Extraversion, Introversion, and the Brain

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The terms "extravert" and "introvert" are often used to describe individuals' interpersonal relations, but what do these terms mean precisely, and is there a neurobiological basis for these personality traits?

The terms originated from psychologist Carl Jung's theory of personality. Jung saw the extravert as directed toward the outside world and the introvert as directed toward the self (1). He characterized extraverts as being "active" and introverts as being "passive." Jung believed that these two types of people shared characteristics of both introversion and extraversion and fell somewhere along a continuum from extreme extraversion to extreme introversion (2). Extraversion allows the personality to "stretch out" and interact with the world, whereas introversion "closes the door, and returns attention inward" (3).

The brain structures research has indicated are active in controlling impulsivity are the orbitofrontal cortex, nucleus accumbens, and amygdala regions, many of the same ones that mediate extra- and introversion (4). Impulsive Disorders characterize impulsivity as "the failure to resist an impulse, drive or temptation that is harmful to oneself or others" (5). It is to pursue a goal. Low levels of serotonin, correlated with depression, may make people more responsive to dopamine and more susceptible to dopamine-stimulating drug use such as the use of cocaine, alcohol, amphetamine, opiates, and nicotine (6).

Impulsivity, which Depue and Collin's link to extraversion, can in its extreme cause attention deficit/hyperactivity disorder, pathological gambling, intermittent explosive disorder, kleptomania, pyromania, sadism, auto-mutilation, sexual impulsivity, as well as borderline personality disorder, and antisocial personality disorder (7). Jennifer Greenberg and Eric Hollander, M.D., in their article "Brain Function and Impulse Control Disorders" characterize impulsivity as "the failure to resist an impulse, drive or temptation that is harmful to oneself or others." (8). One can see why Depue and Collin see impulsivity as being linked with positive emotionality (9). The definition of impulsivity is almost the same as their definition of positive emotionality (more sensitivity to reward than punishment). The only addition is the inability to determine when the punishment outweighs the reward. According to Depue, the extreme extravert, then, is someone who has high dopamine reactivity and, as a result, easily rewards-based cues to impulsive behavior. That person will appear full of positive emotion and highly active in approaching rewarding stimuli and goals. The low extravert will find it difficult to be so motivated and will require very strong stimuli to engage in rewarding activities (10). It is to pursue a goal. Low levels of serotonin, correlated with depression, may make people more responsive to dopamine and more susceptible to dopamine-stimulating drug use such as the use of cocaine, alcohol, amphetamine, opiates, and nicotine (6).

It seems likely that past experience would play a larger role than Depue indicates in inducing motivation. Experiencing social rejection would seem to discourage more risk-taking in the future, but perhaps for those with high positive emotionality, and the effective dopamine production and absorption system that it implies, the reward for succeeding is so great that they will continue the behavior even if they fail repeatedly. Perhaps there is a neurobiological basis for the term "habitual" or "casual skier" or "casual skier," for being a habitual gambler or a casual skier.

What happens at the brain is the neurobiological make-up of someone with high positive emotionality and then suffers a traumatic event. According to Depue, such a person would be in the 30-50% of the population whose positive emotionality is not directly related to genetics and the functioning of their dopamine reuptake receptors. In a less uninhibited way, the same affect is observable in people taking stimulants. Thus, according to Depue, the same affect is observable in people taking stimulants. Thus, according to Depue, the same affect is observable in people taking stimulants. Thus, according to Depue, the same affect is observable in people taking stimulants. Thus, according to Depue, the same affect is observable in people taking stimulants. Thus, according to Depue, the same affect is observable in people taking stimulants.

The desire to pursue goals and to engage in social interaction are linked, in part, to the dopamine system. In particular, there is convincing evidence that the production and absorption of the neurotransmitter, dopamine, affects the perceived intensity of the incentive stimulus, and so, how motivated the subject is to pursue the goal (2). This paper reflects the research and thoughts of a student at the time the paper was written for a course at Bryn Mawr College. Like other materials on Serendip, it is not intended to be authoritative but rather to help others further develop their own explorations. Web links were active as of the time the paper was posted but are not updated.

References


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