Ligands can have different effects on a receptor. Each type of ligand can be readily classified according to its behavior.

One type of ligand is the **full agonist**. The term **agonist** refers to a compound that binds a receptor and elicits a response (\(E\)). Full agonists elicit the same level of full response (\(E = E_{\text{max}} = 100\%\)) as the endogenous ligand of the receptor. Graphically, a receptor-ligand interaction is plotted as fractional response (\(E/E_{\text{max}}\)) vs. log [L]. The relationship is sigmoidal. A full agonist approaches full response (\(E/E_{\text{max}} = 1.0\)) as log [L] rises.

Two ligands can achieve a full response without being equivalent. Ligands can differ with respect to the concentration required to trigger a response. A ligand that causes a response at a lower concentration is said to have a higher **potency**. Potencies are measured as the effective ligand concentration required to reach a 50% response – \(EC_{50}\) or, in these graphs, log \(EC_{50}\). A more potent ligand has a smaller \(EC_{50}\) value.
Partial agonists also cause a response, but they cannot reach the same, 100% response level of the endogenous ligand. Partial agonists also show a sigmoidal relationship between response and log [L]. The potency of a partial agonist is still reported as an EC<sub>50</sub> value, but it does not occur at 50% response. The EC<sub>50</sub> value instead occurs at 50% of the maximum response possible for that partial agonist. For example, if a partial agonist can only achieve a maximum response of 60%, then it's log EC<sub>50</sub> would be measured at 30% response. Partial agonists and full agonists typically bind at the same site. This similarity in binding gives rise to an interesting effect. If a full agonist is at levels sufficient to cause a full response and a partial agonist is added, then the response will decrease. If partial agonist levels are further elevated, the response will eventually decrease to the maximum response of the partial agonist. The partial agonist displaces the full agonist from the binding site and decreases the observed response.

Antagonists bind a receptor, do not cause a response, and block the response caused by an agonist. Based on this description an antagonist by itself has no effect the response of a receptor. An antagonist does, however, decrease an agonist's response and, at high enough concentration, can completely negate the response of an agonist.
Inverse agonists are very interesting ligands because they decrease the response of a receptor. Many receptors can cause a response without being bound to a ligand. Such receptors are said to have constitutive activity (improperly stated as constituent activity in the video). The level of constitutive activity is typically very low and may only be a few percent of $E_{\text{max}}$. When an inverse agonist is added to a constitutively active receptor, the response of the receptor approaches zero.