Why mirror neurons play a part in jubilation

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World Cup: why mirror neurons play a part in jubilation

The FIFA World Cup starts next Thursday in Brazil. When you, as a football fan, join in the celebrations because your favourite team wins or are extremely crestfallen at a defeat then the so-called mirror neurons are in play.

It is a well-known effect: anyone seeing someone else smiling joins in involuntarily. When someone cries, you feel sad yourself or even start to cry. The mirror neurons play an important role in this empathetic behaviour. These neurons mirror external impressions in the brain and allow us to empathise with what is happening around us. "Mirror neurons are thought to be responsible for us being able to put ourselves in

someone else's shoes and yet make us able to distinguish the 'self' from 'not- self'," explains Ornella Valenti from the Department of Cognitive Neurobiology at the Centre for Brain Research of the MedUni Vienna.

The more what is being observed equates to our previous experiences, particularly regarding motor activities, the more intensely the mirror neurons fire. This is why it is possible at a football match for the fans of the victorious eleven to be celebrating whilst, at the same time, the others are weeping. During observation of a known motor action, many other brain areas are activated and among those the one that "signal" rewarding experiences, explains Valenti.

The mirror neurons' resonance system is also responsible for another effect: fans, who themselves play or have played a lot of football and who know how the game works, are better able to "read" a game. Says Valenti: "Studies have shown that, during the game, these football experts are better able to predict the moves. When they do this their mirror neurons are firing more than in other people who understand less about football." In control groups, who have never, or rarely, seen a football match and have not played themselves, the mirror neurons did not fire at all or barely. Says Valenti: "Mirror neurons apparently enable us to pick up the intentions of others intuitively. And all the more, the better acquainted we are with these intentions or actions from our own experience."

In the beginning was the peanut

Mirror neuron research is still in its infancy. It all started 30 years ago in the Italian town of Parma with an ape, a lead trial investigator and a peanut. Originally, the research group around the physiologist Giacomo Rizzolatti had only wanted to conduct research into how actions are planned in the brain and then executed. The scientists were able to measure corresponding neuronal firing when the animals grasped some

food. But suddenly the measuring device also deflected when one of the researchers grasped a nut. And yet the ape sat there quite calmly. Further investigations highlighted that mirror neurons are actually able to decode the intention beyond an action.

Important for social interaction and learning

In the human brain, mirror neurons are mainly found in those areas in which actions are planned or initiated. As well as the primary motor cortex, which transmits the motion impulses to the muscles, this system mainly comprises the premotor as well as the supplementary motor area. They have the task of planning more complex action sequences and coordinating the individual steps necessary.

Brain research holds that important social interactions may depend on mirror neurons. Autism is then a possible outcome. Studies have shown that mirroring does not take place in the premotor cortex of autistic subjects.

Mirror neurons are also utilised in rehabilitation medicine when treating stroke victims: first the patients are shown exercises on the screen, which they are then to carry out themselves. Activating the mirror neurons in this way should help them overcome the paralyses at least in part. "In general, mirror neurons make a positive contribution to learning and communication, this also applies to small children as they imitate us," says Valenti. A baby can imitate certain actions and facial expressions when only a few days old. This can probably also be attributed to the action of mirror neurons. By the way, this also applies to the learning and imitation of the body's posture when kicking a ball.

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