

The quick and the dead: Evidence that movement is swiftest in response to events in the environment

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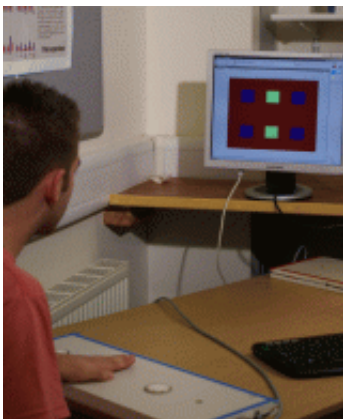


Photo: Biotechnology and Biological Sciences Research Council

Scientists funded by the Biotechnology and Biological Sciences Research Council (BBSRC) and the Wellcome Trust at the University of Birmingham have carried out "laboratory gunfights" to show that we move faster when we react to something in our environment than we do when we initiate the action ourselves - an idea inspired by cowboy movies but in reality more useful for avoiding oncoming traffic. The research is published today in *Proceedings of the Royal Society B*.

Think of the Wild West of early Hollywood movies where the man who draws his gun first is the one to get shot at. This is what inspired the

Nobel Laureate Niels Bohr to suggest that the intentional act of drawing and shooting is slower than the act of firing in response to another's initial action i.e. the "quick draw" is the one responding to their opponent's action rather than the one initiating the dual.

Dr Andrew Welchman, a BBSRC David Phillips Fellow at the University of Birmingham, led the research. He said: "In our everyday lives, some of the movements we make come about because we decide to make them, while others are forced on us by reacting to events. Bohr's suggestion reflects this everyday intuition. We wanted to know if there was evidence for these reactive movements being swifter than the equivalent proactive ones. So we set up a competition between two people who were challenged to press a row of buttons faster than their opponent. There was no 'go' signal so all they had to go by was either their own intention to move or a reaction to their opponent - just like in the gunslingers legend."

The team found that the participants who reacted to their opponent executed the movement on average 21 milliseconds faster than those who initiated the movement. However, they did not respond as accurately in the test.

Dr Welchman continued: "As a general strategy for survival, having this system in our brains that gives us quick-and-dirty responses to the environment seems pretty useful. 21 milliseconds may seem like a tiny difference, and it probably wouldn't save you in a Wild West dual because your brain takes around 200 milliseconds to respond to what your opponent is doing, but it could mean the difference between life and death when you are trying to avoid an oncoming bus!"

"Apparently Bohr tested his theory in toy pistol fights with his colleague, George Gamow. Bohr took the reactive approach and won every time, thus proving himself correct - or at least it looked that way. Actually he

was probably just a very good shot!"

The team are now interested to know if there are two different brain processes happening for the two types of action. There might be some evidence for this in people with Parkinson's disease. It is known that people with Parkinson's disease find intentional movements far more difficult than reactive ones - if you ask someone with Parkinson's to pick up a ball from a table they can find it far more difficult than they would to catch the same ball if it were thrown at them. This might be evidence that particular areas of the brain affected by Parkinson's contribute more to intentional actions than reactive ones. If this turns out to be the case, then it might also be possible to develop some strategies to ease movement in such patients.

Professor Douglas Kell, BBSRC Chief Executive said: "Bioscience will provide solutions to many of the challenges faced in the 21st century and this includes keeping us healthy throughout our lives. By understanding our brains we can know more about how they develop in early life and also why and how they deteriorate, particularly later in life. By generating this knowledge, bioscience research provides unique access to possible actions that we might use to prevent or delay this."

More information: The research is published in Proceedings of the Royal Society B: rspb.royalsocietypublishing.org/content/firstcite

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