The Science of Sameness

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Let's face it: People rarely make history by fitting in. It takes a Nelson Mandela or an Aung San Suu Kyi to draw attention to a cause, a George Lucas or a Madonna to revolutionize an entertainment genre, and a Donald Trump or a Jon Stewart to change the nature of political discourse.

But for most people, fitting in feels far more comfortable than bucking convention. That human tendency has propagated such common behaviors as recycling, picking up after pets, and tipping wait staff. But conformity also can carry negative consequences — juries may reach a unanimous verdict because one or two people on the panel feared disagreeing with the others; a man may force himself to laugh at a sexist joke because his buddies are chuckling at it; and teens may decide to drink alcohol because "all the cool kids are doing it."

Psychological studies on conformity have come a long way since Solomon Asch developed his famous experiments on social pressure in the 1950s. They're showing that conformity is not just a learned behavior, but one that is innate and much more pronounced in humans than in other primates.

Now scientists are investigating the brain processes that drive conformity as well as deviation from it. The research provides new insights into how people handle disagreement and why they comply with rules, customs, and directives even when they believe them to be objectionable. Moreover, these studies stand to uncover the neuroscience behind social deviation.

The Reward Response

Among scientists studying the links between the brain and conformity is APS Fellow Christopher D. Frith, emeritus professor of neuroscience at the Wellcome Trust Centre for Neuroimaging at University College London, United Kingdom, in collaborations with experimental psychologist Daniel Campbell-Meiklejohn of University of Sussex, United Kingdom. Their work indicates that when other people agree with us, our brains show relatively heightened activity in areas related to reward.

In a study several years ago, Campbell-Meiklejohn, Frith, and an international team of researchers recruited 28 volunteers and asked them to make a list of 20 songs they liked but did not own in any format. The participants then rated how much they wanted to own each of the songs on a scale from 1 to 10, with 10 being the highest. They also read profiles of two music reviewers and rated how much they thought each of those individuals could be trusted to pick music they (the participants) would like.

While undergoing functional MRI (fMRI) scans a week later, the subjects viewed a display with the title of a song from their preferred list on one side of the screen and another song title chosen by the experimenter. Participants randomly received a token for one song title on each trial (either their choice or that of the experimenter) and were told that the songs with the most tokens at the end of the task would be given to them on a CD.

Before receiving the token, however, the participants were shown which of the two songs were preferred by each of the reviewers. After the task was over, subjects rated their songs for desirability again.

The fMRI results showed that participants showed relatively greater activity in the ventral striatum, a brain region associated with reward, when their preferred song received a token compared with when the alternative tune got the token. That activity was even stronger when participants' opinions matched those of both of the critics, and this effect was greatest in subjects whose song ratings were influenced by reviewer opinion.

In a later step in that study, Campbell-Meiklejohn, Frith, and colleagues keyed into a specific brain area that seemed to link with our response to consensus. They found that subjects who had more volume in one precise brain region — the lateral orbitofrontal cortex — were more likely than their peers to change their ratings to more closely align with the critics' ratings.

The findings suggest, the researchers note, that the lateral orbitofrontal cortex is particularly sensitive to signs of social conflict or disagreement, which may influence changes of opinion.

“Our results show that social conformation is, at least in part, hardwired in the structure of the brain,” Frith said.

The Punishment Threat

Other researchers have explored activation in threat-processing brain structures when we violate social norms. Among them are APS Fellows Manfred Spitzer (University of Ulm, Germany) and Ernst Fehr (University of Zurich, Switzerland). In a study published in 2007, they examined the brain activity that occurs when we're faced with the consequences of deviating from social expectations. Additionally, they set out to explore how personality affected individual responses to punishment for nonconformity.

Spitzer, Fehr, and colleagues recruited 24 men and had the volunteers fill out a questionnaire designed to measure Machiavellian personality traits such as selfishness and opportunism. They then divided the group into pairs to play a game. Each pair was given an initial endowment of 100 virtual money units, which Player A was empowered to split between himself and Player B. They also received a secondary endowment of 25 money units.

The men assigned to be Player A wore fMRI-compatible video goggles and participated in a series of 24 trials, facing a different Player B each time in one of two randomly alternating conditions.

In the control condition, Player B simply received whatever Player A offered from the 100-unit endowment. In the punishment condition, Player B — if he felt he received an unfair amount from the 100-unit endowment — could penalize Player A by spending all or part of the additional 25-unit pot to reduce their earnings. Specifically, every unit that Player B spent resulted in a 5-unit reduction in Player A's earnings. If Player A kept all 100 units from the first pot, for example, Player B could inflict the maximum punishment and spend all 25 units from the second pot. This would leave Player A with nothing.

In analyzing the results, the researchers found that on average, Player A gave approximately 10 units to Player B in the control condition while sharing about 40 units in the punishment condition. In fact, several of the A subjects who gave no money units in the control condition changed their behavior markedly in the punishment condition, the scientists noted. The finding illustrated that participants were induced to be fair when they faced the threat of a punitive response for being selfish. And as expected, the less A players gave in the punishment condition, the more severely the B players treated them in response.

But how did this manifest in the brain imaging? The researchers found that, compared with the control condition, A players in the punishment condition showed significantly higher activation of the lateral orbitofrontal cortex and the right dorsolateral prefrontal cortex (rDLPFC) when deciding how much to share with B players. Given that the rDLPFC is known to be involved in the evaluation of punishment threats, this finding supports the theory that pressure to conform to social expectations activates a brain-based punishment warning system of sorts. (In 2013, Fehr was part of a team that further demonstrated this, using noninvasive stimulation of the rDLPFC to actually change norm compliance.)

Unsurprisingly, the participants who had scored high on Machiavellian traits transferred less money during the control condition and more in the punishment condition. They also showed heightened activation of key brain areas involved in social-norm compliance. This all fit the typical Machiavellian focus on self-interest.

To compare those brain responses with a condition with a nonsocial punishment, the researchers conducted an additional experiment in which Player A interacted with a preprogrammed computer instead of a human Player B. The researchers found that punishment from the computer produced significantly less activation in the brain areas compared with the human interaction. The psychological scientists suggested their findings could lead to new understanding of psychopathic behavior, since individuals with damage in the prefrontal areas of the brain show an inability to behave in accordance with social norms even when they comprehend them.

Conformity Control

If science can link brain regions with social conformity, can it in turn foster techniques to manipulate our tendency to stick with or break from the pack? Campbell-Meiklejohn and Frith also were on a team of researchers who explored whether Ritalin and other methylphenidates (MPH) used to treat attention-deficit hyperactivity disorder might not increase conformity in behavior, but also in judgment.

The research team gave 38 female adult volunteers a dose of either MPH or a placebo, waited an hour, and then had participants view pictures of 153 faces and rate them for levels of trustworthiness. After rating each face, the volunteers were told the average rating of that face by participants performing the same task at other European universities — in other words, the social norm.

After performing some unrelated tasks for 30 minutes, the volunteers again were unexpectedly asked to rate faces for trustworthiness. They found that, on average, the subjects who received the MPH changed their second rating to twice the extent of the placebo group to conform to the social norm if their original rating moderately deviated from what they were told was average. (This didn’t occur when the volunteers had widely divergent opinions compared with the norm.) The researchers thus propose that MPH may amplify brain signals that promote conformity.

In many cases, a person’s tendency to conform can have negative consequences — think of people joining a violent protest or buying into political propaganda. Researchers led by psychological scientist Vasily Klucharev of Radboud University in the Netherlands have studied the possibility of controlling the drive to conform. They tested a way to moderate conformity by sending electromagnetic pulses to the posterior medial frontal cortex (pMFC), another part of the frontal cortex implicated in reward processing and behavioral adjustments and believed to play a role in social conformity.

Klucharev and his colleagues recruited 49 female students and randomly assigned them to three groups. One group received transcranial magnetic stimulation (TMS) to the pMFC and another group was given subthreshold TMS to the same brain region (i.e., a sham treatment). The third group received TMS to a different part of the brain — the medial parietal cortex.

The women then viewed more than 220 photographs of female faces in randomized order and rated each face on an 8-point scale, with 8 being the most attractive. For each face, they were quickly shown a comparison of their own rating with the average score given by 200 of their peers. In a second session, they were instructed to rate the attractiveness of the same faces, again in randomized order.

In analyzing the differences in ratings between the two sessions, the researchers found that participants in all three TMS groups changed their ratings in the second session to align with the average ratings from their peers. But those who received the full stimulation to the pMFC adjusted their ratings to a lesser degree compared with the women in the sham treatment and those in the control group. Klucharev and colleagues said their research should be expanded to include men as well as other social situations.

Conforming for the Greater Good

Some scientists are investigating the neural mechanisms that drive conformity in the prosocial or healthy sense. APS Fellow Jamil Zaki of Stanford University has conducted several neuropsychological experiments on conformity and has found benefits ranging from public health to charitable giving.

In an experiment conducted last year, for example, Zaki and graduate student Erik C. Nook of Harvard University had research participants undergo fMRI scans while they rated how much they liked a series of both nutritious and unhealthy food items. The participants then were shown average ratings ostensibly made by 200 of their peers for each item, and then rerated the foods while still in the fMRI.

The volunteers' second group rating shifted to resemble the supposed group average. But more specifically, the participants who showed higher activity in the nucleus accumbens, a brain area critical in reward response, more closely aligned their second ratings with the average compared with those who showed less activity in that area. Additionally, they found that participants showed heightened activity in the ventromedial prefrontal cortex, which plays a role in valuations and decision-making, when they were led to believe that their peers like a particular food more than they did. And those the individuals showed an increased preference for those foods upon rerating them.

Zaki and Nook say further research will explore how long such shifts in preference last, but they view the results of their work as a possible intervention for high obesity rates. Might people develop an aversion to junk food if they believe their friends and neighbors are eating vegetables, fruits, and whole grains?

Zaki says research like his reveals that conformity may not be just a matter of lying or faking in order to fit in — as it's often characterized to be — but actually a path toward changing our opinions and values.

"We see conformity as a weakness; we say it supports bad behavior" such as smoking or overeating, he says. "But if you think conformity is a powerful social mechanism through which we change our ideas about the world, it could be used positively," such as by encouraging people to vote or donate to charity. œ

References and Further Reading

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