

**Alan Kay**  
*Something About “The Future Of Text”*

We are the species that has invented itself the most, by creating the *exogenetics* of language and culture which carry our continual further inventions to each other over time and space to invent and reinvent our futures.

But “inventing the future” doesn’t always mean a better future. Most ideas are mediocre down to bad, and when carried onward and outward have catalysed futures we now regard as unfortunate histories. Bad ideas in an age that can replicate and proliferate most things almost without limit produce ever lower “normals” that take us far from our best impulses and interests.

In our time many new technologies provide seemingly “more natural” substitutes for literate discourse — for example: telephone, radio, television, chat/twitter, etc. — in other words, technologies that allow oral modes of thought to reassert themselves. We need to ask whether “oral societies” in the past or as they are seeming to reappear, are in the best interests of human beings. It has often been observed that many of the properties of “civilisation” are inventions — including deep literacies — that are at odds with what seem to be our genetic endowments, but instead try to provide alternatives which lift all of our possibilities. In other words, “civilisation” is not a state of being but ongoing attempts towards “becoming more civilised”: the next level of human exogenetic evolution. It is the very unnaturalness and artificiality of “civilisation” — compared to the closer to our genetics oral cultures — that is its strength. One way to think of modern education is that its main goal should be to help children take on and become fluent with these “unnaturals” that allow us to cooperate and grow in so many more ways.

Plato had Socrates complain that writing robbed people of their memories, and allowed bad ideas to be circulated even after the death of an author, who could no longer be chased down and “argued right”. But both loved irony, so we should note that Plato was using writing to make this argument, and I think was hoping that readers would realise that anyone who wants to remember is given a great boon by writing because it provides so many more perspectives that are worth putting into action between our ears rather than storing them in a page on a shelf. Writing merely forces us to choose whether to remember, and gives us much more in the bargain when we decide to do so.

Another part of Socrates’ complaint worth pondering is that writing doesn’t allow dialogue and negotiation of meanings between humans, and in fact seems to preclude what he considered reasonable argument. Again, Plato in presenting this idea, was also one of the earliest inventors of the new structures needed to allow written description, exposition, and argument, and uses many of them throughout the dialogues. It’s hard to imagine that he didn’t realise full well that he was showing one strong way to present arguments in writing by having Socrates argue against the idea.

Not taken up by Plato are some of the additional things that writing almost magically adds, even as it looks like one word after another, just like speech. Beyond transcending time and space, writing allows much longer and more intricate arguments to be presented, especially when the errors of copying no longer have to be guarded against, for example via the invention of the printing press. This property was noted by Erasmus and his friend Aldus Manutius the printer when they decided in the early 1500s to put page numbers in books to help longer arguments refer to earlier and later parts (this was quite a few years after the first printed books appeared, and years later than the marginalised Jewish culture which used page numbers for the very same purpose in studying and cross-indexing the Talmud).

Most subtly we need to ask: just what is it that happens to our brain/minds when we learn to get deeply expert in something that was not directly in our genetic makeup? And especially if we get deeply expert in a number of very different ways to use language beyond the telling of stories and keeping accounts?

McLuhan, Innis, and Havelock were the most well known who started to ask how human thinking is not just augmented, but fundamentally changed, by writing and reading, and how this affected what we call the growth of civilisation.

One facet of this path that McLuhan didn't explore—he started as a literary critic—was the idea that a new way of thinking could be invented/co-evolved, embedded in language, especially in written language, and when learned fluently would be almost like adding a new piece of brain—a “brainlet”—that could take us far beyond biology. There are lots of these now, but a simple example would be the calculus, which allows a type of thinking even the geniuses of antiquity could not do. Much of mathematical thinking “piggy-backs” on our normal language workings which, in computer terms, is universal enough to allow much more expressible and powerful higher level languages and ideas to be run on a much simpler mechanism.

An enormous such piggy-back invention is Science, which as Bacon called for just 400 years ago in 1620, is a collection of the best methods and heuristics for getting around our “bad brains” (what he called “Idols of the Mind” that endlessly confuse and confound our thinking). This larger notion that Science is about much more than just poking at nature, but is very much about dealing with our mental deficiencies, has been sadly missed in so many important quarters.

A really large context for these perspectives is how “architecture” (felicitous organisations of things and ideas) can qualitatively elevate the simplest of materials to undreamt of heights. For example, it was hard for most humans to contemplate the idea — and now the vetted reality — that life itself is an amazing organisation (and only an organisation) of just 6 simple kinds of atoms plus a few more trace elements.

Similarly computers can be made entirely from just a single kind of simple component which does a comparison: if both inputs are **true** then the output is **false**, otherwise the output is **true**. The rest is “just organisation” of these elements. A powerful approach is to set up the components so they can manifest a symbolic machine (software), and the software can then be further organised to make ever higher level software “machines”.

And this brings us to the large arena of Systems: organisations of dynamic intercommunicating parts that are found at every scale everywhere in nature and in the inventions of nature's creatures. To take “systems perspectives” is such a new set of ideas and methods that they are not found in most standard curricula for children, despite that “*the systems we live in, and the systems we are*” are intertwined, and include the cosmos, our planet, our societies, our technologies, our bodies, and our brain/minds: all united by systems perspectives.

Germane to our topic here is that systems organisations do not fit at all well with our normal use of language, and especially our deep needs to explain by stories, which have beginnings, middles and ends. Systems are most often displayed as large charts that organise visual and textual languages in such a way to simultaneously relate views of parts and communications showing their relationships, which most often include “loops” so that most systems don't have beginnings or ends or just one path to take through them.

Systems are inherently dynamic, even when they appear to be in repose, so to understand them it is also necessary to be able to take them forward and backwards in time. The circularities and complexities of systems — as with Science — very often defeat our normal commonsense ways to think, and we need help of many kinds to start to grasp what might be going on, and what might happen.

Two examples that are critical right now are epidemic diseases and our planet's climate. Our normal commonsense reasoning, much of it bequeathed by our genetics, is set up for the visible, the small, the few, the quick, the soon, the nearby, the social, the steady, the storied, and to cope. Epidemics and climate are not like these. It is hard to notice and take seriously the beginning of an epidemic or the climate crisis

early enough for something to be done about it. Nothing seems to be happening, and normal commonsense thinking will not even notice, or will deny when attention is called to it. McLuhan: “Unless I believe it, I can’t see it”.

Scientists use need and use tools to help them think because they have the same kinds of genetically built brains all humans are born with. One of the uses of mathematics is to compute progressions that are difficult to envision. For example compound interest grows exponentially beyond our unaided imagination, but we can easily calculate the growth. Epidemics have similar properties, and can be also be calculated. Despite this, governments and most individuals are constantly surprised and underprepared for both epidemics and what taking on debt implies.

The climate is a much more complicated set of interrelated and difficult to understand — or even identify all of — systems, and simple calculations using simple math doesn’t work. But one of the most important properties of computers is that *their media are dynamic descriptions of any number of relationships that can be progressed over time: they provide the lingua franca for representing, dealing with, and understanding systems of all kinds.*

This is a new kind of literacy, and though it is a kind of mathematics, it is sufficiently different enough from classical mathematics to constitute a whole new mathematics that is also a new science.

And yet it is still piggy-backed on the kinds of languages humans have used for 10s of thousands of years, but with new organisations that take what can be represented and thought about much further.

To return to the climate: in the late 50s, Charles Keeling did the first high quality science to accurately measure CO<sub>2</sub>, the main greenhouse gas in our atmosphere (without it the Earth would be about 60°F (33°C) cooler. Five years of measuring produced enough accurate data to build the first models of what was going on. This was enough to prompt the US NSF to issue a \*warning\* in 1963 that the planet was very likely be in deep trouble in less than 100 years, and it was time to start mitigating the problem.

A recent study has shown that even with the meagre super-computers of the 60s (which were literally 10s of millions of times slower than a single iPhone 6), *all the climate simulations done back then have proved to be accurate within a few percent.* Thus science and computing did their jobs to provide (as of 2020) about 55+ years of accurate predicting of the future that we are now just starting to cope with today. Many things could have been done starting back then, but were not.

In the context of the present book, this is one of the most important “futures of representations” — to be able to represent, simulate, and understand complex dynamic systems, especially those literally concerning life and death. This was already invented and in use by a tiny percentage of the world’s population 60 years ago. To paraphrase William Gibson “The future was already there, but just not distributed evenly”.

And it still isn’t. For example, Plato would certainly have appreciated the irony here of me writing the description of a very important future for representations on a computer — which is the vehicle for this future — and though everyone now has one, they will not be able to experience an example of what I’m describing because they will wind up reading it in a book printed on paper (or a computer simulating a paper book). Hard to beat this for “not distributed evenly”!

Now we can do a much better job of simulating extremely realistic futures — including both wonderful and dire ones — years ahead of time. But one of the oldest stories we know in our culture — that of Cassandra — is again being acted out in front of our noses.

Not all uses of language and writing need to be elevated. But any culture that abandons the more difficult higher levels to just embrace the easy and predominately oral uses of language, is not just throwing away the past, but setting itself up for a most dismal future.

