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Study indicates how we make proper movements

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When you first notice a door handle, your brain has already been hard at work. Your visual system first sees the handle, then it sends information to various parts of the brain, which go on to decipher out the details, such as color and the direction the handle is pointing. As the information about an object is sent further along the various brain pathways, more and more details are noticed -- in that way, a simple door handle turns into a silver-plated-antique-style-door-handle-facing-right. Information about the handle also reaches the part of your brain responsible for planning movements (known as the pre-motor area), and it comes up with a set of motions, allowing you to turn the handle with your right hand and open the door.

However, this is not necessarily a simple process for the brain. For instance, how do we end up turning the door handle with our right hand, instead of just hitting it with our left? During this analysis, the brain is bombarded with a lot of irrelevant information, so it relies on a control system to filter out unnecessary information. In the visual system, this control mechanism is known as center surround inhibition and it works by activating only the neurons that are required for further action.

In other words, if any extra neurons are turned on, this control mechanism will shut them off, so that the brain can focus on the relevant information. Although the center surround inhibition system has been well documented in the visual system, it was not known if this type of control mechanism exists in the motor regions of the brain. Psychologist Daniel Loach from Macquarie University in Sydney and his colleagues

conducted a set of experiments to explore inhibitory mechanism in the areas of the brain involved in planning movements.

A group of participants were successively shown two door handles and had to press a left or right button which corresponded to the texture (either wood or metal) of the second handle. Some of the pairs had both of the handles in the same orientation, in other pairs the two handles would be rotated at varying angles. In addition, the researchers noted which hand was used to make the response— if it was compatible or incompatible with the direction the handle was facing (e.g. the right hand was compatible for handles that were facing right).

The results, published in the December issue of *Psychological Science*, a journal of the Association for Psychological Science, show that the participants were faster to respond with the compatible than with the incompatible hand if both the handles shared an identical orientation; if the two handles were at slightly different angles, the response time with the compatible hand was much slower. When the two handles were angled 60° away from each other, response times were similar for both the compatible and incompatible hands.

These results suggest that when we see an object, a number of motor programs in the brain are involuntarily activated (each with a different potential movement we can make), which all compete with one another. One program emerges as the winner of the competition and is ready to be implemented while the other programs (which would result in erroneous movements) are inhibited.

These results indicate that there is a common mechanism which acts in both perception and movement. These findings also tell us how information travels throughout the brain and how the motor system and visual system interact. The authors note that these results do not only give us information about normal brain functioning, but suggest that

deficits with the center surround inhibition mechanism may contribute to poor motor planning and coordination which often accompany autism and schizophrenia.

Source: Association for Psychological Science