Life's a Game

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We sometimes joke about the world conspiring against us. For instance, I might suggest that it will rain today because I'm without my umbrella or that my football team will play poorly this weekend because I'm attending the game. But of course the weather is not influenced by my umbrella, and football teams do not perform any differently when I'm present. Any perceived correlations here are most likely illusory or, if real, mere accidents. In other words, the probability of a fine day and the probability of my team playing well are independent of my actions.

But sometimes the world does conspire against us; it reacts to our decisions in real and occasionally unexpected ways. Consider the game of tennis. Suppose that after making a particularly difficult return, I find myself a long way behind the base line. I might have the following thought: "with my luck, the next ball will be very short and I'll need to run to the net." But this is no mere paranoid thought. My opponent, seeing that I'm out of position, will attempt to return the ball so as to make it as difficult as possible for me, and a drop shot just over the net is a good candidate. My decision to run so far behind the baseline makes the drop shot more likely. Unlike the previous example, we do have probabilistic dependence here: my actions influence the action of the other player (and vice versa).

When we have such situations, where the end result depends on more than one agent's decision and the decisions of each agent contributes to the decision of the other, we are in the realm of *game theory*. This theory is so named because it is straightforwardly applicable to competitive games such as tennis, chess, poker, and the like. But it is not confined to recreational games. The theory was developed during the cold war to model more serious games of "first strike" and "the nuclear arms race". (See Poundstone for more on the historical background and Luce and Raiffa 1957, and von Neumann and Morgenstern 1947 for early presentations of the theory.) Game theory is widely applied in areas such as economics (e.g. Gibbons 1992) and conservation management (e.g. Colyvan et al. 2011). Within philosophy, game theory has been used to shed light on morality (Joyce 2010), conventions and language development (Lewis 1969), and even dating and relationships (Colyvan 2010).

A common thread in many of these philosophical applications is to provide an account of cooperation in a world that's often stacked in favour of going it alone (Skyrms 2004). For example, altruism is initially hard to explain in an evolutionary framework (Sober and Wilson 1998). After all, altruistic behaviour results in a reduction in fitness compared to selfish individuals. We would thus expect altruism to be selected against, yet altruism is widespread in nature (Okasha 2009). Take anther example of cooperation: a typical social contract such as two people agreeing to go tango dancing together. Suppose that both parties prefer to tango together but there is always the risk of one defecting, in

which case the other person is left stranded. To avoid being stood up, each person should be looking to defect from the tango agreement, despite the fact that both would prefer to be tango dancing. This kind of situation is known as a *stag-hunt game* (after a passage in Rousseau (1984) about an agreement to cooperatively hunt) and is deeply puzzling. Both parties can easily end up with their second best option. One way to understand why people do honour such social contracts rests on the idea of "the shadow of the future" (Axelrod 1984). By defecting from the tango agreement a person is likely to find it difficult to find tango partners in the future. The threat of this future cost can outweigh any benefit gained from defecting from the current agreement. This is the key to cooperation.

Game theory is important in both everyday decisions and public policy. We need to recognize those situations where the world is capable of reacting to our decisions. In such situations we need to anticipate the possible reactions before we make a decision or implement public policy. For example, I once heard a story of a gun buy-back scheme in Brazil. The policy was designed to reduce the number of guns on the streets. But many people reacted to the new policy by manufacturing home-made guns to sell under the buy-back scheme. Amateur gun production was an unexpected outcome of the new policy and came about because reactions to the new policy were not properly considered. Game-theoretic thinking can help us avoid having our decisions come back to bite us like this.

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