Economics 314 Spring 2019

Daily Problem #29 March 22

In the Cooper and John model, e_i represents the action of the ith agent, and $\bar{e}$ is the average action of all agents, which we take to be the action of all other agents. The payoff to agent i is $V(e_i, \bar{e})$, with first and second partial derivatives:

$$
\begin{aligned}
&V_1(e_i, \bar{e}) \equiv \frac{\partial V}{\partial e_i}, \\
&V_2(e_i, \bar{e}) \equiv \frac{\partial V}{\partial \bar{e}}, \\
&V_{11}(e_i, \bar{e}) \equiv \frac{\partial V_1}{\partial e_i} = \frac{\partial^2 V}{\partial e_i^{\,2}}, \\
&V_{12}(e_i, \bar{e}) = V_{21}(e_i, \bar{e}) \equiv \frac{\partial V_1}{\partial \bar{e}} = \frac{\partial V_2}{\partial e_i} = \frac{\partial^2 V}{\partial e_i \partial \bar{e}}, \\
&V_{22}(e_i, \bar{e}) \equiv \frac{\partial V_2}{\partial \bar{e}} = \frac{\partial^2 V}{\partial \bar{e}^2}.
\end{aligned}
$$

Explain each of the following interpretations:

1. The marginal benefit of the action to agent i is V_1.

2. Others' actions have *positive spillovers* on agent i if $V_2 > 0$.

3. Others' actions have *negative spillovers* on agent i if $V_2 < 0$.

4. Agent i's action exhibits *strategic independence* if $V_{12} = 0$.

5. The action exhibits *strategic complementarity* if $V_{12} > 0$.

6. The action exhibits *strategic substitutability* if $V_{12} < 0$.