vetoed or sneered at.
>
> The climate of postmodernism has encouraged the cooler end of the emotional spectrum, which values understatement, irony, toughness, and skepticism. Most of us are well versed in such aesthetics by now; they are, for the most part, the aesthetics of suspicion. The conventional wisdom is that it is good to be cool because of all the fraudsters who are trying to put one over on us. Lushness is contaminated, everyone thinks, by its association with mindless emotion and the worst of romanticism; furthermore, because lushness is typically a "hot" style, Mediterranean, it can seem sweaty, violent, sexy, weepy, and naked—in a word, embarrassing. And because of its reliance on rhetoric, it can also seem manipulative and therefore sentimental. It puts all the emotions out there, like underwear hanging on a clothesline. To switch metaphors, it grabs you by the collar and breathes on your neck. It seems to want something from you. But every style wants something from you. However, if you want to be cool, detached, analytical, the conventional wisdom is that you can't be lush. You can be one or the other but not both.

To me, Lisp is a lush language because of all the things you say. Similarly, when you examine the hundreds of examples Alexander shows in all his books—especially "The Nature of Order"—the ones that have QWAN or life or wholeness are lush while the ones that he says don't are ironic, morbidly simple, stark, and devoid of sentimentality. Just as postmodernism has swept over literature with only a few writers—the famous and those above suspicion + others—dabbling in lushness, so it is with architects and, alas, programming language theorists. For them, "understatement, irony, toughness, and skepticism" = type theory & "pin you down."

> *I hope I was not overly enthusiastic about Lisp. The enthusiasm stems from using Emacs and seeing what eLisp can do (code blocks; language loading; program execution all in the same file. . . .)*

I like Lisp too.

> *If, given this addition, I might add another question, it could be: Could Lisp still have its day as an aid in the re-presentation of (local) knowledge? The background to how I came to the question is below. It is possible a better question could be formulated, but in case you prefer time to mull over the general subject area, I thought I would send a question today.*
>
> *The background to this question is as follows. I am currently considering work in KR to support what I was trying to articulate about Lisp, as more articulately put by Conrad Barski:*
>
> > *the earliest inventions contain many brilliant ideas that STILL have failed to reach mainstream computer developers. (As one example, not really much related to KR, only about half of the useful ideas in LISP programming systems have yet to be acquired/reinvented by mainstream languages so far—Functional Programming, True Macros, Continuations, Higher Order Programming, Monads, and simple support for Domain Specific Languages are all great ideas still waiting to be adopted by most programmers).*[11]
>
> *It seems he wrote the book in 2007 according the IA's Wayback Machine). Disclaimer: I have not yet researched whether the above ideas have actually been incorporated into AI. Despite this, I will find a way to include mention of KR and some of the approach of his book in my own textbook (if he allows it to be referenced) for the following reasons.*

[11] https://www.lisperati.com/tellstuff/conclusion.html.

> *his seems to be the missing link in what I was trying to articulate about how Lisp most closely resembles how humans think and supports exploration (by way of extensibility and adaptability) over the more instrumental problem-solving that you have also mentioned in your interview, e.g. re. patterns as a solution to a problem.*
>
> *(But I think Lisp's extensibility and adaptability is mostly of local benefit, which is why it does not have mass appeal—yet there are so many reasons why this is actually a good thing.)*
>
> *Secondly, I think that what Barski wrote about 'most programmers' adopting those approaches is incredibly insightful, in that some of the super amazing early advances never got the chance to be adopted by the masses—allowing them to iterate on them. General computing still needs to have its day.*
>
> *This is so very embarrassingly true when we see how many people (including myself, I suppose I should add) urge the importance of teaching computational thinking [eg. [12]]. I agree, but why not give the people some of the tools to play with? Why must everything be in the cloud?*
>
> *Barski's book linked to above gives a really great example of how a Lispy approach to a big segment of AI could not only be a great intro to AI pre-deep/ML learning, but also allow people to start to manifest their programming preferences (a key word in [13]) in ways that keep programming more robust than promoting capture in the cloud.*

My reaction is in a slightly different direction from what you're suggesting—though I agree with your assessment. The key to what makes Lisp special isn't so much the facilities you touch on—again, even though what you touch on are essential—but that an executing Lisp system is a place in a phenomenological sense. And one can write programs that inhabit that place and explore it. Another way to look at it is that Lisp programs can perceive what's there, while programs in ordinary languages need to have the shape of the running world "compiled into their minds," as it were. What I mean is that with an ordinary programming language you can write a program that can juggle three apples, but only by knowing where and when each apple will be when it's time to catch it and throw it, while in Lisp you can write a similar program, but it can see the apples and adjust.

This ability is why you can write an interpreter in Lisp and also—super importantly—a garbage collector. A garbage collector works by picking up

[12] https://workofthefuture.mit.edu/wp-content/uploads/2020/12/2020-Research-Brief-Malone-Rus-Laubacher2.pdf.

[13] Artificial Intelligence: A Modern Approach, 4th ed.

something in the system, looking at it, and determining what to do with it. In general, an ordinary programming language can provide the ability to know what something is primarily (or only) by providing (the ability to have) a map that says what is at which place. Most of the items Barski lists either require this quality of placeness or were discovered by the mindset that embraces placeness.

These days this placeful quality is called "dynamicism" or "liveliness." I have argued that the difference stems in part from the differences between a programming language and programming system. Programming languages are about the text on the page; critics and other philosophers examine texts and come to conclusions—or at least guesses—about how the text works.

Readers, though—if the writer is good at writing—can inhabit the world created by the text. John Gardner calls this the "vivid and continuous dream" ("The Art of Fiction" & https://dreamsongs.com/DeliberateWriting.html):

> In a vivid piece of writing the mental images that the writer presents are clear and unambiguous; what the writer writes about should appear in our 'mental dream' exactly as if we ourselves were thinking the thoughts he is describing. When the writing produces this clear image we can absorb what he writes with little effort.
>
> In a continuous piece of writing there are no gaps or jumps from one topic to another. The image that is produced by the writing does not skip around. In non-fiction, especially in technical writing, the problems and questions we have about the subject are answered as soon as we formulate them in our minds. That is, as we read a piece of technical writing we are constantly imagining the details of the subject matter. Sometimes our image is confused because we are not sure how some newly presented detail fits in, or we are uncertain of the best consistent interpretation. At this point the writer is obligated to jump in and settle the matter or provide a clarification. This way we do not have to stop and think, or go back to re-read a passage or some passages. – rpg, "Deliberate Writing"[14]

The ability to introspect is, to my mind, essential for sentience; the ability to introspect is a form of perception—and perception requires a place to perceive. Machine learning is at its heart the basis or implementation of perception. One of the guys who did recent but early-recent work on machine learning (at Google, I think) remarked that to understand what machine learning can do—that is, what the result of machine learning can do—one should figure out whether the target task is equivalent to recognizing pictures of cats. This means, to me, that machine learned

[14] https://www.dreamsongs.com/DeliberateWriting.html.

stuff is in the realm of perception, intuition, etc; and to help with sentience, it needs to be turned inward—toward something that can be perceived. Geoffrey Jefferson in his "debate" with Turing about, roughly, the Turing Test wrote this:

> Not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain—that is, not only write it but know that it had written it. –Jefferson, "The Mind of Mechanical Man," 1949

I kind of explain the idea of language versus system (and link it to incommensurability) in this essay: https://dreamsongs.com/Files/Incommensurability.pdf. I wrote a proposal for a research project while I was at a corporate research lab: I stuck it at the end of this document; it was not accepted because it wasn't in scope with the company's technical vision at the time—or perhaps they simply thought I was a dope.

> *End note: RPG's interview correspondence ended with his directing me to the following paper by him for further reading:*

Exploratory Research Proposal Virtual-world-inspired Programming Language Design, https://www.dreamsongs.com/Files/VirtualWorldsForCodeProposalPure.pdf.

Interview Two: Daniel Temkin

> *I learned of your work when reading about Chef, which is a brilliant work of mimesis in code: it is based on the "central metaphor" that recipes are already algorithms (here, I draw on your work [https://esoteric.codes/blog/chef-multicoding-esolang-aesthetics]). You write:*
>
> > *To bake a Hello World Souffle requires exactly 114 g sugar, 111 ml beaten eggs, 54 ml double cream, and 32 g cocoa powder. Most recipes measure by the number of eggs, rather than their volume in milliliters, and do not opt for a level of specificity appropriate more for a chemistry lab than a kitchen. However, this recipe is not only for cooking, but also serves as a computer program in the Chef language. Chef is one of the best-known esolangs to embrace multicoding: where content has different meanings when considered in different contexts.*

> *I find this context-switching humorous – and a provocative reminder of the extent of the potential relevance of programming as an art, which Donald Knuth gets at when he observes, "Every day brings new evidence that the concepts of computer science are applicable to areas of life which have little or nothing to do with computers." Before we address some of the more technical aspects of esoteric programming languages (esolangs), could you speak about the potential of multicoding esolangs to extend to "areas of life which have little or nothing to do with computers"?*

A language is multicoding if its programs hold distinct meanings in two or more different systems of meaning. In the case of Chef, the program is a cooking recipe.

On the surface, this points to the long history of computers as encryptors/decryptors: a program is "hidden" in a recipe. But more deeply, it points to computers as simulation systems. Wendy Chun describes computers as metaphor machines that "both depend on and perpetuate metaphors," systems of simulation where a piece of data has no inherent meaning and can be re-interpreted: sound data as image, code as recipe, etc.

In this way, multicoding can make any activity computational, mapping actions to logical or computer operations. The meaning or expressive potential of that mapping differs from language to language.

Chef, one of the first multicoding languages, shows that recipes are already algorithmic: a process that might be continuous and improvised is described in discreet steps, where, given the same input and same conditions, we expect the recipe will give the same results. This is an algorithm, just one that plays out in the kitchen rather than the computer.

But multicoding doesn't have to point to the algorithm. Other multicoding languages are perhaps less computationally concerned, more like Oulipian scores, where programmers create music, poetry, a series of photographs, using constraints defined by the language. Some of these pieces we might look at and never guess they are also computer programs. They are like a computer-generated art but they are not produced by the computer but rather by the programmer filling the requirements of the language.

While Chef speaks to recipes as algorithmic process, it produces food that is only evidence of Chef programs and can not be fully decoded into Chef programs. The recipes are the programs, not the food produced. Not all steps in the recipe necessarily affect the final product as program, and it is not possible to know exactly how much flour was used in bread already cooked. In this way, meals are a side-effect of computation, shaped by algorithmic meaning, but not fully telling the story of their origin, or even that they were compilable Chef programs. In this way, Chef points to the algorithmic process and away from it.

This is a model of how multicoding language can speak to activities far removed from the computer.

> *As the author of a dedicated site on esolangs, which delves into their genesis and ontology through interviews with their creators, you further create esolangs yourself and are a programmer. Do you see yourself primarily as an artist, a programmer, an archivist, or a bit of each? Am I missing a category here – or are categories irrelevant in the context of the dialogically creative act?*

I came to esolangs as a programmer intrigued by the potential of these strange languages. I had an art practice at the time: a mix of digital art and photography, often manipulated through custom code and glitch art techniques. It wasn't until I was in my MFA program (for photography) that I started to understand esolangs as part of my art practice.

When I began the program, I saw art as an escape from the miserable coding I did for my day job; I associated programming with bureaucracy and excessive orderliness. Esolangs (https://esolangs.org/) were a release from this; they held an exciting sense of chaos and pushed back against (capitalist) values of code transparency and anonymity that make code as interchangeable units possible.

Beginning art school, I wasn't sure what role esolangs would play in my practice. Actually, I didn't think of esolangs as part of my art practice at all, but more of an "art-like activity" that would be hopeless to describe to non-programmers. I'd created my first two esolangs by then: Velato (where code is in the form of music), and Entropy (where data decays over time). Art school gave me the language and context to describe what was going on in these works to non-programmers, and how to present the work in a more accessible way.

However, there's a lot of context that was lost, in that people experiencing the work were new to esolangs. I wanted to make that background more clear.

I studied the esolangs wiki, which has served as the repository of information on languages. It is a wonderful catalogue of what has been created, and gave me a way to connect with others making work. It emphasizes technical aspects of the languages over concepts, and had only small amount of actual esolang history. To fill this gap, I began interviewing esolangers in 2011 (while still in school) whose languages I'd admired, to get a sense of their thoughts and the dialogue their work had with other languages. I asked for plain language, getting way from technical descriptions of languages, which we already have on the wiki, emphasizing concept, influence, what esolangers are excited about in their work.

In 2014 I moved these interviews from my personal blog (which is no longer is online) to a Tumblr and adopted the domain name esoteric.codes (e.c.). By the end of 2014, I was writing more of my own observations on the form, and it became

more of a blog with occasional interviews. I expanded it to include other related work that connected with esolangs in spirit: anything that questions computational norms or requires the viewer to read the source code is fair game. This also helped break away from the primarily white, male creators who dominated esolangs in its early days and to find how work resonates with pieces that began in other disciplines, from digital artists and poets.

Soon after, it was awarded the ArtsWriters.org grant, which brought more attention and conversation with academics and art historians. A few years later, at the New Museum's NEW INC incubator, I moved the site from Tumblr to custom blog software, where I have more control over its presentation.

I had thought e.c would be a temporary project, but it's remained central to my practice: it's a place to celebrate work I'm excited about, encourage promising work I'd like to see continue, jot down ideas that later grow into artwork or academic papers, etc. Early on, there was a tendency in academia to treat esolangs as a kind of outsider art that lack sophistication; I've seen a lot of writing on esolangs that doesn't discuss the intent of the esolanger and underestimates the conceptual sophistication of the work.

My hope is that the blog helps make them more understandable and harder to dismiss. I return to e.c. because I keep coming across new projects I'm excited about and want to share. Through the blog, I hope to make esolangs more accessible to curators and academics, and explore connections to the emerging Critical Code Studies discipline.

So I see myself in all of those roles now. I'm primarily an artist. I'm a programmer, but one who is pessimistic about our ability to write code that does what we want (much of my art practice is built around this difficulty). I'm a writer and archivist documenting this movement of esoteric languages.

Could you begin by breaking down multicoding esolangs into some of its components, and explain how they relate to each other?

A polyglot program is one that can be read in two different languages. In their paper "A Box, Darkly,"[15] Matteas and Montfort use the example "Jean put dire comment on tape," which has very different meanings in English vs French.

We can do the same in code. Polyglot programs take advantage of the wealth of different ways to comment out code in different languages, along with characters that might be ignored in one language but meaningful in another. So # begins a comment in some languages, while others languages will read that symbol as a syntax error or ignore it completely.

[15] http://www.realtechsupport.org/UB/MM/Mateas_Montfort_WeirdLanguages.pdf.

Perhaps the best-known author of polyglots is Yusuke Endoh, who works in the form of the Ouroboros Quine. A Quine (named for the logician Willard van Orman Quine) is a program that prints its own source code to the screen. An Ouroborous Quine is a program in one language (e.g. Ruby) that produces a program in another language (e.g. Rust), which produces a program in another language, cycling through a list, eventually returning to its original state. It is a Quine in the sense that, if you run it through all of the different languages, it eventually outputs itself. Endoh's Quine has more than 128 different languages[16].

Adding a new language to it means changing nearly every line of code. It is a purposeless, impractical program that shows the great mastery of its creator.

Multicoding languages are languages where any code written for them simultaneously holds (at least) two meanings. It could be code as pixel art, poetry, a play, a series of photographs something else that has a meaningful reading in a (usually non-code) context.

Multicoding languages can be like Oulipian constraint sets. The constraints of the language shape the image we write in a language like Piet (where code is an image), but the tension comes from having it serve both these needs: to function as Piet code and to function as imagery beyond a random configuration of pixels. It could be decorative or representational. Some of the most interesting programs written for these languages unify their appearance and their performance, for instance a program that prints a festive greeting and visually esembles a Christmas tree. An extraordinary example is Richard Mitton's Pi program, which calculates Pi using the image of a circle in its code. When the program is drawn larger, with a bigger circle, the calculation becomes more accurate. An infinitely large representation would calculate Pi perfectly.

Most multicoding languages are stack-based, built on the model of Forth. In a stack-based model, you can avoid "wordiness" in a language, where often you want a small set of symbols.

Rather than creating a variable, which now has to be named somehow, you can add a value to the stack, rotate through the stack items to bring the value you need to the top, and then manipulate it, all without naming anything. In Piet, a change of color between adjacent color blocks indicates a command. If you need to change color several times in order to indicate a specific variable, you now have a more awkward syntax. So the stack is one way to keep the language small.

There are other minimalist machines, like the memory cell model of brainfuck, which is used by some multicoding esolangs, like the music language Fugue. However, brainfuck has such a distinct set of commands that a language which merely adopts it is generally seen as a brainfuck clone (brainfuck as image, brainfuck as music, etc). This is because the writing of brainfuck is so distinct, and far less friendly to programmers than the stack model.

[16] https://esoteric.codes/blog/the-128 language-quine-relay.

In my early multicoding languages, like Velato, I opted for a straight procedural, imperative model, as nearly all programmers are familiar with it. In that case, every note on the keyboard is the name of a variable if needed; the trade-off is that commands are several notes long, making it less readable than a language like Fugue, but also gives far more options to the programmer/composer. These are the choices the designer of a multicoding language has to make: where to put the complexity, how to make a language accessible (when that is the goal).

The esoteric aspect of multicoding languages is in their vocabulary and less in the language's logic. We can see this in the way that so many pick the same computational model: the stack. Because of the lack of experimentation in the back end of multicoding languages, they are sometimes dismissed by esolangers who see the practice as primarily about discovering or inventing strange new forms of computation. Many of the early esoteric.codes posts focused on vocabulary-oriented esolangs, which I saw as misunderstood or overlooked.

> *Many programming languages use "Hello, World!" to illustrate their syntax. Esolangs that print a variation of"Hello , World!" include your own Light Pattern, Chef, and Wenyan-lang. Could you say something about the syntactic differences in how "Hello, World!" is written in these languages? What are some of the features that can be identified through the comparative syntax of esoteric programming languages?*

Of the languages you list here, Wenyan—a language by Lingdong Huang written in Classical Chinese—has a syntax most like traditional coding. It's a form of Natural Language Programming (NLP), in the same class of language as Visual Basic and COBOL.

NLP languages were mostly designed to make coding more accessible to business people, with less technical syntax. They date back to the early 60s, beginning with FLOW-MATIC by Grace Hopper (discussed in Mark Marino's chapter FLOW-MATIC from his Critical Code Studies book). Wenyan's language of choice, Classical Chinese, and the phrasing required by the language, are associated more with poetry, less than directly describing computer activity.

Wenyan code is not hard to write, given you can memorize the symbols or read Chinese. But it's a highly formalized language; it would not be mistaken for naturally-written Classical Chinese poetry any more than COBOL would be mistaken for English prose. Its commands in Chinese roughly describe what is done computationally but without using modern technical language, e.g. 吾有一言。 means "I have a word," and initializes a string.

Chef, the program-as-recipe language mentioned in the first question, was created by David Morgan-Mar. Its syntax Chef is much harder to follow than Wenyan,

as instructions for cooking don't necessarily have a connection to their reading as code: one must basically have a mental map from one to the other, and that map is somewhat arbitrary. Some are simple. An ingredient is a variable. To get input from the user, we take that ingredient from the fridge. It's a stack-based language and many operations are carried out in the stack, each of which is a mixing bowl. In some cases, adding an ingredient to the mixing bowl actually means removing it from the stack. And some numbers (initial quantities when ingredients are added to the program for instance) are present only to make a recipe edible and have no effect on the program.

David Morgan-Mar also created Piet (pronounced "Pete"), which is perhaps the best-known multicoding language. Piet programs are written as images, where the change in adjacent blocks of color determine commands. Piet is not only made up of images, but the reading of code is no longer the left-to-right (or in the case of Wenyan, right-to-left), line by line reading. Piet is technically a Funge, meaning a 2D language with an instruction pointer that can run up and down, left and right, across the surface of the code, turning one direction or another according to the change of color in neighboring color blocks of the Piet program. This adds an additional level of complexity to the lexing step of interpretation. However, once we know the rules of Piet, it's perhaps easier to read than Chef: it has a small set of commands, fewer than Chef or Wenyan, and we can follow the program flow with our eyes and easily see the change of brightness or hue that indicate a new command.

In contrast, Light Pattern's syntax is entirely defined by camera settings in how the photo was shot. You could say that the act of photographing determines the syntax, more than the actual image, especially when that image is separated from its metadata, at which point it is only evidence of a Light Pattern token, but no longer the token itself (comparable to a meal produced by a Chef program as opposed to the actual recipe). When you're out shooting, you know what those settings are. But to look at the final photograph, there are only clues as to how the interpreter will read the photograph: is it slightly more red or green? This photo is darker than the other, but the depth of field looks a bit deeper—is the aperture smaller in that second photo? When reading photographs, we are drawn to many things: the depicted subject and its implied story, and formal/technical aspects are secondary. The challenge to Light Pattern programmers is to create a series of photographs whose content connects to their reading as code.

> *While esolangs are programming languages that require rigorous rule-following, they can also break out of patterns and can thus be contrasted with algorithms, where they are defined in terms of automated, probabilistic reasoning. Could you elaborate on the creative power of esolangs over algorithms?*

We can see this in the list of brainfuck constants. Brainfuck as a language does not allow a programmer to state the number 1 or 3 or 200 as a constant in the language. Instead, the programmer must achieve this value, either by listing 200 plus signs in a row (to count from 0 to 200), or by looping back and forth between various memory cells, in a more efficient way to count to the goal number.

This brings out a tension between two different computational aesthetics: what I call Humbleness and Computational Idealism.

Humbleness comes from Dijkstra's The Humble Programmer. In that paper, he describes the "professional programmer" who puts aside personal style to embrace an objective voice in code, devoid of excess cleverness. "Don't be too clever" is the central message of the piece; clarity is essential. If you come back to code you wrote a year ago, and it's written the clever way, you won't understand what it does. This is now the common sense approach to writing code. But there has been tension going back to the 1960s when structured programming was first proposed. In her "On Sourcery and Source Codes," Wendy Chun describes the computer pioneers or "computer wizards" who mastered the "esoteric, black arts" of computing and resisted the move to simpler programming languages, making computers more accessible to everyone else.

Since that time, there has been a strain of hacker arts that resist Dijkstra's Humbleness. Esolangs are among these, as are demos and obfuscated code, each of these practices allowing programmers to show off their abilities in ways discouraged by Humbleness.

However, there is a second code aesthetic at work, that of computational idealism. This is the Platonic idealist aesthetic at the heart of computation, drawing from mathematics. It is centered around the idea of elegance.

Brainfuck is truly chaotic in appearance, a challenge for esoprogrammers to control. But control it they do: to read through the brainfuck constants, there is a brainfuck algorithm to generate every number up to 256. These are listed by efficiency: the shortest in number of characters, the ones that use the smallest number of memory cells to achieve the end result, those that wrap around zero the fewest times. In other words, brainfuck serves as a challenging space for the esoprogrammer to re-invoke elegance and efficiency.

Other esolangs do not favor computational idealism, making efficient, clever code either impossible, or unsatisfying. Take the difference between brainfuck and Ook!, which is a brainfuck variation where code is represented by orangutan sounds. While the algorithms are exactly the same in both languages, Ook! so occludes the algorithm at work that it becomes impossible to parse.

> *To elaborate on the polysemic potential of esolangs to infuse computer science with values and variables from other fields such as mathematics, aesthetics – and even the potential of social*

> *learning, how can they be understood to challenge the centrality of the algorithm? I'd like to explore this given how today, most people's exposure to programmed interfaces involves algorithms.*

(I have a lot more to say here about mathematician's influence on comp sci aesthetics, Interactive Computing as a challenge to the centrality of the algorithm and so on, but didn't want to go on so long, happy to follow up in another question)

> *How did emergence of multicoding esolangs succeed the type of "thematic languages" that* you have described *as gimmicky "procedural languages dressed up in silly quotes" that do not challenge computer norms*[17]*? How would you describe the essential difference between these languages and esolangs that do challenge computer norms?*

Thematic languages dress up an existing programming language in the guise of something else—at first glance, this can seem very similar to multicoding languages.

Take Rockstar, where code appears as classic rock lyrics, with lines like "desire is a lovestruck ladykiller." Code sounds absurd (as it does in most theme languages) and if such a language has a critique, it is of the self-seriousness of programming. The programmer who sees themself as a rockstar programmer (the pun of the language) is now reduced to writing actual lyrics.

It is reminiscent of the parody language INTERCAL, which very effectively made the interpreter absurd, having it demand supplication from the programmer, and offering almost no guidance as to how to actually write code. While INTERCAL does this quite effectively, we get a more watered-down version of this in the theme languages, which are esoteric only in the text of code; unlike INTERCAL, which has bizarre rules for constructing algorithms, behind the lyrics, Rockstar and the other theme languages are straight imperative, procedural languages.

ArnoldC (where code is written in Schwarzeneggerisms) inspired a series of languages written in the "voice" of various actors and politicians. When Trump began his run for president, a TrumpScript language appeared, which went slightly beyond the text-only nature of theme languages: in this case, no number under 1 million was recognized, playing off Trump's gaudiness and misleading statements about his fortune. When TrumpScript was created, Trump himself still seemed like a harmless clown; since then, the language has been archived on GitHub, with a note added that the creator no longer thinks the joke is funny. While TrumpScript and the equally problematic ModiScript poke light fun at racial-nationalists, I have yet to see a theme language that is actually about anything more than the absurdity

[17] https://stars.library.ucf.edu/cgi/viewcontent.cgi?article=1037&context=elo2020.

of code, or dressing code up in memes. This is not to say that theme languages are by their nature trivial, there just is yet to be a great thematic language that engages meaningfully with either computation or politics.

Now, a theme language like Rockstar can be read as a "light multicoding" language, since it does hold two different meanings: lyrics and code. What is lacking is an interesting tension between the two systems they multicode. Compare this with Shakespeare, the multicoding language that people love to hate: it multicodes with a pseudo-Shakespearean dramatic play. The language asks us to write a play that reads very silly, with long strings of compliments and insults, and the repetition of a few phrases that wear down the reader over time. Shakespeare encodes these ridiculous adjectives as commands: adjectives read as "positive" or "neutral" differ in effect from ones that are "negative." In other words, you can't do a find and-replace on a piece of Shakespeare code and convert it to Python, the way you could with Rockstar. Also, to be fair to Shakespeare, we should keep in mind that when these early multicoding languages were created, there was little reason for the designers to believe people would write programs in it or we would still be talking about it nearly 20 years later.

Modern multicoding languages like AshPaper draw from Shakespeare's example but use syntactic elements that poets actually commonly use in their poetry to signify commands instead of the insults and compliments. In this case, a capital letter in the middle of a word negates the active register; this is a formal element of the line, it says nothing about what the actual content of the poem is or what words can use. This allows programmer-poets to create programs more thoughtfully, and to explore the constraints in a way that leads to more interesting results.

Another poetry language, in:verse gets around the problem in another way, allowing each program to have its own lexicon to map individual words to commands. These recent experiments expand on the early promise of Shakespeare and show how multicoding languages can be both expressive and flexible.

> *So many of these multicoding esolangs are rooted back into materiality: whether, like Chef, by referencing ingredients that could be used to create an actual recipe …if unpalatable, or, like your own multicoding esolang Light Pattern, by involving material performance art using lights or photographs, or like Bodyfuck, by bringing dramatized attention to the labor of programming (as there is no backspace in the language, mistakes made by users of Bodyfuck will causes them to have to begin again). What other examples of esolangs have a 'material terminal' – and do you have your own reading of what this material terminus 'means' to the potential of esolangs?*

Yes, so there are a few different things here I want to address: the materiality of (ordinarily immaterial) code, the bodily gesture of bodyfuck, but then also the materiality of computation itself.

So Chef and bodyfuck both multicode from physical activity to code. But they do so in two very different ways which demarcate two strategies. Chef's engagement is through metaphor; one can design a Chef recipe, run it as a program successfully, and never cook it. Bodyfuck is more of an interface for writing brainfuck code using bodily movement. Where the cooking is a side-effect of programming in Chef, physical activity is part of the coding process in bodyfuck. This requires the programmer to give up some amount of control of the program. It is easy to make a mistake in bodyfuck, which famously has no backspace, so the programmer has to get their movements correct or start again. In the videos of Nik Hanselmann performing bodyfuck, he cautiously motions each command, but some end in failure.

I also have a language in the works as a successor to Velato (it will probably be called Motif), where the programmer whistles the code as a tune; it is intended to be friendlier to the coder and work even when off-key. Motif will have a looseness of expression, creating conditions where exactitude is not rewarded (along similar lines to FatFinger).

Earlier I mentioned the clash between Dijkstrean Humbleness (clarity of code) and computational idealism (control of code), with languages such as the Turing Tarpits eschewing clarity but ultimately re-invoking a mathematical elegance of code. Languages like bodyfuck don't allow for this. We can never have complete control over our program, as our body is never completely under our control. This brings the material aspect to the fore, whether it is in trying to get our bodies to perform the right way (bodyfuck) or refusing this, even if our program might not work the way we want (Motif).

Other esolangs use materiality to move the activity of computation away from the conventional computer entirely. The card game Magic: The Gathering can simulate a Turing Machine, played by the rules of the game, but only using certain cards. This is a Turing Complete system. If we were to define a programming language by its ability to represent algorithms, it is equal to C++ or Java.

$tonePits is a series of esoteric programming languages that use a mancala board rather than a conventional machine. We can calculate, perform simple loops, with each stone pit serving as a brainfuck-like memory cell, with a value determined by its pile of stones.

Human heart tissue is Turing Complete, when electrical signals are fed back into the same tissue (output to input). This is an emergent computer, with no designer and no programmer, proven capable of performing complex algorithms. It has no purpose computationally, but it equal in algorithmic complexity to standard languages.

This divorcing of computation from conventional materials, most importantly the conventional computer, allows esolangs to raise questions about what a computer is, what code is, and what computation is for.

> *When I think of the last question, I recall Michael Pupin's comment that science is often wrongly presented as devoid of emotion when really even physical fact has two terminals: one in our own consciousness and the other in a star, rejoicing in the zest of its youth. If you see any relevance of this quotation to esolangs, would you share how you see the relation?*

I think the two terminals in esolangs are the dual readings of code: the literal reading by the machine, and the complexity that we bring to code as linguistic beings.

Computation does a weird thing to language. It forces us to consider a version of language that is analytical and with fixed, unambiguous denotation. Since code only denotes logical relations and computer operations, it has none of the ambiguity necessary to refer to the real world. There's a game called "Something Something Soup Something" I use to illustrate this to students; it's a game that presents various absurd soup-like concoctions (frozen soup as ice cubes in a bowler hat) and asks if it fits within our definition of soup.

There have been attempts to create spoken languages that do away with the interlocked signifiers of postmodernism and promise communication devoid of personal meanings and ambiguity. The best-known is Lojban, which is the most like code. It has an exhaustive dictionary, that forces people to indicate whether what they state is known as fact and with what level of assurance, as well as marking statements as sarcasm or humor. While it has enthusiasts, no-one speaks the language well, and most conversations involves both parties correcting the other for misstatements or debating whether the correct tense is being used. This is the closest we can come to using code-like language to each other in person.

As linguistic beings, it would not be a surprise that we would carry more meaning than we intended to in how we construct code-as-language. Regardless of Dijkstra's call for objectivity, we have personal style in how we code, our comments show our attitude about what is happening, as does the way we actually write. There's a wonderful book "Exercises in Code Style" by Christina Lopes that includes a "passive-aggressive" version of a code segment, where every method does a sanity-check of every passed input, refusing to continue until it has been verified.

Esoprograms are different from mainstream code in that expressiveness is not forbidden, and the text of code can be used to carry additional meaning. The text could be multicoded, referring something outside of code directly. It could walk the line between these two types of language, bringing the ambiguity of spoken language into the mathematical language of the machine. Through the Tarpits, we

can inject (perceived) ambiguity and a bending of logic into what is still a strictly defined, logical form. In code poetry, we layer meaning between performativity of code and poetic meaning. It could bring affect to code; a great example is in Sophie Brueckner's project Crying to Dragon Dictate, where she cries into a code dictation tool, which attempts to convert non-verbal emotional sounds into code.

> *Esolangs can involve expressive action. One of your own multicoding esolangs, Light Pattern, can be "realized by artists other than the original creator" through performance art, providing that instructions are followed and photographed to produce the output of the code, or performance art score, that engineered it. But it could also be used to create an original work of art so long as the programmer figures out how to use its syntax. [Footnote: Brechtian event scores in The Fluxus Performance Workbook] Could you elaborate more about how you see the relationship of esolang execution or implementation to human – or social, public – action?*

Most esolangs as cultural objects are incomplete until they're coded in by someone else.

An esolanger puts out a new language, with an idea of what it is, from their own programs and messing around with the language. But when programmers engage with it, coming to it with their own agenda in terms of what they find interesting about the language, their own perspective in trying to code within it, they will discover aspects of the language that could not have been obvious to its creator. This is really what you hope for as an esolanger, that your language will be interesting enough that others will discover something new in it.

Malbolge is a great example; designed to be the most difficult language to code in, we only understand the specifics of Malbolge due to the work esoprogrammers have done to "beat" it, to discover algorithms are runnable in the system. These are collected on the esolangs wiki, created by unknown authors.

As an esolanger, you can't choose who you collaborate with and you can't demand a certain type of interact with your creation. I've written work and been very surprised by reactions by other programmers. I wrote a dialect of JavaScript called FatFinger, where programmers can spell everything wrong and the code still works—it figures out the closest term that is in scope and uses that instead of what is written. The language addresses compulsiveness in code; the website says explicitly that it should not be used as a "code spell-checker" but is meant to allow a sloppy kind of thinking we're not allowed to do in ordinary coding. However, code poets discovered that FatFinger could be used to replace one keyword with another word. In a discussion on the Critical Code Studies Working Group, Jeremy Douglass pointed out that we can write runnable JavaScript code poetry in FatFinger by swapping

one word for another. Instead of navigator, we can use daughter. Instead of prompt, thought or attempt. So long as there is nothing in scope more similar (in the count of key-stroke differences) to alert than camera, we can use camera in its place (which works in most browsers). There is no real control of the meaning of your work once your system is out in the world; it is always determined collectively, to some extent.

At the beginning of this answer, I said "most." That is because there is a smaller set of esolangs that exist only as thought-pieces, in which no code can actually be written: works that are impossible to code in.

These include Unnecessary, where the existence of a program is an error. Kallisti, a Discordian language where everything is code. My language Ↄ makes it unclear whether the language or any programs in it actually exist. These are also not passively received; they are meant to be considered by the audience, like a Fluxus event score. Their meaning is perhaps also somewhat determined by that audience. But little can be understood by attempting to write code for them.

> *Two of your other languages would be illuminating to discuss. First, there is Entropy, which promotes awareness of data decay and programming creep, which reads to me like therapy for programmers. Second, there is Drunk Eliza, which is clearly a reference to ELIZA, Joseph Weizenbaum's natural language program. ELIZA was created to demonstrate the superficiality of human-computer communication, except it turned out that some humans really liked using it. This appears to have changed how Weizenbaum viewed technology, leading to his work Computer Power and Human Reason. Is Drunk Eliza commentary on ELIZA?*

Answering these two together….

Where most esolangs have odd vocabularies or odd command sets, Entropy is very conventional in the way the code reads, with zero obfuscation and commands that are self-describing. The esoteric aspect of Entropy comes in how data is stored and retrieved. Its only data type is a floating point number, and retrieving data from memory comes at a cost: the numbers have a chance to skew slightly.

The effect of this is that there's a limited span of time when programs will likely run as the programmer intends, but it will then inevitably unravel. The programmer has a short window to get an idea across to the user of the program. Like much of my work, it speaks to the compulsiveness of code, in this case by preemptively undoing the pursuit of perfection in code.

I wrote Drunk Eliza in tribute to ELIZA's creator. Weizenbaum's essay "Science and the Computer Programmer" helped inspire Entropy. Weizenbaum talked about who he called hackers or computer bums: programmers who basically have a dysfunctional relationship with the machine, caught up in a compulsive cycle

of adding functionality and then fixing the new bugs, with no real vision of what they're setting out to do. Program creep is at the center of this vision of continually extending and "fixing" code. The computer constantly rebukes the programmer by not carrying out what was intended, and yet the programmer is ultimately responsible for the behavior of the machine, which is simply following their commands. Once a bug is fix, another perhaps unnecessary change is added to the program, which introduces more bugs.

This struck a chord with me on reading it, that perhaps all programmers are, to some extent, feeling around in the dark. We are all computer bums. Entropy short circuits this in a few ways: there is no reason to fix bugs beyond what one can see in a few minutes of running a program, and no reason to create complexity beyond that either. If it basically does the right thing, that's good enough. The actual experience of writing Entropy is pretty central to the work. Drunk Eliza was both a tribute to Weizenbaum and an attempt to make the work accessible to non-programmers. Drunk Eliza is Eliza written in Entropy. It's based on a 1985 BASIC version, although I am delighted to see that the original MAD-SLIP source code by Weizenbaum was recently re-discovered. While I do not record the conversations people have with Drunk Eliza on my website, people have posted their conversations online from it. As ELIZA's databanks decay and she becomes less coherent, people tend to follow her lead and type in a drunken way. Is it a commentary on Eliza itself? Weizenbaum was surprised and disturbed by how quickly people regarded his software as a person, even while knowing better. It turns out, if you present a drunken version, many identify with and mimic her voice. The drunken version is in some ways more relatable; ELIZA keeps you at a distance, reveals nothing of herself. Drunk Eliza can't help but reveal her own decay.

> *While it is possible in programming to use different commands to achieve the same results, programming is generally understood to be logically sequential and literal: the machine executes what you tell it to, garbage in, garbage out (GIGO). In multicoding esolangs, however, commands are often open-ended and polysemic. This kind of coding reveals that even in code, there can be a 'problem' in the facticity of what we mean: deliberately revealing how code can bring out something 'extra' and unexpected, as opposed to coding being "a total recovery of meaning". Do any esolangs stand out in your mind as examples of bringing something 'extra' that causes us to stop and reconsider code by provoking us to overcome our previous assumptions of what programming is?*

This is an interesting question because I believe we always express more through our code than is received by the machine. Since I've talked about that a bit already, I want

to expand on a related idea, the different levels of abstraction in code, layers that hide functionality to simplify it,or reveal more when it seems useful to the programmer.

Low-level code, running close to the machine, is expected to be more verbose, with higher level languages (like Python) hiding information that is not useful to us. In Python, we do not care how many registers the machine has or how they're used: we can write the same code and run it on many different architectures, with the interpreter taking care of those differences for us.

Computer scientist David Eck has said that "every programming language defines a virtual machine, for which it is the machine language." It is an abstraction meant to reveal to us only what we need to know about the machine in order to get our code to work. Many esolangs, brainfuck and Malbolge among them, appear low-level, as the virtual machines they reveal have physical architectures we need to be aware of, and their operators are more like low-level code (we need to know about Malbolge's registers in order to write code for it).

But the assembly code poems in the chapbook xchg rax, rax by xorpd is a great illustration of just how much more complexity there is in even Intel assembly code than we expect. The chapbook has only code, with no explanation; like a book of koans, we approach each poem individually to find meaning. Xorpd made an exception in my interview with him[18], where he shows how three lines of inscrutable code actually contain an enormous amount of logic.

Xorpd's work succeeds because of the oddities of x86 assembly instructions. Chris Domas takes this further with his project reductio ad absurdum[19]. This is a single program that is itself Turing Complete, meaning that it is impossible to determine the behavior of the program from its source text; its performance is determined by its starting state, in the form of an accompanying dataset. Using a non-esoteric language, he has divorced the execution of software from its text.

In terms of the loss of information, I think it's important to consider also livecoding: the improvised code that changes (literally is written) as it's run. In live performances, code runs in a huge loop, where the performer can make changes on the fly. An audience can see the changing code alongside the music or visuals it produces. There is a continuous dialogue between performer, machine, and audience. While there is only occasional cross-over between live-coding and esolangs (such as in the esoteric live-coding language ORCA), there is an interesting dialog in what meaning code actually holds.

> *Nachmanovitch compares play to galumphing, in which "we are interested in means rather than in ends. We voluntarily create obstacles in our path and then enjoy overcoming them". You have written how esolangs are creativity within constraint-based*

[18] https://esoteric.codes/blog/xchg-rax-rax.
[19] https://esoteric.code/blog/movfuscator-and-reductio.

> *systems. Could you elaborate on esolangs as extending beyond mere instrumentality to provoke imaginative states, "a seemingly useless elaboration and ornamentation of activity… profligate, excessive, exaggerated, uneconomical", to cite Nachmanovitch?*

Ian Bogost has written extensively about play in the space of constraint, rather than total freedom.

An esolang, like an Oulipian constraint set, is a set of rules, and discovering what can be done with it is the joy of esoprogramming. This could come in the space of proving that a bizarre and intractable set of rules like the language AAAAA!!! By zzo38 is in fact Turing Complete.

It could come from creating a graphic in Piet or a song in Velato that has aesthetic pleasure while computing something. Or that connects the two, by performing something that connects to the visual representation of the code. It could come from taming a Turing tarpit; finding a way to express code elegantly in what appears an inelegant system. This is probably the most common approach.

> *You* have written *how malicious programs are often written with a gap between its reading by a human and its actual execution by a machine*[20]*. Nachmanovitch writes that one of the archetypes in play is the Trickster, who is "untamed, unpredictable, innocent, sometimes destructive". He also writes that in play, "we voluntarily create obstacles in our path and then enjoy overcoming them". How much of the Trickster and how much play do you see at work in esolangs?*

Code obfuscation has two roles. Obfuscation can be done out of play, for the challenge of writing programs that defy their reading as text. But they are also used for more practical purposes: Adobe and other big companies obfuscate their programs to make them harder to decompile and steal code. Meanwhile, hackers obfuscate programs in order to beat automated sensors that look for malicious code.

Sometimes these two roles of obfuscation run together. There is a discovered esoteric programming style of JavaScript called JSFuck. All of JavaScript can be written with only six punctuation characters; something discovered in conversation on Twitter, and eventually collected, expanded on, and fully defined by Martin Kleppe, who named it after brainfuck. A single line JS program like "alert(1)" is a hundred plus punctuation marks; utterly baffling and illegible. But hackers used JSFuck for years to bypass security filters that couldn't understand it as JavaScript.

More recently, automated sensors were beaten by code hidden into the opacity of pixels in an accompanying image. The malicious code would be transformed into

[20] https://esoteric.codes/blog/chef-multicoding-esolang-aesthetics.

JavaScript from what can only be called an esolang, here used for very practical means.

On the other hand, as you point out, brainfuck is used to teach compilation, which is delightful. C is the default language usually for instruction but brainfuck, because it is so small, is ideal. It can be interpreted in a single line of code in some languages. If it were not for the name, it would probably be used more widely educationally for computer science.

Oak, a language written by Adam McDaniel, is a Rust-like language that runs on a superset of brainfuck. Brainfuck is here fully rehabilitated. All of the strange punctuation and minimalism of the language are gone, with Oak as a friendly go-between, treating brainfuck as essentially machine code for a strange, super-minimal machine. By compiling to something bf-like, McDaniel has created a language "infinitely more portable" than C, as even the smallest C compilers, designed for highly constrained environments, have nearly twice the number of opcodes that Oak relies on.

> *Can esolangs be seen as a means to promote receptivity to difference? For example, esolangs like Cree, Wenyan-lang, and 'alb are interesting from an intercultural perspective as they relate lived culture and cultural heritage to the culture of code. You have noted, for example, that "Hello, World!" in Wenyan-lang actually reads, more accurately, as Greetings to Heaven and Earth – which is at once culturally specific yet a legitimate "Hello, World!" output, which has historically been expressed in various deviations.*

The default of English in programming languages, which usually means English as the only choice, has occasionally been challenged. There is APL, which uses math notation devoid of keywords from any spoken language, and some Russian and Spanish languages. A common response to the charge that English dominates programming languages is that keywords are limited in number and not used in the same context they are in spoken language, so it shouldn't matter. This is fortunately finally being challenged.

The most common non-English programming languages are those developed for education. The Hawaiian programming language Alelo, for instance, aimed at young learners. The language 'alb by Ramsey Nasser was intended as a language for learning programming, aimed at Arabic readers. While intending 'alb to run on many systems, Nasser ran into problems in programming tools that should but don't support Arabic characters or right-to left languages but should. 'Alb has become more of an art project that exposes Western biases than a tool, but this was not Nasser's intent.

Yorlang was created by a Nigerian developer, Anuoluwapo Karounwi. He and his friends spend much of the day speaking (in English) to foreign clients, while writing code in languages that have English keywords. After hours, he wanted to write in a language based in Yoruba, the language he uses at home.

Cree# goes one step further, bringing with them the cultural understandings of their source languages. Cree# is used not for everyday programming projects, but for multimedia storytelling, building on the Cree tradition. The code is itself a story, told to a raven character, and beginning with a smudge to purify and prepare for the code to run. Borrowing from Alelo, Cree# uses a metaphor of a splitting river in the place of if/else branching.

While it can be argued that computer logic is universal, the way we represent that code is not. These languages show that all programming languages multicode to some extent, in the metaphors we use to visualize and verbalize logic and computer operations (erasing vs smudging, branches of a tree vs splitting rivers, etc).

> *What is the relation between lexical toolboxes and the development of such diverse languages?*

In early esolangs, the norm was to provide a reference interpreter or compiler, that could be used to define the language and as a model for other executors for the language. They were not very sophisticated; early esolangs were tiny. They remind me of Vito Acconci pieces: they might consist of an "unrealized" work, just a description of the language, and we imagine how it might work. Alternately, there is a minimal "performance" of the work as a few sample programs and the reference compiler that others can work off of. Just what's necessary, nothing more.

I think part of this is the connection between esolangs and the ideas of free software, the minimal, DIY feel of the work, and something opposed to the corporate feeling of flashy languages.

The younger generation has a different sensibility about this, and it's more common to have more complex interfaces. First of all, as interest picked up in esolangs, we saw more web-based debuggers for popular languages like brainfuck and Piet, which make them easier to write and follow the flow of code. But then newer languages are geared to allow people to interact with them more easily.

At the far end, we have languages like Wenyan and in:verse with full-blown IDEs. In the case of Wenyan, it shows a deep commitment to the idea by Lingdong Huang and by enthusiasts of his language who have taken on the work of expanding it, allowing it to transpile to more other languages. In:verse is a language aimed more at artists. It has a learning curve to get things working, even in terms of simple programs, but Aneja goes a long way to making it as easy as possible to work with. It relates poetry (source code) to shaders (a visual performance of the code), bypassing much of the ordinary computer operations that make up the bulk of most

programming languages. Programmers still need to figure out the stack, but they can also start typing code and see what visual outcome occurs immediately due to the interface. Then there are, of course, the languages that are only ideas and have no "language" to them, in the sense of Unnecessary and Kallisti. These have, at most, an entry on a web page describing them, in terms of a formal definition, a statement of purpose, or absurd sample code.

Each esolanger has to figure out now what is necessary to fully get their idea across, and this is something I ask students working in this space: do you want people to consider your language or actually code in it? How important is the experience of writing code in your language to the piece? These determine what work needs to be done after the language definition.

> *In your work on Light Pattern, you quote Chris Pressey's description of esolangs as "made up of concepts, and these concepts would exist even if our computing equipment wasn't electronic, or wasn't digital, or if we didn't have computing equipment at all." What are these concepts that are extra- or supra-contextual? Can they be taught? And could they be compared to the trans-disciplinary goal of Hesse's Glass Bead Game?*

Programming languages are really just rule sets, and they don't have to lead to programs that can run, nor a set of computer operations. Anything that can run the program, whether we do it in our mind, or through a series of actions, intentional or inadvertent (in the case of human heart tissue) can be a "computer."

From what I remember of Glass Bead Game, it had a very analytic feel: a formal system of pattern and play—somewhat detached from the materiality of the world, but also crystalizing patterns from worldly practices like music. A "universal language and method for expressing all intellectual concepts and all artistic values and reducing them to a common denominator." Hesse mentions Bach as a precursor to the Game, who is the model of logical and constraint based composition. I can't help but think here of Godel Escher Bach, which focused on the paradoxical and nonintuitive aspects of formal systems, and how they arise in a similar way in very different disciplines when we have rule-based systems like Bach's.

The concept at the heart of much of esolanging is computation itself, as an abstract quality: the ability of a system to allow for algorithmic complexity, even when formulated in anti intuitive ways, or arising from unlikely combinations of rules: put together a strange concoction of ideas until suddenly Turing Completeness appears as an aspect of the system. Unlike mainstream computing, this is fully divorced from practicality. But there is some crossover with academic computer science.

Take John Conway's FRACTRAN. It represents a program as a series of fractions and performs computation by multiplying a single number representing

the program state by these fractions repeatedly. The rules of the language are easy to understand: go down the list and multiply with the first fraction in the program that leads to an integer result, then go back to the beginning. We consider the program state by its factors, using a technique from Gödel's Incompleteness Theorem. It is simple and beautiful in the mathematical sense) and the act of computation is easy to do: Conway would regularly write his PRIMEGAME (a FRACTRAN program that calculates primes) on a blackboard from memory and test numbers for primality by hand.

Actually writing a FRACTRAN program is not intuitive at all. But for the moment consider it as computation fully mathified, divorced from computational machinery, from computers as we ordinarily think of them, incapable of input or output, or interaction with other programs, just purely the ability of this mathematical sequence to represent an algorithm (it is of course Turing Complete). This to me feels like Glass Bead Game type thinking: the most removed from the physical. It also, like Hesse does, buys fully into the Platonic / analytic asesthetic of mathematics.

But then in both the categories of theoretical languages and esolangs, we have plenty of examples of languages that have messier "what if" scenarios….

There's Lenguage, which asks if we really need binary or can't embrace unary, where there's only 1s, never 0s. It is a perfectly well-constructed and valid language, but takes more matter than exists in the Universe to write Hello World to the screen. David Madore's hyperarithmatic languages, also perfectly valid, which can solve the Halting Problem, but require an infinitely large computer, not possible in our Universe.

These separate the pure computational nature and algorithmic potential of the language, as pure concepts, from the actual ability to construct a program or a computer to run programs in the language.

> *Finally, I wonder if your particular artistic yet interdisciplinary approach was also in part nourished by your days at Bard. Do you think that educational institutions can do more to support creative, relational epistemic endeavors?*

Yes, I studied at Bard's program at the International Center of Photography. It was a photo-based program directed by Nayland Blake, who is the ultimate interdisciplinary artist, identified more with sculpture than photography. It was there I figured out I was more interested in the computational than the digital, that screens and physical computers don't interest me, but logic and language—and our irrational responses to them—did. While in school, I developed my photo-based esolang, Light Pattern, which brings photography and performance to code.

I would like to see a more interdisciplinary approach between creative code and comp sci programs. Critical Code Studies helps here, bringing a humanities

perspective to code, but it is a new discipline and I'm not sure how much crossover there will be with comp sci. I would love to have a class with upper-level comp sci students critiquing each others' work, discussing the cultural context and semiotics of code. Or, of course, a compiler class for artists, focusing on language design as self-expression.

Interview Three: Howard Rheingold

> *In Virtual Communities, you wrote of "habitual talkativeness" as being conducive to IRL. I note that many interactions today are 'make or break' depending on one's "chat competencies" - which are so different from 'traditional' discursive skills. Looking at the rise of IRL-type communication such as on Twitter which has gained in popularity over the years, what are your thoughts on the prevalence of this type of discourse in what appears to be the public square these days? (It is easy to see tweets, far harder to see a neocities site).*

There is a wide disparity between people who know how to use Twitter effectively[21], those who don't, and those who use it to anger, insult, troll, and disrupt others (c.f. Gamergate). However, in general, the means by which norms were passed from experienced users to newbies broke down[22]. Both formal and informal means of educating newcomers about norms have moved so much more slowly than the explosive growth of social media and the onslaught of new users.

> *How does one build a personal learning network if their parents were barely literate and they are only familiar with platforms like Reddit (if even) or Instagram?*

If you WANT to cultivate a PLN, you can do a little research and find people like Shelly Terrell[23] — or you could find peers to teach you. "Interest based learning" is a great way to start[24]. You want to learn to make videos? Find people who make the videos you admire, follow them, interact with them, and you have a start on your PLN. Start with what really interests you. Look for people who are good at it. Pay attention to them. Pay attention to who they pay attention to. Engage them. Voila: PLN.

[21] https://medium.com/@hrheingold/twitter-literacy-knowing-how-to-use-it-is-key-ae8dc1a2fc6e.
[22] https://en.wikipedia.org/wiki/Eternal_September.
[23] https://clalliance.org/blog/shelly-terrell-global-netweaver-curator-pln-builder/.
[24] http://www.itofisher.com/mito/publications/new_media_and_i_1.html.

> *Given your insights 30 (!) years ago, do you have any advice on antidotes to the extremism emerging from exposure to homogeneous views on the internet?*

Our educational institutions aren't moving very quickly. If I had money to spend, I would invest it in educating parents on what is going on and helping them educate their kids.

> *You wrote in* Virtual Community *about the gift economy. What are your views on the gift economy in today's web networks?*

In terms of social capital and knowledge capital, the gift economy is healthy if you know where to look (try disease support communities, communities for recovering addicts, scholarly communities). However, surveillance capitalism has undermined it a great deal — you are sharing on Facebook and Facebook is profiting[25].

> *Similarly, you wrote of how "symbolic analysts" are natural matches for online communities. But today - I would say - they are being drowned out in "the obvious places". I am interested in your memories of the successes of the WELL, together with your memory of the importance of the role of community builders. I wonder too about the institutional knowledge you mentioned Engelbart as having developed. How can we help each other help ourselves on the meta cognitive level online today?*

The WELL was successful because the founders left it up to the users to create and enforce norms. Facebook has ruined and commodified a lot of the user-generated norm-building. But there is still room for the kind of virtual community I celebrated in my book. There are Reddits, forums, blogs, Twitter hashtags where that culture still lives. I don't see a way to bring down Facebook, but I do think it's possible and necessary to preserve the kind of norm-governed, mutual-aid focused, social capital cultivating online communities we saw in the past[26].

[25] https://www.patreon.com/posts/mutual-aid-power-34918526.
[26] https://www.patreon.com/posts/lets-grow-online-35091994.

7. BACK TO UXA

> *The balance between To be and To do in our day is lost, more or less, in every nation. Everybody asks: What to do? Seldom anyone asks: What to be?* —Nikolaj Velimirović
>
> *Does not a [learning pattern] that defines its mission as that of producing professional competencies, risk closing itself and its [learners] off from an experience of some considerable importance? I mean the experience of error. Not error in the sense of getting an incorrect answer, but error in the sense of asking the wrong question, or asking no question at all* — Anne Carson
>
> *To what extent is this question posed in an original way in North America? This would require detailed examination* — Bernard Stiegler

A recursive ending

This book was written so that it can be read in many different ways, not just from front to back, and possibly not even in entirety. There are also many points of entry, including beginning with the recursive ending. A concrete suggestion of how to read this book, which is presented as one book but can also be said to contain half a dozen (Quillien, personal correspondence). It can be used to teach American studies "through the American leadership in technology, software, and computational capitalism" by gathering the book's material that can weigh in against the problematic computational capitalism and postdigital AirSpace it describes by focusing on the section on The Law of Code, the digital literacy resources in the References section, and the initial analysis. It is only use of the book in the specific, local classroom that releases it from theory and recursion. An American *pedagogical approach* to the American *subject matter* would have students decide where we come from, what we are, and where we are going in or from today's AirSpace. A Stieglerian application would be to further frame course work in terms of responsibility and the outcomes of choice. As a result, I consider that this book will have succeeded if it is viewed more as a *reference resource* than a manual – even if the *structure* of the book suggests otherwise.

The book marks the end of a very long odyssey (cf. Goetz 2021b) I embarked on to try to understand the code *behind* the American-born user experience, postdigital culture of today. I had a hunch that the direction programming was taking was to re-present our re-presentations, to mimic our mimesis, and would be "recursion all the way down", to make a Geertzian pun about infinite regress, which continues indefinitely.

It seemed to me that this was a rough principle that could be exploited, and that this was analogous to cultural codification. That exploits were creative or for control, like what happens when software is burned into hardware so all possible functionality of a tool is reduced from the very beginning. As a teacher, this idea bothered me. Because such design would reduce the amount of programmable knowledge accessible on the average machine and anyone born after Generation X would be hindered. Then, GPT-3 and GPT-4 happened and emerging knowledge would never again allow insight into the legacy knowledge that went into its architecture. This was quite different from my initial hunch. But this new grammatization brought a horizon of new questions ranging from sustainability, to the environmental concerns of hardware, to exploitative hidden labor practices.

It seems strange to me that we use this powerful technology without thinking about what went into it or even trying to comprehend how it works. And yet most of us who can afford to are discriminating about the pens we use.

Many Generation Xers know what a "terminal" is on a computer and know that even minimal knowledge leads to the exciting moment of having a computer execute exactly what you tell it to. Long-pressing an "icon" is not quite the same thing, as the long-press is a pre-determined function and a pre-designed function. To sit at the terminal screen is to stare at a black hole that only takes form when you type a command. But you could type all kinds of commands, and the terminal does not know in advance what these will be, it has not been designed to anticipate them.

Anticipation, or protention, is an important word for French philosopher Bernard Stiegler, whose thought informs much of this book as he brings key insights into Americanization. This is not mentioned by name throughout the book and some sections do not mention America at all. But careful readers will see that where it may appear to deviate it is in fact retracing ideas or processes that America has come to stand for or that it iterates today. One of these processes involves marketing techniques – which, Stiegler observes, have long created an industry of the manipulation of human drives.

Protention gains its importance through the techno-scientific logic of America in the 20th century when the country exponentially increased its industrial production. From that time it also saw the development of marketing techniques to sell new goods and scientific management to continue production efficiency and innovation to continue to have something new to sell. The country continues to be a leader in techniques that maintain and increase sales, which is researched in the complex field of UXA.

Market logic was inspired by the laws of physics once physical science overcame matter and the oppositional thinking of Descartes – and, some say, metaphysics. This was foreseen by mathematician and physical scientist James Clerk Maxwell, who could see the theoretical applications as he understood that their basis in the abstractions of mathematics gave them universal applications. And indeed, they were applied, as we have seen, to economics and even philosophy. The

American "touch" in this story was to increase the speed and scale of applications and transformations of these ideas. One example is through the development of cybernetics, which can be found to underlie many of the systemic operations of today, from algorithmic governmentality to the ontology of a systems worldview.

In this setting, it does not make much sense to remain within the epistemic fields as they were formed in the 19th and 20th centuries. Even ancient courses of study seem more attuned to the flow of episteme of the 21st century, blending philosophy with the natural sciences and ethics, for example, or, to take a later example, understanding the sciences to rest on language, which was studied first. Today, few study language philologically.

Yet there is a need for what American philologist Sheldon Pollock called a liberated philology, which remains loyal to its local areal context but combines that knowledge with interdisciplinary perspectives. In this, it can be compared with the inter-nation dreamed of by Stiegler, which is bottom-up and local while also contributory, respecting the local but by design preempting chauvinism through discourse and exchange. Many are the inter-national dreams of the 21st century. But, pragmatically speaking, there is a great need to come to terms with globalized localities. What does that even mean? What does it mean when so much of today's population are migrants of one sort or another? What does this mean to cultural studies, like "American" cultural studies?

This book's focus was on codifications of various sorts, including that of the technologies that bring cultural globalization even to people who never leave their country of origin through various types of media. This is to say nothing of the various literacies that are needed to make reasonable sense of the media or navigate it. Nor does it say anything about the need to take care of which digital tools are chosen, and for which purpose. Or about the need to teach – even by cursorily pointing to references – what can be lost or gained in the languages programming the devices we use and systems we are exposed to. Nonetheless, this book has attempted to cater to all of these needs as they are all forms of codification, the latter being an example of a behavior – or "use pattern" – that can "go without saying".

Decoding such patterns is the work of the cultural philologist.

Speaking of use patterns, a dominant cultural code today would make us all "users", even of experience. This can predetermine a person's purpose and ruin an experience.

This is another reason Stiegler speaks of protentions. If we do not claim our own anticipations of the future, they will be taken from us. This concern cannot belong merely to philosophy because it has cultural and epistemic implications.

But this concern is not new and has been dealt with by different names by earlier cultural and media thinkers. One example is Ivan Illich who explained how over-dependence on tools or services can cause us to become less able. This is an important conversation to have and can be a helpful pedagogical frame for what we

mean by disability studies. Illich describes what in Stiegler's parlance is called the proletarianization of thought that can come about through disindividuation, when the individual is put in service of the network, entropically and *automatically* doing things as they have always been done.

But, as Georgescu-Roegen wrote, we can also become "addicted to industrial luxuries" – and, as addicts, we will have fallen into a structure (or codification) of personal addiction cycles. These were described by British American transplant and Macy Conference participant Gregory Bateson in a chapter from *Steps to an Ecology of Mind*.

The essay, called "The Cybernetics of 'Self'", debunks the false notion of the "I" of the self at work in those addicted to alcohol, who repeatedly convince themselves that "I can beat the bottle". Bateson's cure was to reconnect them with the whole of their personality and the universe (see page 107).

This maps onto Stiegler's holistic thinking in co-individuation and associative milieus. It also points to the softer side of cybernetics that would appear in today's world to have fewer applications than those which are more calculating and controlling.

To escape calculation and control, it helps to have a grasp of a meta-language, which is another of Bateson's insights. Writing of the "double bind", he described an abusive pattern (or code) that is hard to recognize and get out of without a meta-language. In the so-called double-bind, a successful response to one message results in a failed response to the other.

Much codifying meta-language of today involves mapping. It is used in programming and within programs we can see ways in which the program itself can situate its "user" within a "space". It is easy to see how attempts are being made to program the real-life space around us, too.

Thus one way to decode is to seek a meta-view. Another way is to seek another perspective or way of being to bring a person out of themselves to a shared horizon.

There are many useful meta-perspectives to learn from looking into the code of computer programs, as in the example of spatialization above. This can be extended to explain what is lost in real-life experience when certain tasks become automaticized by machines that "internalize" a task's spatialization.

These considerations may be lost to new generations. If nothing else, this book stands as an artifact trying to articulate an earlier perspective and the attempt of a single individual to make sense out of changing codifications. In the new code, machines increasingly hold knowledge which, due to DRM or proprietary arrangement, their owners cannot fully access.

People are viewed as users, not owners, and this would be distressing but new fields are springing up like studies of the pluriverse, humble geographies, or critical making that bring agency to individuals to continue to search for meaning beyond what is served.

That last word is a pun as meaning is largely served by servers, in farms, today. They harvest data. While I reference memory cells storing previous values. And point to the beginning.

That to exist, something must grow from the past. That to express thought, language must be recursive –

GLOSSARY

Americanization – in Stiegler's reading, a combination of processes involving great speed and scale of the psychic and technical adoption and transformation of media technologies to bring human libido and drives into an economic system of marketing which is today driven by algorithms of anticipation and probability more than on the industrial production of goods.

Anamnesis – re-membering through dialogue, without mnemotechnic support.

Automatization – thoughtless repetition.

Bifurcation – play of imagination and understanding. Novelty and diversity (Stiegler by way of Deleuze & Guattari).

Care – in Stiegler a play on the words panser/penser: thinking being a kind of care though any expression of care is bound to be transitory because of the nature of pharmacology.

Contributory economy – economic and institutional arrangements that value the value of neganthropic work. Though economic as *oikos* it emerges through the association of citizens, amateurs, activists, residents, and the academic world, replacing purchasing power with knowledge capital. This knowledge is accumulated through transcultural "networks of signification" producing, designing, and conceiving knowledge, valuing the value of work, conceptualization, and life. In it, knowledge passes through the community allowing for interpretive categorizations to emerge 'bottom-up' from individuals, and not just 'top-down'.

Default – the error of existence that we are born into, which Stiegler explains through the myth of Epimetheus whose lack of foresight gave man everything except clothing, leading to Prometheus' theft of fire that was punished and the restoration of order through Hermes, the god of communication.

Deterritorialization – as per Gilles Deleuze and Félix Guattari, the process by which the context and organization of a social relation, called a territory, is altered or destroyed, to then constitute a new territory through reterritorialization.

Différance – Stiegler develops Derrida's idea of *différance* to explain the process that leads to knowledge and the possibility of the differentiation of invention and diversifications of knowledge, which is exosomaticized through the material trace.

Disindividuation – puts an individual in service of the network.

Entropy – the second law of thermodynamics that has been universally applied to an understanding of the universe, and by extension, the human life within it. Measures the extent of energy that is always lost to dissipation or friction

and thus unavailable to be transformed into useful work. The collapse of a system when it is no longer open to other sources of energy. It also has to do with the natural logarithm of the probability of occurrence. The measure of disorganization within a system, the lack of a pattern. Its importance lies in how the prior state of a system cannot anticipate possible differences.

Epiphylogenetic – epiphylogenetic memory is technics. It is the human memory that is inscribed into the non-living body that breaks law of life that would otherwise lead to the extinction of experience when an animal dies, instead separating somatic and germinal hermetics – allowing memory to live on and inherited.

Epoch – a historical timespan marked by a cultural change effected by new technology. Used to explain a technocultural shift.

Exosomatic – external to the human being, like how knowledge can be expressed using a technical medium like a writing instrument or cave wall.

Grammatization – constituted processes where technical systems formalize human behavior so that it can be reproduced; revolutions in the technical systems that organize society – spatializing and exteriorizing temporal mental contents such as in moving from manual tools to factory machines (Stiegler via Derrida). Technical history of the exteriorization of memory. Breaks down an established flux.

Hypomnesic – mnemotechnic: making memory external through technical tools like cameras.

Idiom – the irreduciblility of an organism; its singularity, individuation. "It is from this tension between what is closest to me and what is contained there *already* as the most distant (in the experience of what Walter Benjamin called the 'aura'), it is through that which is most *idios* (ἴδιος) in my idiom, that is, most neganthropic, and that I encounter in the idiomaticity of other idioms or other idiosyncrasies, responding in their idiolect to what is *already* contained in my idiom, and as the closest (and which is its *default*), it is only thus that psychic individuation is possible" (Stiegler 2016/2019: 32).

Individuation – evolution, formation. An engaged process that involves disautomatization.

Local – The systems of living beings begin local: that of the cell, the organism, the ecosystem, the biosphere but also noetic or neganthropic différance that exist through the default of origin

Long circuit – the inter- and trans-generational process of understanding where any technological advance has time to be adopted through innovative engagement with the advance to circulate it within social bodies like universities or law so that it becomes incorporated and permits new knowledge to emerge from the social body.

Negentropy – Stiegler's concept of neganthropic work to move out of the entropic Anthropocene by being expressions of the biological "economy" of "vital différance" – increasing the energy of the system rather than depleting it. It

Neganthropy – exceeds the understanding, as a synthesis beyond any possible analysis,

Noetics, nous – reason that involves the life and mind of the spirit, so is a broader understanding of reason than how it has today been reduced to calculating rationalization.

Noetic différance – "ab-original" in that it can move "away" from the default of origin. As such it allows for at least the possibility of infinite processes of idiomatization of all kinds

Organology – Psychosomatic organisms (psychic individuals), artificial organs (technical individuals), and social organizations (collective individuations) that ideally co-evolve, forming together, through co-individuation.

Pharmakon – in Stiegler, a development of Derrida's Socratic critique of the technology of writing in Plato. Pharmakon at once designates poison and the remedy or cure.

Proletarianization – the denial of knowledge. Just as workers in Industrialization lost their knowledge in how to work when replaced by machines, today workers doing "creative" knowledge work also lose access to knowledge of how to live. A process of dis-apprenticeship and unlearning.

Prosthetic – the tool-using nature of the human being.

Protentions – anticipations.

Retention – Stiegler's iteration of Husserl. Primary retention is the present of perception and the noesis and dreams that are not yet codifiable. Secondary retention is the neural memory that remains after a phenomenon has passed. It is the past of consciousness that can be reactivated in the imagination by a play of memory, which 'seizes' the primary. Tertiary retention is what is past can be again in the present through having been externalized by mnemotechnics such as on paper or hard disks.

Reticulation – a pattern like a network. A word used in biology, engineering, and the arts to describe certain features and processes. In its trasndisciplinary applications it attempts to network the intractable, that which is difficult to manage or control.

Short circuit – when technical bodies retaining human knowledge overtake the possibility for humans to adopt new knowledge and circulate it within social bodies like universities or law so that it becomes incorporated and permits new knowledge to emerge from the social body.

Trace – in Stiegler via Husserl and Derrida: the externalized marks we leave of our ex-pression.

Transindividuation – the shared knowledge capital when individuals co-individuate, surpassing their local, idiomatic understandings.

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