abstract We develop a distillation protocol for multilevel qubits (qudits) using generalized beam splitters like in the proposal of Pan et al. for ordinary qubits. We find an acceleration with respect to the scheme of Bennet et al. when extended to qudits. It is also possible to distill entangled pairs of photons carrying orbital angular momenta (OAM) states that conserves the total angular momenta as those produced in recent experiments.