Abstract: In search of a concrete model for a given action of a countable group $G$ on a space $X$, one may wonder if it is embeddable into a finite shift action. This is equivalent to the existence of a finite partition of $X$ into well-behaved sets such that every point in $X$ can be determined by its trajectory through the partition when acted upon by $G$. Entropy theory tells us that there is a measure-theoretic obstruction to this, and it was asked by B. Weiss in the 80s if it is the only obstruction. We show that the answer is positive for a large class of actions.