Gauge Theory is a Brain Drain

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The history of mathematics is fraught with mathematical Platonism that seems tangible and beautiful, but is bound to blow up in the face of a mathematical genius. Gauge theory -- the mathematical theory that the Lagrangian is invariant under particular Lie groups of local transformations, underpins much of modern physics in the language of differential geometry.

From classical modern physics (gauge transformations) to contemporary quantum field theory (connections), gauge theory has allowed theoretical physicists and mathematicians to delve into the very nature of space-time, particle interactions, and soap bubbles, i.e., the gauge symmetry of James Clerk Maxwell’s field equations, the SU (3) × SU (2) × U(1) Standard Model of the electroweak, nuclear, and strong forces, and/or the quantum thermodynamics of nuclear plasma.

Permitting substantial progress in geometry, i.e., geometric analyses, Chern-Simons form for the Jones Polynomial, and/or perturbation theory, gauge theory has proved to be an important and yet overuse sub-branch of mathematical engineering. Whether through path integrals and/or non-linear partial differential equations, the atypical and redundant is misconstrued as functional sophistication and procedural eloquence in computational decision-making.
Poor in its construction and counter-intuitive in its very application to the compactification of higher dimensions, i.e., Kaluza-Klein reduction of gravitation and electromagnetism, it’s an atypical redundancy that drained the field of physics of needed computational power at the expense of maximum efficiency. True, non-abelian gauge theory proved to be worthy of the peace prize in mathematical physics. But gauge theory means different things to many other theorists.

Overall, it means a brain drain that led to the blow up of much of mathematical geometry: more its emphases, the more its overuse -- more its overuse, the likelier that the field of modern physics will succumb to mathematical incapability and experimental inadequacy.

Eventually soap bubbles pop, yet too much of a good thing can be a bad Platonic idea. It’s more than just over for the geometric principle, it’s complete overkill for the field of mathematical theory.

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