All-Possible-Couplings Approach to Context and Determinism

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From behavioral sciences to biology to quantum mechanics, one encounters situations where (i) a system outputs several random variables in response to several inputs, (ii) for each of these responses only some of the inputs may have "direct" influence, but (iii) other inputs provide a "context" for this response by influencing its probabilistic relations to other responses. These contextual influences are very different, say, in classical kinetic theory and in the entanglement paradigm of quantum mechanics, the difference being traditionally interpreted asa that between different forms of physical determinism. We show how one can quantify and classify all logically possible contextual influences by studying various sets of probabilistic couplings, i.e., sets of joint distributions imposed on random outputs recorded at different combinations of input values. In particular, given a constraint imposed on the set of observable distributions, we consider the set of couplings that are implied by this constraint, the set of couplings that imply it, and the set of coupling that are equivalent to it.