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Nicolas Fillion*. *Trust but Verify: What Can We Know About the Reliability of a Computer-Generated Result?*

Since the Second World War, science has become increasingly reliant on the use of computers to perform mathematical work. Today, computers have justifiably become a trusted ally of scientists and mathematicians. At the same time, there is a panoply of cases in which computers generate demonstrably incorrect results; and there is currently no reason to expect that this situation will change. This prompts the careful user to verify computer-generated results, but it is clear that we are often not in a position to review the work of computers as we would traditionally review a putative derivation or calculation. In this sense, computational processes are epistemically opaque.

Since Humphreys introduced the phrase ‘epistemic opacity’ in the philosophical literature in 2004, the concept of opacity has been developed along different lines; furthermore, many incompatible claims have been advanced—be they about what opacity is or about whether we should worry about it—leaving this field of the philosophy of computing in a state of confusion. In this paper, we propose a framework that disentangles three core questions (1. What kinds of epistemic opacity are there in scientific computing? 2. Should we worry about epistemic opacity? 3. Should we seek greater transparency whenever possible?) and systematically survey how their answers inter-relate.

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