What is 'Real'? How Our Brain Differentiates Between Reality and Fantasy

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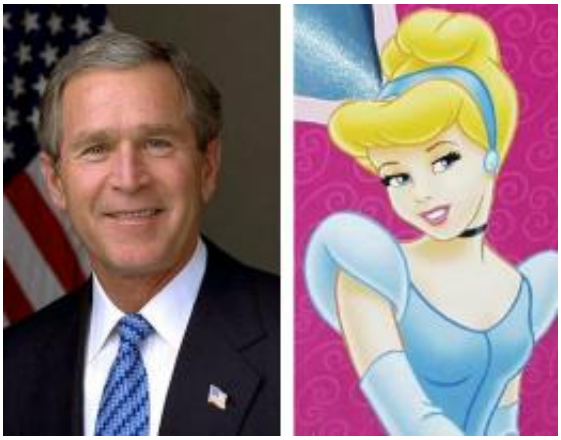

What criteria does the brain use for distinguishing between real people such as George W. Bush and fictional characters such as Cinderella? Recent research suggests that personal relevance may be a key factor, although there are exceptions.

(PhysOrg.com) -- Most people can easily tell the difference between reality and fantasy. We know that characters in novels and movies are fictitious, and we also understand that historical figures - even if we've never met them personally - were real people. As obvious as this distinction may seem, however, scientists know very little about the specific brain mechanisms that are responsible for our ability to distinguish between real and fictional events.

Recently, research has identified two areas of the brain that are more

strongly activated when people see real characters than when they see fictional characters. These brain regions - in the anterior medial prefrontal and posterior cingulated cortices (amPFC and PCC) - are known to be involved during autobiographical memory retrieval and self-referential thinking. Based on this finding, scientists have hypothesized that our brains may distinguish between reality and fantasy because real things tend to have a higher degree of personal relevance than fictional things do.

A new study tests this hypothesis that personal relevance is the critical factor in differentiating between reality and fantasy by using functional magnetic resonance imaging (fMRI) to compare the brain's response when processing real and fictional characters. Anna Abraham of the Max Planck Institute for Human Brain and Cognitive Sciences in Leipzig, Germany, and the University of Giessen in Giessen, Germany, and D. Yves von Cramon of the Max Planck Institute for Human Brain and Cognitive Sciences and the Max Planck Institute for Neurological Research in Cologne, Germany, have published their results in a recent issue of *PLoS ONE*.

"Perhaps the greatest significance of the study is that it has enabled us to get a step closer to understanding what 'realness' captures," Abraham told *PhysOrg.com*. "The categorical distinction between reality and fiction that we employ in daily life appears to be too simplistic and non-representative of our phenomenological experience. The term 'real' in itself does not have much explanatory power, as it means only that something objectively exists."

The researchers' experiments helped them investigate what "realness" is, as the brain defines it. Two weeks prior to the experiments, 19 volunteers were asked to submit names of their close friends and family, and also read through a list of famous people and fictional characters to confirm that they were familiar with them. During the experiments, the

participants viewed names of individuals who were either friends/family (high personal relevance), famous people (medium personal relevance) or fictional characters (low personal relevance). The participants also answered questions, such as whether it was possible for someone to talk with one of the people/characters (interactions between real people and fictional characters were considered impossible).

As the researchers had predicted, the results showed that when participants answered questions about their friends and family (high personal relevance), stronger activation occurred in the amPFC and PCC regions, as compared with questions about famous people (medium activation) and fictional characters (low activation). As the scientists explained, our conceptual knowledge of real people is more extensive than our knowledge of famous people, and much more extensive than our knowledge of fictional characters. But this finding also raises further questions.

“I experience my mother and George Bush as being ‘more real’ than Cinderella, but why do I experience George Bush as being ‘less real’ than my mother?” Abraham said. “After all, both people objectively exist. Is it because I’ve never interacted with him? Is it because I know less about him? Would he have been more relevant for me if he waged war on my home country? These are all open questions that can only be answered when we define what constitutes ‘realness.’ And we have shown in this study that one factor that affects how real I perceive someone to be is modulated by how personally relevant the person is for me.”

The researchers further explained that personal relevance is not unequivocally related to what is real, since some individuals may experience personal relevance in certain fictional realms, such as in chronic computer gaming or religion. For instance, for a chronic gamer, a World of Warcraft character could yield greater activation in the amPFC and PCC than a real person of low personal relevance would.

Abraham added that, although the current research doesn't provide insight on a connection between fictional violence and real violence, future related research may help understand if a connection exists.

"A great deal more work needs to be done before we attempt to assess such complex connections," she said. "For a start, one needs to define what exactly is meant by fictional violence - is it limited to violence experienced while playing computer games or does it extend to watching violent movies and/or even to one's own fantasies about carrying out violent acts? Of utmost importance when exploring such ideas is to aim for specificity (avoiding undue generalizations)."

In addition to helping understand how the brain differentiates between reality and fantasy, this study could help researchers understand the brain's default network, to which the amPFC and PCC belong. The default network is a group of brain regions that are generally more engaged during passive periods, such as when at rest or when performing undemanding tasks. During these periods, the brain tends to multitask, such as by reflecting on past events, planning future events, or thinking self-consciously.

This study shows that brain regions (the amPFC and PCC) in the default network are automatically engaged when an individual views a person's name - even when the individual is not thinking specifically about their own personal relevance to the person. In other words, personal relevance is not relevant to this task, but it may be explained by the anticipatory nature of the brain. The default network may play a role in automatically evoking various associations with a stimulus in order to quickly react, if needed. This finding may help researchers further understand how the brain's default network works.

"Our immediate plans are to verify our findings by exploring the modulation of personal relevance within fictional and real domains," said

Abraham. “An example of a within-fictional domain investigation, as stated in the paper, would be studying chronic gamers versus beginner gamers on group-relevant versus group-irrelevant information. An example of a within-reality domain investigation would be studying groups with different vocations/interests - for instance, political journalists would be expected to find information concerning politicians far more relevant than that of celebrities, whereas the situation would be expected to be vice versa for paparazzi journalists. There are several avenues to be explored. Once the findings have been verified across a variety of situations, we will be in a better position to dig deeper to uncover how our brains encode and store such categorical information in the first place, how malleable the reality-fiction distinction is, and so on.”

More information: Anna Abraham and D. Yves von Cramon. “Reality = Relevance? Insights from Spontaneous Modulations of the Brain’s Default Network when Telling Apart Reality from Fiction.” *PLoS ONE*, March 2009, Volume 4, Issue 3, e4741.