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## The Business End

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# What game theory teaches us about Lance Armstrong

Just stay with me there a minute...

BY [LIAM STOKER](#)

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Lance Armstrong, once cycling's poster child, now faces a future in disgrace. Forced into standing down from the chairmanship of his cancer charity Livestrong, Nike has unceremoniously dropped him in the face of "insurmountable evidence" put forward by the US Anti-Doping Agency.

Having masterminded what USADA has referred to as "the most sophisticated, professionalised and successful doping programme that the sport has ever seen", Armstrong cheated his way to an unprecedented seven Tour de France wins. Hard evidence and witness accounts have now testified, however, that the only thing Lance Armstrong convincingly won in his cycling career was a doping arms race.

With the help of controversial doctor Michele Ferrari, Armstrong and his team mates at the US Postal Service team stayed one step ahead of anti-doping officials. Not only were doping regimes planned to evade detection, but Ferrari was given information relating to testing procedures, allowing him to devise specific workarounds.



Lance Armstrong. Photograph: Getty Images

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doping officials continually closing doors only opened by the dopers themselves. A chicken and egg argument with a definitive answer, but no apparent solution. Athletes continually uncover methods in which to subvert the regulations, only to leave anti-doping officials in a perpetual state of catch-up.

Anti-doping authorities like USADA and WADA must tighten their practices and work towards enforcing much stricter parameters for athletes to qualify from; however they are at an instant disadvantage given the position from which dopers can work from. Game theory, the mathematical modelling of how two intelligent entities strategically interact, has been used to refine airport security measures to become less predictable, could it be used in a distinctly similar fashion here to thwart dopers?

A particular strain of game theory, dubbed Stackelberg, game suits the doping proposition perfectly, as it requires one entity to establish its defences first whilst the other conducts surveillance to identify weak spots. The notion of a sequential move, with the opposite entity responding to measures established by the first, closely resembles the way in which cycling's dopers have found ways to subvert cycling's anti-doping strategy.

Stackelberg game is also capable of introducing what has been billed as systematic randomness to the equation, vital in this instance given the random nature of drug testing. Cyclists can be requested to provide a sample at any time, even in the middle of the night, a factor which can be worked into the game. Stackelberg game has been used in airport security to make strategies harder to analyse through surveillance, a method which could have thwarted the way in which Armstrong and Ferrari successfully thwarted USADA for more than a decade.

What Lance Armstrong has managed to make abundantly clear is that current anti-doping controls are not working. Testing procedures need to become significantly more stringent and randomised if they are to be considered fit for purpose. If Stakelberg game can profess to do just that, then perhaps it's time the theory's own systematic and intelligent randomness was put to good use.

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