The Growing Danger of Toxic Cyber Additives

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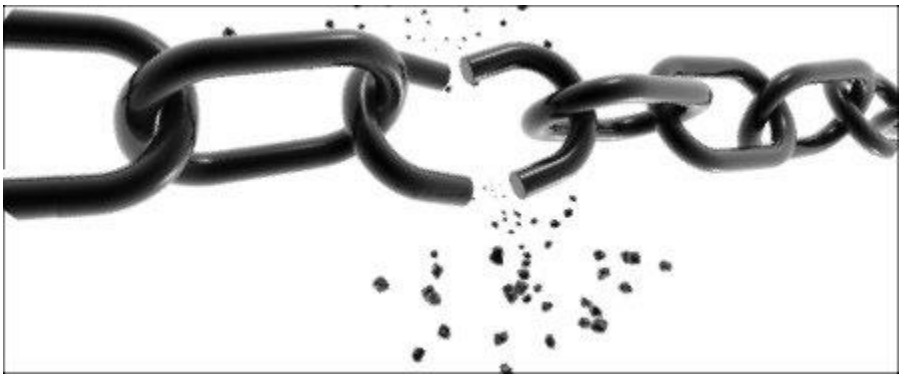

Adding noise to information retrieval is corrosive and breaks the chain of trust.

In 2007 and 2008, companies in China were caught using a deadly additive, melamine, in internationally distributed pet foods and internally distributed milk. Thousands of pets died [1] as a result, and in China, several babies died from contaminated milk [2].

The incentive behind this recurring and deadly problem was simple, even if incredibly cruel: Adding cheap melamine to food products allowed manufacturers to fool tests designed to ensure that the foods had adequate nutritional levels of protein. Even worse, their additions proved directly toxic, increasing harm beyond malnutrition.

But what if I told you that an entire multi-billion-dollar 2024 industry with globally expanding markets also adds an extremely dangerous additive to its products? This additive is specifically and consciously designed to fool the tests that should have verified the value and safety of these products. Also, like melamine, this additive can cause serious harm to property and human lives. You have almost certainly already used some of these products. Without action, your use of them will expand, not shrink.

You haven't heard about this scandal because all of this is happening in cyberspace. The products are called chatbots. For years, vendors of these products have told the public that these products have passed something called the Turing test and thus are verifiably as intelligent and clever as humans. People have already invested their personal funds, companies, and future hopes on this widely touted success. If such machines can pass a test designed by one of the most indisputably brilliant minds of the 20th century, Alan Turing, how can investing in these products possibly go wrong?

Even more ominously, these products are working their way into our fundamental infrastructure. Roles that once had verifiably sentient humans in them are increasingly passing to chatbots and chatbot derivatives, almost always based on the assumption that the superb memory, networking reach, astronomical speed, and 24-hours-a-day availability of human-smart chatbots make them an obvious choice for replacing slow, unreliable humans. These chatbots have, after all, passed the Turing test.

Only they didn't. All of them cheated by adding digital melamine, better known as noise.

Correctly and ethically programmed Large Language Models — LLMs, what too many folks call artificial intelligences — are fantastically effective retrieval engines. If you need to find a paper by some author who worked

their entire lives to figure out some result that is critical to your own business or research, you cannot do better than to use an LLM. It can pull out tiny clues from your wording of the problem and figure out just what paper to access and present to you. Innovative retrieval is where LLMs shine and can constructively boost the entire world's economy. An ethically programmed LLM enhances free-market economies by allowing good ideas from little-known locations to spread and reach every potential market. Others build on those successes, and you amplify opportunities for small innovators and resources available for innovation.

But what if you don't want that? What if you only care about advancing your interests while making sure that potentially competing innovations from others never see the light of day? Simple: You add noise.

Noise is the "spice" [3] — more accurately, the digital melamine — that allows an unethically designed LLM to pretend it is something more than an incredibly powerful retrieval engine. An ethically programmed LLM always gives the same result for any cluster of closely relative queries, and that result always references the specific body of human work that produced those results, often at great personal cost. When used ethically, there is no ambiguity about what is happening because the LLM takes you directly to the source of the solution. That source — that business, artist, author, engineer, or researcher — benefits in classic free-market style, gaining the attention and funds needed to advance good ideas.

Adding digital melamine — adding noise — beautifully obscures this fair retrieval process by mixing up the results from multiple similar sources just enough to make finding the correct source impossible. The honest, repetitive results of an ethically programmed LLM quickly reveal that it is nothing more than a powerful retrieval engine. In sharp contrast, LLMs "spiced" with digital melamine — with noise — replace these ethical connections to source providers with crafty hodgepodges of similar results with just enough noise added to make it look like the chatbot "thought through" the problem before answering. The LLM owner can then pretend the hodgepodge solution came not from humans but from the chatbot's Turing-verified, highly boosted, "human-like" intelligence. Without legal remedies, this bit of Turing-fooling deception gives the LLM owner an excuse to avoid crediting creators for their work or even letting users know who did that work, as would happen in a free-market economy.

Even worse, this mixing-to-cover-sources is extremely toxic. The randomness of the mixing process quickly destroys the actual market value of the real sources while fooling users into thinking they are getting "smarter" results than they would from individual sources. Eventually, they fall victim to this deception when their attempts to create actual products fail, sometimes spectacularly, due to the failure of the randomization process to keep critical bits of information in the final mix.

The toxicity of digital melamine — of intentionally adding noise to LLM retrieval engines for the specific purposes of fooling Turing tests and obscuring free-market sources — exponentially increases if you let this noise toxin creep into your physical infrastructure. Imagine a 911 system controlled entirely by noise-added, melaminized LLM systems that slowly degrade as the noise toxin designed to fool people takes over more and more turf within the previously carefully human-designed 911 system.

This situation cannot continue. State and federal governments need to recognize that toxicity is no longer a purely chemical problem and ban the use of cyber toxins whose only purpose is to fool tests, delude users, destroy the effectiveness of free-market economies for promoting business innovation, and slowly poison systems.

Thanks to Lisa Baird, Dr. Jeffrey Funk, and Sarah Clarke for calling my attention to the excellent Brendan Dixon article. Coming from an environment where safety, accuracy, and information pedigrees are top priorities in the design of robots and AI systems, the concept of intentionally damaging an LLM retrieval system through noise insertion to mimic humans better would never have occurred to me.

[1] Wikipedia, “2007 pet food recalls”.

[2] Wikipedia, “2008 Chinese milk scandal”.

[3] B. Dixon, “What Chatbots Have Achieved, and What They Haven’t - And Can’t,” Mind Matters 2024, 0504 [May 4] (2024). https://mindmatters.ai/2024/05/what-chatbots-have-achieved-and-what-they-havent-and-cant/

[4] Apabistia Notes: https://sarxiv.org/apa.2024-05-08.1522.pdf

[5] LinkedIn: https://www.linkedin.com/pulse/growing-danger-toxic-cyber-additives-terry-bollinger-qyc2c