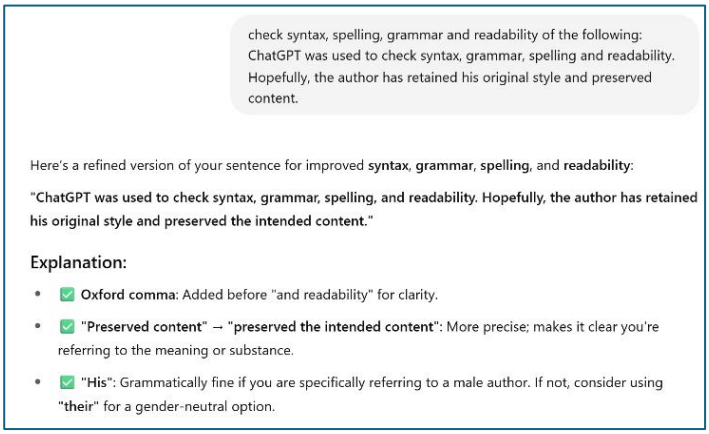
The unintended consequences of efficiency and improvement

"Well-intentioned improvements can end up having the opposite effect!"

I remember a doctor friend telling me that when she was an intern, one of many cost cutting initiatives the hospital she worked at implemented was a switch from 3-ply to 2-ply swabs. Contrary to expectation, the outcome was not a saving. Usage actually increased as practitioners found that 2-ply swabs were inadequate for many tasks and began doubling up (using four plies instead of three). Similarly, my local council provides biodegradable bags for recycling food waste. These worked well until they were replaced with thinner, lighter (and flimsier) versions which tend to leak under any load. As a result, double bagging has become the norm. There are many similar examples, where a breakthrough or improvement is meant to generate efficiencies and savings but ends up doing the opposite:

The replacement of typewriters with word processors has (anecdotally) led to increased paper use, not less as our tolerance for errors has decreased. Expectations for polished, error-free documents has become the norm - meaning more drafts and reprints.

The internet provides us with easy access to information, which means we replicate what we're fed, rather than critically searching for and assessing information ourselves. We've become self-proclaimed experts - bypassing proper medical diagnoses, amplifying misinformation (fake news), and enabling (and becoming victims of) new avenues for criminal and subversive activity. This is exacerbated with increased and easy access to **generative AI***. We are now



Source: ChatGPT.

creating large volumes of content with unprecedented ease. Where does consideration, critical thinking or analysis fall into this process? Instead of using AI as a tool for enhancing research and problem-solving, it's increasingly seen as a replacement.

In sustainability and climate action, the same pattern emerges. **Rooftop solar** allows us to justify running more air conditioning for longer when it's hot. Because this is the exact time when solar generation is high, we feel good (almost smug) about it. **Sustainable aviation fuels** remove the guilt from flying, and the adoption of electric vehicles encourages continued car use rather than shifting to public or active transport.

The list goes on. In our efforts to do better, without thinking, we end doing exactly the opposite.

Some of these unintended consequences are conscious - "I fly more because I am not damaging the environment (anymore)". Others not – such as the increased use of paper from word-processing or using two swabs instead of one. There are also instances where we are deliberately manipulated or mislead with implied inten t - using obfuscating language such as for example: "90% fat free", "can be recycled", "new and improved" or "no up front fees" to imply healthy, sustainable, better or cheaper. This is not limited to words. The all too popular move towards green (the colour) packaging and the proliferation of logos (trees, leaves) and pseudo certifications make products look sustainable without being specific, while various rating systems and claims may or may not be real.

The table below contains examples where outcome differs from the headline intent.

	Intent	Unintended Outcome	Comments
Word processors (online editing)	Online editing of documents prior to publication – less paper usage (edit first then print).	Less tolerance for typographic errors – **more reprinting**.	With new tools, standards change and norms move.
Sustainable aviation fuel (SAF)	Clean aviation.	**More flying** as guilt factor is removed	Emphasis should be on flying less overall.
Rooftop solar	Reduce carbon footprints. Reduce emissions.	**Increased use of power** in marginal situations (running AC all day, running appliances on power cycle during daytime instead of efficient cycles)	No incentive to be efficient if there is no direct linkage with cost, effort, outcome or reward.
Electric vehicles	Lower emissions	**More driving**.	Emphasis on public and active transport instead of driving.
Generative AI	Access to information. Increased knowledge, productivity.	Temptation to **bypass filtering** or direct impact. **Bypass critical thinking**. Just go straight to AI and trust the output. **Massive increases in energy usage**, which work against the	Should be a tool to aid, not a replacement for thinking and critical analysis. Realise that everything should be fact checked.

		efficiency improvements we are meant to see with generative AI.	
Automated content creation	Easier publication of ideas, better communication.	**Overwhelming amount of collateral**. A (misheld) belief that (posting) more is better. Outcome is shorter attention spans, tendency towards soundbites. Propagation of misinformation.	Focus should be on quality not quantity. Learn to filter and fact check. Realise that "more is written than what is read". It's not all about likes and followers.
Lighter products, less materials in consumables (swabs, plastic bags)	Less wastage.	**More wastage** as new products become flimsy (eg double bagging, 2x2ply instead of 1x3ply swabs).	Focus on user experience not absolute quantities when designing or 'improving' a product.
Carbon offsets	Less pollution by compensating for emissions.	**More polluting**. Enables business as usual to continue as cost of offsetting is cheaper than changing. Efficacy of many offsets is questionable.	Ensure end goal is met (ie less polluting) by direct action ahead of anything else.
The ability to process in parallel	Increases speed of actions.	We become **impatient** when results are not instantaneous, so we **repeat** the same actions for example logging in to the same website more than once to obtain 'hard to get' tickets, or running an AI prompt on **multiple instances** of a system because the results are delayed.	Realise when a process is wasteful and inefficient. Instant gratification is not a default.
Smart scheduling	We can schedule almost anything – emails, posts and other tasks. Aimed at making us efficient and ensuring timely delivery.	Optics over actual – **creates an illusion** that we are active, online or at work 24/7. Creates an **expectation of continuous output**. Can become counterproductive by delaying or drip feeding for appearance's sake.	Humans and machines are different. Embrace the difference, take time out. Everything is not work.
And many more			

So what!

Innovations, improvements, and sustainability efforts often backfire when they overlook human behaviour, incentives, and unintended consequences. Progress, with promises of improvement in efficiency or sustainability goes wrong when it removes friction or guilt without shifting mindset or behaviour. From using more energy when it comes from the sun to flying more because it feels "sustainable," or relying on AI not as a tool to enhance thinking but as a shortcut to avoid it. With all these innovations, we seem to forget what the objectives of using them are (reducing energy usage, flying less and having access to tools and information to aid our thinking, curiosity, understanding and analysis). True progress requires not just better tools, but better (or more) thinking about how we use them and perhaps changing out behaviour. Without this, we may just simply accelerate the very problems we're trying to solve. Whenever we adopt something new, it is essential to understand the what and the why of any innovation, otherwise we shouldn't be surprised when the outcome doesn't match the intent.

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[*] ChatGPT was used to check syntax, grammar, spelling and readability. Hopefully, the author has retained his original style and preserved the content.