

Causal asymmetry and the intuitive physics of collision events

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Abstract: In the Michotte (1963) launching scenario, an object (X) moves toward a resting object (Y), eventually colliding with it. In the moment of contact, X stops and Y starts moving - creating the strong impression that X caused Y's motion and that X exerted a force on Y (but not vice versa). These asymmetries contradict the (symmetrical) laws of Newtonian mechanics, which are at the heart of the popular "noisy Newton" theories of intuitive physics. As an alternative, we propose that inferences in physical scenarios operate over pre-Newtonian representations that are based on the asymmetrical concept of impetus, a motive force that keeps objects moving and that is transferred and reflected in object collisions. We present a formal model of impetus and show that, unlike noisy Newton theories, it provides an explanation of asymmetrical judgments. Other related findings can also be modeled (e.g., biases in mass judgments).