

# The Impossibility Triangle: A Human-AI Journey At The Frontier.

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## Abstract

What happens when a rejected proof, a missing condition, and an AI collaborator conspire to recalibrate an intuition by 180 degrees? This talk recounts a personal journey through the landscape of *algorithmic information theory*, where a failed attempt to solve an open problem unexpectedly crystallized into a simple, elegant impossibility: you cannot have equal complexity, easy computability, and algorithmic independence all at once when the source string is random. This “impossibility triangle” is a fundamental barrier to creating algorithmic twins – copies that are both deterministic and genuinely independent of the original.

The result itself is a crisp, three-line consequence of the symmetry of information and the incompressibility of random strings. But the process that uncovered it was anything but crisp. Working with the AI assistant DeepSeek, I experienced a pace of “discovery”<sup>1</sup> that felt “qualitatively”<sup>2</sup> different from previous collaboration. From sharing intuitions, ideas to constructions and tests; discarding and iterating in rapid loops, the pace is at the frontier. The AI was not merely a tool – it became a mirror<sup>3</sup>, a catalyst, and at times a genuine intellectual partner. This blurring of roles raises unsettling questions about how scientific research, authorship, creativity and the perhaps most importantly about the nature of intelligence itself.

I will walk through the impossibility triangle and the “forbidden information” principle it exemplifies, and then open a broader reflection on what human-AI collaboration means for the future of research. How much of the discovery was mine? How much belonged to the machine? And what does it say about computational creativity when a truth you could not see alone, readily becomes visible through an artificial other? The talk is intended not as a polished answer, but as an honest report from the frontier – an invitation to the audience to share their own experiences and to try to help make sense of a landscape that is shifting under our feet.

**Keywords:** algorithmic information theory, Kolmogorov complexity, forbidden information.