EVOLUTION AND THE THEORY OF GAMES

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Exercises 12-10-2016

14. Consider the **iterated Hawk-Dove** game with the strategies *always Hawk* (aH) and *Retaliator* (Rt), where aH (as the name suggests) plays Hawk in every round, and where Rt plays Dove in the first round but after that copies his opponent's action from the previous round.

(a) Calculate the entries of the payoff matrix

	aH	Rt
aH	E(aH,aH)	E(aH,Rt)
Rt	E(Rt,aH)	E(Rt,Rt)

(payoffs to rowplayer)

(b) Find all EES-s. Distinguish between the cases $0 < C < R$ and $0 < R < C$. How do the results depend on the probability $\delta \in (0, 1)$ of haven another round?

15. Like the previous exercise but now for the strategies *Retaliator* (Rt) and *Bully* (Bl), where the latter plays Hawk in the first round but after that does the opposite of what its opponent did in the previous round.

16. Play the **iterated War of Attrition** between the strategies *Mixed* (Mx) and *Share* (Sh), where Mx is the mixed ESS with probability density

$$f(c) = \frac{1}{R} e^{-\frac{c}{R}} \quad (c \geq 0)$$

from the single-round (i.e., non-iterated) War of Attrition, and where Sh does not invest any time and cost but is willing prepared to share the resource but immediately quits the game if his opponent is not of the same mind.

Give the payoff matrix for the strategies Mx and Sh, give all ESS-s, and indicate how the result depends on the probability $\delta \in (0, 1)$ of haven another round?

17. Consider the **iterated Battle of the Sexes** (or: "who takes care of the kids?") where each round the players have to decide to stay with the offspring or to run away for one round. Play this game between the mixed ESS of the single-shot

game (see lecture notes of 10-11-2011, section 18) and the *Retaliator* (Ret) strategy. The latter starts with Stay, but in every next round copies the action of its partner.

(a) How would you calculate the payoff matrix for the iterated game?

(b) Consider the iterated Battle of the Sexes, but now between the mixed ESS of the single-shot game and the strategy *quit-Stay* (qS) who plays Stay till the partner runs, and then quits the game. Calculate the payoff matrix for the iterated game and give all ESS-s.