The apparent absence of muon-electron transitions without neutrinos, such as $\mu \rightarrow e + \gamma$, $\mu \rightarrow 3e$, and $\mu^- + p \rightarrow e^- + p$, leads one to suspect that there is a new conservation law forbidding them. Calculations[1] of the rate of such processes, assuming no such law exists, have indicated that it is hard to understand their absence in an intermediate boson theory of weak interactions. Even if there is no intermediate boson, the decay $\mu \rightarrow e + \nu_1 + \bar{\nu}_2$ with $\nu_1 = \nu_2$ would lead to these processes in some order of perturbation theory, and arguments have been given[2] which indicate that any field theory of weak interactions may predict unacceptably large rates for these processes in the absence of a selection rule.

If we assume that $\mu^- - e^-$ transitions are forbidden by a selection rule, the nature of the selection rule remains an open question. It has been suggested[3] that an additive quantum number exists which is always conserved and which[4] is +1 for μ^- and zero for e^-. In order to make this consistent with known weak interactions, it is necessary to assume that there are two neutrinos, which are distinguished by their value of this quantum number. The conservation law forbids all reactions in which any nonzero number of muons change into electrons, without neutrinos.

This assumption of an additive conservation law is not the only possibility. All of the "missing reactions" involve odd numbers of muons and electrons. It is therefore possible to forbid them by a multiplicative conservation law. By this it is meant that there is a quantity we shall call "muon parity" which is -1 for the muon and its