

Can We Use Physics Concepts to Construct a Theory of Artificial Intelligence?

Prof. G. Bertoni's Speech (25-09-25)

I certainly do not have the expertise to discuss such an advanced topic as the one proposed. Furthermore, it is one that raises highly complex, speculative issues regarding artificial intelligence (AI) — a subject that everyone is seemingly passionate about. I will, therefore, focus on just three simple, cross-cutting considerations that I deem fundamental for understanding this phenomenon.

- The sheer volume and complexity of available data has made “neural networks,” and therefore AI, increasingly necessary. This has been evolving over recent decades, but even more so since becoming professor emeritus, even in my scientific field of agri-food disciplines. This helps to convey how significant the potentially positive role of AI application can be for the advancement of knowledge.
- This is a major confirmation of how these new technologies should essentially be viewed with confidence and without the easy demonization that we leave to the pages of certain newspapers. This does not preclude the need for a cautious or, rather, informed approach (very distant from the “paralyzing” precautionary principle, which is often just an excuse for us being lazy.) Some form of regulation is absolutely necessary, provided that it does not result in purely bureaucratic constraints — which often are impractical and therefore mostly ineffective, yet undeniably penalizing for those who wish and need to conduct scientific research.
- Finally, we must not forget that we are living in a period of significant energy and environmental challenges — an aspect that must not be overlooked, given AI's extremely energy-intensive technology. Even in our region of Lombardy, data centers will absorb 10% of the region's energy needs in a few years' time.

So, I would simply like to reiterate the need to pay greater attention to pure common sense regulations, which should be applied when faced with any innovation: i) avoid a priori positions of rejection or excessive emphasis (in medio stat virtus, as the Romans used to say); ii) build tools that are capable of fostering critical thinking (discernment) within society.

At the same time, it seems essential that “experts” (scientists, opinion leaders, policy makers, etc.) know how to act with transparency and a sense of responsibility, with the awareness that decisions — specifically those regarding AI — must be supported and supplemented with assessments that also include ethical principles. The best way to build a broad and informed consensus for our choices is to continuously ask ourselves what is right (and why.) However, this implies that the same ethical logic must apply to both research and experimental findings, as well as to their communication to decision-makers and society as a whole.

I am positive that Professor Marc Mézard will uphold these principles, just as his Invernizzi Chair predecessor did — Professor Luca Trevisan, whom is remembered by the entire University as a great motivating force and innovator of ideas and perspectives.

Thank you.