Suppose one has a group $G$ with a normal subgroup $L$, and a representation $\theta : L \to GL(V)$ for a finite-dimensional vector space $V$. A natural question in Representation Theory is whether this representation can be extended to a representation $\tilde{\theta} : G \to GL(V)$. In this talk, I shall construct an object resembling (but distinct from) an exact sequence which will provide cohomological conditions on existence and uniqueness of such an extension when $V$ is $G$-stable. If time permits, I will demonstrate how this idea can also be used to give insight into the question of whether a representation of a Lie algebra $\mathfrak{g}$ of an algebraic group $G$ over a field of positive characteristic can be integrated to a representation of $G$. Joint work with Dmitriy Rumynin.