Library on Mars

Reading in the 21st century

Case study no. 1

"[...] back in the days of Roman numerals, basic multiplication was considered this incredibly technical concept that only official mathematicians could handle [...].

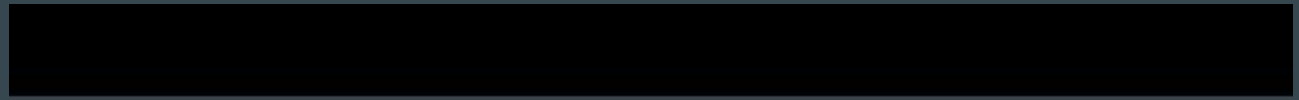
But then once Arabic numerals came around, you could actually do arithmetic on paper, and we found that 7-year-olds can understand multiplication.

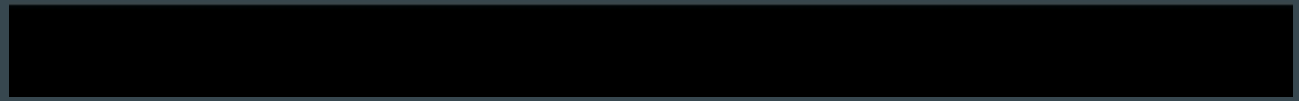
It's not that multiplication itself was difficult. It was just that the representation of numbers — the interface — was wrong."

Bret Victor, interaction designer, researcher, ...

Case study no. 2

Normally you'd need ~20 seconds to read such text. Try this in 30 seconds:





Did Jake take or not take the medicine?

Why did Lori help Jake?

What danger does Jake face?

Are you able to answer these questions?

Did the way the text was presented allow you to notice or think about the actual information captured in the text as you would like?

It is written in style called Scriptio continua - the prevalent way of writing texts in the western world for over 1500 years (its gradual death came between 9th and 14th century AD).

Paleographers today identify the extinction of Scriptio continua as a critical factor in augmenting the widespread absorption of knowledge in the Pre-Modern Era.

Can we still further improve our understanding of texts?

This February, when the entomologist Ruth Mueller pried open a container of genetically modified mosquitoes in a high-security lab in the Italian town of Terni, she wasn't just experimenting with a powerful new tool in biotechnology. She was implementing a change to the Mendelian laws of inheritance that govern all life on Earth.

The mosquitoes she released, each of them carrying a CRISPR-enabled "gene drive" designed to spread through a group of mosquitoes, would test whether humans could successfully force a trait through the whole of a free-living population. The lab in which Mueller works has been carefully designed so that, for now, the change takes place on a limited scale and securely indoors. But gene drives can theoretically spread themselves unaided to any corner of the globe in which populations of interbreeding mosquitoes live. They change the genetic rules wherever they travel.

If the question is "How much does your research amend the planetary rules?" the Mueller lab has plenty of company.

Early this summer, a research team from Harvard University will conduct the first field test of geoengineering the climate. They plan to use a high-altitude balloon to place reflective particles into the stratosphere above the arid landscapes of the U.S. Southwest. There they will examine how effectively the particles beat back incoming solar energy. Scaled up appropriately, the technology could in the future be used to rewrite the planetary rules in a way that echoes the changes wrought by gene drives.

Anthropogenic climate change has already altered how heat moves through the system. As devastating as this is, up till now, climate change has never been a matter of intentional planning and design. Our species has never before attempted to calibrate what the sun will deliver. This thermal quotient has been baked into the physics of the solar system. Should a large-scale deployment of reflective particles into the stratosphere eventually happen, it will rewrite this equation in our own hand.

Technologies such as gene drives and climate engineering go a quantum leap beyond what stratigraphers were noting when they recommended renaming this epoch the Anthropocene. Accidental changes are entirely different from deliberate ones. David Keith, one of the researchers in the Harvard climate-engineering project, points out the huge difference between deliberately engineering something and simply making a mess. In the former, the sense of responsibility is much higher. Think of why murder is so much worse than manslaughter.

Unlike habitat destruction, carbon emissions, and other signatures of the Anthropocene epoch, the technologies being tested today are designed for consciously taking control of some of the key physical processes that shape our world. The bedrock laws of nature don't disappear, of course, but they become subject to a deeper kind of manipulation. You could think of these as not simply "cosmetic" changes but "metabolic" ones. Charles Darwin, Gregor Mendel, and the conventions of atmospheric physics become subject to a delicate kind of renegotiation.

The crossing of this line represents radically new territory for both our species and for the planet. Nature itself will be shaped by processes redesigned and "improved" by geneticists and engineers. We should call this transition the beginning of a "synthetic age," a time in which

A bulk of research has already shown that this kind of third-person thinking can temporarily improve decision making. Now a preprint at *PsyArxiv* finds that it can also bring long-term benefits to thinking and emotional regulation. The researchers said this was 'the first evidence that wisdom-related cognitive and affective processes can be trained in daily life, and of how to do so'.

The findings are the brainchild of the psychologist Igor Grossmann at the University of Waterloo in Canada, whose work on the psychology of wisdom was one of the inspirations for my recent book on intelligence and how we can make wiser decisions.

Grossmann's aim is to build a strong experimental footing for the study of wisdom, which had long been considered too nebulous for scientific enquiry. In one of his earlier experiments, he established that it's possible to measure wise reasoning and that, as with IQ, people's scores matter. He did this by asking participants to discuss out-loud a personal or political dilemma, which he then scored on various elements of thinking long-considered crucial to wisdom, including: intellectual humility; taking the perspective of others; recognising uncertainty; and having the capacity to search for a compromise. Grossmann found that these wise-reasoning scores were far better than intelligence tests at predicting emotional wellbeing, and relationship satisfaction – supporting the idea that wisdom, as defined by these qualities, constitutes a unique construct that determines how we navigate life challenges.

Working with Ethan Kross at the University of Michigan in the United States, Grossmann has also looked for ways to improve these scores – with some striking experiments demonstrating the power of illeism. In a series of laboratory experiments, they found that people tend to be humbler, and readier to consider other perspectives, when they are asked to describe problems in the third person.

Imagine, for instance, that you are arguing with your partner. Adopting a third-person perspective might help you to recognise their point of view or to accept the limits of your understanding of the problem at hand. Or imagine you are considering moving jobs. Taking the distanced perspective could help you to weigh up the benefits and the risks of the move more dispassionately.

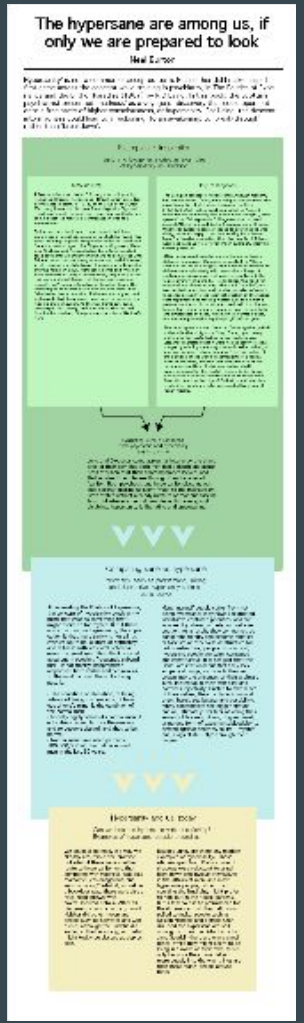
This earlier research involved only short-term interventions, however – meaning it was far from clear whether wiser reasoning would become a long-term habit with regular practice at illeism.

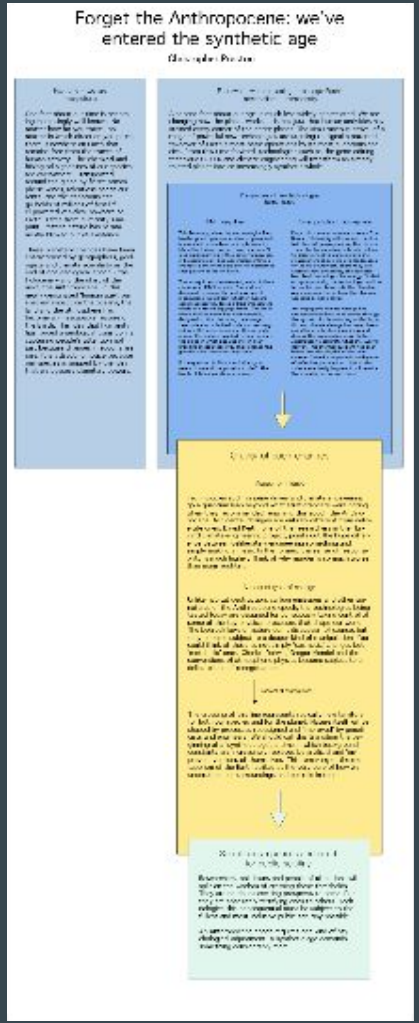
To find out, Grossmann's latest research team asked nearly 300 participants to describe a challenging social situation, while two independent psychologists scored them on the different aspects of wise reasoning (intellectual humility, etc). The

Texts nowadays.

(so static,
JavaScript under-used
and misused)

But, in our minds, do they look more like something like this?





Reading is an active effort.

There is a lot of thinking going on in our heads when we read a text, but we don't get a chance to mirror - and build on top of - basically any of it *while* we read. We have to hold it all in our heads.

So many of our thinking steps get lost. I believe it has consequences.

What if we could do things like this - as default - when reading?

Chris Young was asked to meet with the team. Young, a mathematician, biochemist and chef, is a guy who wants everyone to love their food, and wonders why people like some things and not other things. He's curious and playful, both in and out of the kitchen. Young and a collaborator had just finished a book and he had a little time free before publication. Young's boss suggested, "You really don't know anything about this problem or project, but you do know a few things about milk, so go see if you can contribute something."

The team asked Young to look at solving the milk-fouling problem for the heat exchanger. The engineers were excited about the technology, and figured that if Young could make it work with milk, they'd have a solution.

Young had no pre-conceived ideas. He joined the team with an open, curious, and exploring state of mind, not attached to a particular outcome. He was not limited by what was known, and was able to hold what he did know, lightly: maybe things are this way and maybe they're not.

During a meeting with the team, when they were reporting on a trip to Kenya, one researcher mentioned that, in Kenya, people don't drink milk by the glass. People boil the milk, then add tea, and sugar. The engineers and consulting dairy scientists had all assumed that milk needed to have a "fresh" taste.

Young wondered, is the "fresh" flavor really important? If the milk tastes "cooked," is that a bad thing? Young decided to test the flavor; he cooked milk for longer periods of time and tested batches. To him, the cooked milk tasted sweeter.

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Would we be able to extract the meaning of text better?

Would we be able to see connections in it better?

Would text become more accessible?

Would we remember it all better?

Would "the book" then *really become* the mirror of our mind?

We have many powerful mental capacities but do not consider using them in such an important act as a reading (and typography).

What happens if we use them?

What will it enable us to see?

Have a read. With superpowers.

Library on Mars

Enraged? Enraptured? Contact

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