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INFO-F-409 - LEARNING DYNAMICS

Assignment One

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1 The Hawk-Dove game

The Hawk-Dove game was first formulated by John Maynard Smith and Georg Prince in 1973 [1]. The aim of the game is to gain a better understanding of conflicts in the animal kingdom. It consists of two players {Player One, Player Two} who have each two actions {Hawk, Dove}. The resulting payoff matrix can be seen in Table 1 where:

- V = fitness value of winning resources in fight
- D = fitness costs of injury
- T = fitness costs of wasting time

and we assume that $V, D, T \geq 0$.

Table 1: Hawk-Dove Payoff Matrix

		Player Two	
		Hawk	Dove
Player One	Hawk	$(V-D)/2$ / $(V-D)/2$	0 / V
	Dove	0 / V	$V/2-T$ / $V/2-T$

In a mixed strategy game, we consider each player performing his action with a certain probability p , which results in the following payoff matrix displayed in Table 2.

Table 2: Hawk-Dove Probability Payoff Matrix

		Player Two	
		$P(\text{Hawk}) = q$	$P(\text{Dove}) = 1-q$
Player One	$P(\text{Hawk}) = p$	$(V-D)/2$ / $(V-D)/2$	0 / V
	$P(\text{Dove}) = 1-p$	0 / V	$V/2-T$ / $V/2-T$

2 Which social dilemma?

3 Sequential truel

References

- [1] J. Maynard Smith and G. R. Price. The logic of animal conflict. *Nature*, 246(5427):15–18, 1973.