Cooperation with Network Monitoring: Corrigendum

Alexander Wolitzky

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There is an error in the proof of Theorem 1, and the correction requires a slight strengthening of the stated assumption on players' utility functions.[1] The relevant assumption is that, for every pair of players i, j, the function $f_{i,j}$ measuring i's benefit from j's action is either strictly concave or identically 0. The proof of Theorem 1 is correct if all of the $f_{i,j}$ are non-zero, but an extra assumption is needed to allow $f_{i,j} = 0$. A simple sufficient assumption for the case of a fixed monitoring network L is the following.

Assumption If $f_{i,j} \neq 0$ and player $k \neq i, j$ lies on a shortest path from i to j in L, then $f_{k,j} \neq 0$.

To see that Theorem 1 can fail without this assumption, suppose there are three players with the fixed monitoring network $l_{1,2} = l_{2,1} = l_{2,3} = l_{3,2} = 1$, $l_{1,3} = l_{3,1} = 0$ (i.e., players 1 and 2 see each other's actions, as do players 2 and 3, but not players 1 and 3), and benefit functions $f_{1,3} \neq 0$, $f_{3,1} \neq 0$, $f_{1,2} = f_{2,1} = f_{2,3} = f_{3,2} = 0$. Then player 2 will never play $x_2 > 0$, so players 1 and 3 will not find out if the other shirks (recall that players need not observe their own payoffs), and therefore $x_1^* = x_2^* = x_3^* = 0$, while Theorem 1 may state that x_1^* and x_3^* are positive.

The error in the proof of Theorem 1 is that "news" about a deviation cannot be spread by a player whose equilibrium action is already 0 (like player 2 here). Formally, the mistake is in the first paragraph on p. 424. One must show that $\sigma_j^*\left(h_j^\tau\right) = 0$ whenever $j \in D(\tau, t, i)$, $\Pr(j \in D(\tau, t, i)) > 0$, and $f_{i,j} \neq 0$ (this last condition is missing in the published version).

[1] I thank Shengwu Li for finding the error.

The key error is in the third-to-last sentence of this paragraph: the conclusion in this sentence that $\hat{x}_k > 0$ is valid only if $f_{k,j} \neq 0$. The player k referenced in this sentence may be taken to lie on a shortest path from i to j. Thus, the argument in this paragraph is valid under the above extra assumption.

The analysis of all applications in the paper remains valid. In particular, the only application that involves $f_{i,j} = 0$ for some i, j is the "local public goods" case in Section 5. The extra assumption is trivially satisfied in this application, as if $f_{i,j} \neq 0$ then $j \in N_i$, so the only players on a shortest path from i to j are i and j themselves.