Games with zero-knowledge signaling

Abstract

We observe that in certain two-player repeated games of incomplete information, where information may be incomplete on both sides, it is possible for an informed player to signal his status as an informed player to the other without revealing any information about the choice of chance. The key to obtaining such a class of games is to relax the assumption that the players' moves are observable. We show that in such cases players can achieve a kind of signaling that is "zero-knowledge", in the sense that the other player becomes convinced that her opponent is informed without ever learning the choice of chance. Moreover, such "zero-knowledge signaling" has all of the statistical properties associated with zero-knowledge proofs in intereactive protocols. In particular, under the general assumption that moves are unobservable, such signaling leads to a class of equilibria in repeated games that are *separating* in regard to the status of player 1—informed or uninformed—but only for player 2; any other player in a network, being unable to observe the moves of player 2, remains uncertain as to the status of player 1.