

# On the genesis of non-extensive statistical mechanics: modes of inference and openings of the logic of wonder

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C.S. Peirce – scientist and founder of modern semiotics – states that in the logic of science, in addition to the two traditionally accepted modes of inference – deduction, and induction – there exists a third mode, abduction. Abduction represents the process by which we generate hypotheses to account for the facts that surprise us. The conclusion reached is always conjectural, though entirely plausible, and its validity lies precisely in this plausibility, not so much in its actual probability. Abduction describes how the scientist's mind works when he suspects where the truth lies: to materialize scientific breakthroughs according to an extended logic of reasonableness. We will show how the so-called logic of surprise, on the genesis and development of the Tsallis Statistical Mechanics, is a fully rational process in which the scientific subject must continuously measure himself against the set of demands and evidence with which he faces the reality he intends to know.