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WHAT INTUITION IS AND HOW IT ARISES IN THE BRAIN. AN ANALYSIS USING HIGH INTELLIGENCE AS A REFERENCE

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Abstract: The aim of this study is to offer a more in-depth interpretation of the concept of intuition, based on research carried out with gifted people from the *Gifted debate* group, linked to the Heraclitus Research and Analysis Center (CPAH). Intuition is analyzed as a capacity that goes beyond intellectual abilities measured by IQ tests, also encompassing emotional and social intelligence and subjective creativity. Creativity is discussed as the ability to generate new ideas spontaneously, without necessarily having prior knowledge of the subject. Thus, intuition is presented as a phenomenon that explores various cognitive and emotional dimensions in search of new possibilities.
Keywords: intuition, giftedness, emotional intelligence, social intelligence, subjective creativity, IQ tests.

INTRODUCTION

Intuition has traditionally been described as a form of implicit knowledge, manifesting itself without the use of conscious reasoning and in an apparently immediate way. Although widely debated in areas such as psychology and philosophy, the neuroscientific understanding of intuition has advanced significantly with the development of modern techniques such as neuroimaging and genomics. This study aims to elucidate the neural and biological mechanisms underlying intuition, with a focus on the correlation between high intelligence and the cognitive processes that support it.

In addition, the aim of this study is to improve the interpretation of the concept of intuition, using research carried out with gifted individuals belonging to the *Gifted debate* group, linked to the Heraclitus Research and Analysis Center (CPAH). Intuition transcends the cognitive abilities traditionally assessed by IQ tests, also encompassing aspects of emotional and social intelligence and subjective creativity - the latter referring to the ability to spontaneously generate new ideas, even in areas in which the individual has no formal expertise. Intuition therefore explores possibilities in multiple dimensions, integrating different facets of intelligence.

DEVELOPMENT

Definition of Intuition: Intuition is characterized as a form of cognitive processing that results in quick and efficient decision-making without the involvement of conscious analytical thought. Studies indicate that intuition is a multisystem phenomenon, involving interconnected cortical and subcortical networks, based on previous experiences and implicit learning (Kahneman, 2011).

The definition of intuition in neuroscience encompasses a complex system of brain regions and neural networks that contribute to rapid decision-making without the conscious involvement of analytical thinking. Below is a detailed description of the main brain regions and sub-regions involved in the intuitive process, as well as the associated neurotransmitters, based on known morphology and neurobiology.

REGIONS AND SUB-REGIONS INVOLVED IN INTUITION

1. VENTROMEDIAL PREFRONTAL CORTEX (VMPFC)

- **Function:** The vmPFC is responsible for integrating emotional and social information, which is essential for generating intuitive responses based on past experiences.
- **Morphology:** Located in the lower part of the frontal lobe, the vmPFC has connections with subcortical areas such as the amygdala and the nucleus accumbens, which facilitates the evaluation of risks and rewards.

- **Neurobiology:** The vmPFC acts in the evaluation of emotional feedback and in the modulation of rapid and adaptive responses, contributing significantly to intuitive decision-making.

2. ANTERIOR CINGULATE CORTEX (ACC)

- **Function:** The ACC plays a crucial role in monitoring conflicts and regulating behavior in situations involving uncertainty, facilitating quick and intuitive responses.
- **Morphology:** Located along the medial surface of the frontal lobe, the ACC is divided into rostral and dorsal regions, each with functions in emotional regulation and attention.
- **Neurobiology:** During intuitive decision-making, ACC helps monitor behavior and adjust responses quickly by integrating emotional and cognitive data in real time.

3. DORSOLATERAL PREFRONTAL CORTEX (DLPFC)

- **Function:** The dlPFC is crucial in executive control and the integration of emotional and cognitive information, playing a central role in the modulation of complex intuitive processes.
- **Morphology:** Located in the lateral portions of the frontal lobe, the dlPFC interacts with associative and motor areas, facilitating the planning and execution of rapid actions.
- **Neurobiology:** It acts in the coordination between deliberative and intuitive thinking, allowing the efficient transition between these two modes of cognitive processing.

4. AMYGDALA

- **Function:** The amygdala is involved in the evaluation of emotional stimuli and the formation of emotional memories that impact intuition, especially in situations of risk or danger.
- **Morphology:** Located in the medial temporal lobe, the amygdala is made up of nuclei that process different emotional aspects, such as fear and reward.
- **Neurobiology:** The amygdala influences intuitive responses by quickly assessing the emotional relevance of stimuli, often in direct communication with the vmPFC and hippocampus.

5. CORPUS CALLOSUM

- **Function:** The corpus callosum facilitates communication between the cerebral hemispheres, enabling the efficient integration of analytical and intuitive processes. In the context of intuition, this structure allows the right hemisphere, which is involved in recognizing patterns and evaluating implicit information, to interact with the left hemisphere, which deals with more rational and deliberative processes.
- **Morphology:** As the largest white matter structure in the brain, the corpus callosum connects various cortical regions in both hemispheres. Its fibers ensure fast and efficient information transfer.
- **Neurobiology:** The corpus callosum allows emotional and contextual information from the right hemisphere to be combined with more detailed analysis from the left hemisphere, facilitating quick and intuitive decisions. Studies indicate that a greater density of fibers in the corpus callosum can improve the ability to integrate different types of cognitive processing, which is crucial for intuition.

6. HIPPOCAMPUS

- **Function:** The hippocampus is involved in the formation and retrieval of explicit memories, allowing the brain to access past experiences in a non-conscious way, fundamental for the generation of intuitive responses.
- **Morphology:** Located in the medial temporal lobe, the hippocampus has a curved shape and is essential in organizing and storing episodic and contextual memories.
- **Neurobiology:** Working together with the amygdala, the hippocampus facilitates the integration of memories with emotional processing, essential for intuitive decisions based on past experiences.

7. INSULA

- **Function:** The insula plays a central role in interoception, i.e. processing internal signals from the body, such as changes in heart or respiratory rate, which can influence intuitive responses.
- **Morphology:** Located deep in the temporal lobe, the insula is subdivided into anterior and posterior regions, each responsible for integrating different types of bodily and emotional information.
- **Neurobiology:** The anterior insula integrates complex emotions and physiological states with decisions based on risks and rewards, while the posterior insula is more involved in sensory and bodily processing.

NEUROTRANSMITTERS INVOLVED IN INTUITION

1. DOPAMINE

- **Function:** Modulates the anticipation of rewards and motivation, and is crucial for adjusting behavior based on past experiences.
- **Associated Regions:** Dopaminergic system, including the prefrontal cortex, nucleus accumbens and subcortical areas such as the substantia nigra and ventral tegmental area (VTA).
- **Neurobiology:** Dopamine facilitates learning from rewards and punishments, a process central to making quick intuitive decisions.

2. SEROTONIN

- **Function:** Regulates mood and emotions, influencing the capacity for intuitive responses, especially in social and emotional contexts.
- **Associated Regions:** The serotoninergic system involves several brain areas, including the prefrontal cortex and limbic system, with the raphe nucleus being the main source of serotonin.
- **Neurobiology:** Serotonin modulates the ability to regulate emotions during intuitive processes, particularly in rapid responses to emotional states.

3. NOREPINEPHRINE

- **Function:** Crucial in the stress response and cognitive readiness, facilitating quick decisions in high-pressure situations.
- **Associated Regions:** The locus coeruleus is the main source of norepinephrine, with projections to the prefrontal cortex and hippocampus.
- **Neurobiology:** Norepinephrine increases vigilance and alertness, which favors the ability to make intuitive decisions in urgent situations.

4. ACETYLCHOLINE

- **Function:** It is involved in attention and focus, playing an important role in detecting patterns and selecting relevant information for intuitive decisions.

- **Associated Regions:** The cholinergic system includes the prefrontal cortex and hippocampus, with the nucleus basalis of Meynert being one of the main sources of acetylcholine.
- **Neurobiology:** Acetylcholine promotes synaptic plasticity, facilitating the reorganization of information that allows for quick responses based on intuition.

Intuition can be understood as a neurobiological phenomenon that emerges from the dynamic interaction between various brain regions and a complex network of neurotransmitters. Cortical regions, such as the ventromedial prefrontal cortex (vmPFC), the anterior cingulate cortex (ACC) and the dorsolateral prefrontal cortex (dlPFC), act in an integrated manner with subcortical structures, such as the amygdala and hippocampus, to combine emotional, social and contextual information in the generation of intuitive responses. These regions do not work in isolation; on the contrary, they communicate continuously and fluidly to form rapid judgments that often escape consciousness. Dopamine, serotonin, norepinephrine and acetylcholine are some of the main neurotransmitters involved, playing key roles in regulating the emotional and cognitive states that facilitate agile and adaptive responses in situations where intuition is required. This view of intuition as a deeply adaptive process anchored in accumulated experience offers a new understanding of how the human brain accesses and uses implicit information to make quick and accurate decisions (Bechara et al., 2000; Botvinick et al., 2004).

GIFTED EDUCATION

Gifted people, defined as individuals with exceptional cognitive abilities compared to the population average, show an increased capacity for intuition. This ability seems to be associated with greater efficiency and connectivity in specific areas of the brain, which facilitates the rapid and accurate processing of implicit information. Neuroscientific studies suggest that some brain regions and networks are particularly important in the cognitive functioning of these individuals and are directly related to intuition. Among these areas, the ventromedial prefrontal cortex (vmPFC), the anterior cingulate cortex (ACC) and the corpus callosum stand out for the role they play in integrating emotional, social and contextual information (Bechara et al., 2000; Botvinick et al., 2004).

The **ventromedial prefrontal cortex (vmPFC)** is fundamental in evaluating rewards and punishments based on past experiences. Gifted people tend to exhibit a greater capacity for learning from feedback, which enhances their intuitive responses. The efficiency with which the vmPFC processes information allows quick decisions to be made based on previously stored data in a non-conscious way, a mechanism commonly observed in highly intelligent individuals (Bechara et al., 2000). This region, connected to subcortical areas such as the amygdala, facilitates emotional integration with the decision-making process, which may give gifted individuals an advantage in situations that require quick and precise responses.

The **anterior cingulate cortex (ACC)**, in turn, is involved in monitoring conflicts and regulating behavior in situations of uncertainty, a crucial aspect for intuitive decision-making (Botvinick et al., 2004). Gifted people, due to their greater capacity for cognitive control, may be more adept at dealing with ambiguity and uncertainty, frequent characteristics in situations that require intuition. The ACC modulates the brain's response to these challenges, allowing it to adapt quickly and efficiently to the environment. The greater activity and connectivity of this region in gifted individuals favors the integration of conflicting signals, enabling a rapid and well-adjusted intuitive response (Pretz et al., 2014).

The **corpus callosum** also plays a central role in intuition in gifted people, as it facilitates communication between the cerebral hemispheres. Studies indicate that gifted people often exhibit more robust inter-hemispheric connectivity, which allows them to more efficiently integrate intuitive processes, typically associated with the right hemisphere, with analytical processes, predominantly located in the left hemisphere (Jung et al., 2007). This interaction favored by the corpus callosum allows for a better synthesis of emotional and rational information, resulting in faster and more adaptive responses. The greater density of fibers in the corpus callosum of gifted individuals may explain their greater intuitive ability, as they are able to access and integrate different types of cognitive processing in a more fluid and efficient manner (Jung et al., 2007).

In addition to cortical regions, **neurotransmitters** play a fundamental role in the intuition of gifted individuals. **Dopamine**, for example, is critical in reward-based learning and motivation, two factors most strongly modulated in individuals with high cognitive abilities. Dopamine facilitates the ability to learn quickly from experience, which enhances intuition in gifted individuals (Goldman et al., 2005). **Serotonin** and **norepinephrine**, in turn, are involved in emotional regulation and cognitive readiness, respectively, influencing the ability to respond quickly and appropriately to the demands of the environment. Gifted people may be more efficient at regulating these neurotransmitters, which enhances their intuitive ability, especially in social and emotional situations (Canli et al., 2005).

In summary, the combination of greater brain connectivity, especially in the **corpus callosum**, and the efficient use of **cortical regions** such as the **vmPFC** and **ACC**, as well as the modulation **of neurotransmitters** such as dopamine and serotonin, seems to give gifted people a significant advantage in the use of intuition. The ability to access implicit information and quickly integrate different types of cognitive processing allows gifted people to make more accurate and faster intuitive judgments, which makes them more effective in complex and uncertain situations.

ON ANALYTICAL THINKING

Analytical thinking involves a specific brain circuit that allows for the logical, sequential and detailed processing of information. This type of thinking is associated with the activation of several cortical areas responsible for executive control, planning, logical reasoning and problem solving. The main regions involved include the dorsolateral prefrontal cortex (dlPFC), the parietal cortex, the anterior cingulate cortex (ACC) and the orbitofrontal cortex, forming a circuit that integrates different types of information to perform complex analytical tasks (Miller & Cohen, 2001).

The **dorsolateral prefrontal cortex (dlPFC)** plays a central role in analytical thinking. It is responsible for executive control, which includes the ability to plan, reason abstractly and inhibit automatic responses. In addition, the dlPFC is involved in the manipulation of information in working memory, which is fundamental for solving complex problems (Miller & Wallis, 2009). Located in the lateral part of the frontal lobe, the dlPFC maintains strong connections with other brain regions, such as motor, sensory and associative areas, facilitating the integration of data for logical reasoning. Functional neuroimaging studies confirm the intense activation of the dlPFC in tasks that require reasoning and sequential planning (Fuster, 2015).

The **anterior cingulate cortex (ACC)** also plays an important role in analytical thinking, especially in monitoring conflicts and selecting adaptive responses. The ACC allows the brain to detect discrepancies between different options or solutions, helping to adjust

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behavior and select the most appropriate response to the problem at hand (Botvinick et al., 2004). This region is activated during tasks involving complex problem solving and decision-making situations, when there are several options to be compared and evaluated.

Another region involved in analytical thinking is the **parietal cortex**, which contributes to selective attention and spatial reasoning. This area, particularly the intraparietal sulcus, is activated during tasks that require the manipulation of numbers or the solution of spatial problems, such as mathematical calculations and geometric reasoning (Dehaene et al., 2004). The parietal cortex interacts with the dlPFC to provide the information needed for logical decision-making, integrating sensory and abstract data for detailed analysis.

Finally, the **orbitofrontal cortex** plays a role in evaluating risks and rewards during analytical thinking. This region is involved in making decisions that require considering future outcomes and evaluating possible consequences, which is essential for planning and problem-solving (Wallis, 2007). Together with other regions of the analytical circuit, the orbitofrontal cortex helps guide behaviour towards solutions that maximize benefits and minimize risks.

MORPHOLOGY OF EMOTIONAL AND SOCIAL INTELLIGENCE

Emotional and social intelligence involves a brain circuit that integrates various areas responsible for emotional processing, decision-making and social interaction. Central regions in this process include the amygdala, the ventromedial prefrontal cortex (vmPFC), the anterior cingulate cortex (ACC) and the temporoparietal cortex. These areas work together to evaluate emotional signals, process social information and regulate appropriate behavioral responses, allowing for efficient navigation in complex social environments (Adolphs, 2009).

The **amygdala** is fundamental for processing emotions, especially in recognizing and responding to emotional stimuli such as fear and joy. It plays a crucial role in detecting emotional signals in other individuals, facilitating empathy and the evaluation of social intentions. In addition, the amygdala has direct connections with the **ventromedial prefrontal cortex (vmPFC)**, which is responsible for regulating emotions and making decisions based on social judgments. The vmPFC integrates emotional signals coming from the amygdala and other limbic regions, modulating behavior according to social norms and expectations (Pessoa, 2008).

The **anterior cingulate cortex (ACC)** and **temporoparietal cortex** also play important roles in emotional and social intelligence. The ACC is involved in monitoring social conflicts and regulating behavior when social interactions are complex or ambiguous. The temporoparietal cortex, specifically the temporoparietal sulcus (TPS), is essential for theory of mind, which allows for the understanding of other people's intentions and beliefs, facilitating the navigation of complex social interactions and the formation of empathic judgments (Saxe & Kanwisher, 2003). Together, these regions provide the neurobiological basis for emotional and social intelligence, allowing individuals to interpret and respond appropriately to emotions and social dynamics.

NEUROSCIENCE OF CREATIVITY

Creativity, especially **subjective** creativity, involves the ability to generate original ideas and solutions, often without explicit knowledge or prior learning on the subject. This process is supported by a brain circuit that integrates areas responsible for abstract cognition, emotional regulation and cognitive flexibility. The main regions involved include the dorsolateral prefrontal cortex (dlPFC), the medial prefrontal cortex, the posterior cingulate

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gyrus and the angular gyrus. These regions interact with subcortical systems and neurotransmitters to facilitate creative thinking (Beaty et al., 2016).

The **dorsolateral prefrontal cortex (dlPFC)** and **medial prefrontal cortex** play central roles in subjective creativity, providing the executive control and cognitive flexibility needed to generate new ideas. The dlPFC is involved in manipulating information in working memory, allowing the brain to explore new combinations and associations between concepts, while the medial prefrontal cortex connects to the default mode network, which is activated during daydreaming and the generation of spontaneous thoughts (Jung et al., 2013). These processes allow emergent creativity to go beyond previously acquired knowledge, connecting implicit and unconscious information.

Emotional intelligence is also closely linked to subjective creativity, as the areas responsible for emotional regulation, such as the **amygdala** and the **ventromedial prefrontal cortex (vmPFC)**, influence the ability to access creative thoughts. The amygdala assesses the emotional charge of information and, in collaboration with the vmPFC, regulates the emotional impact on creative thinking, helping to identify innovative solutions in social and emotional contexts (Pessoa, 2008). Neurotransmitters such as **dopamine** play an essential role, promoting cognitive flexibility and motivation to explore new ideas, while **serotonin** helps with emotional regulation, both of which are critical for spontaneous and emotionally regulated creativity (Limb & Braun, 2008).

GIFTEDNESS, CREATIVITY, EMOTIONAL INTELLIGENCE AND INTUITION

Giftedness is often associated with greater cognitive ability, including creativity and intuition. Studies indicate that gifted people have more efficient activation of brain regions such as the dorsolateral prefrontal cortex (dlPFC), responsible for executive control and cognitive flexibility, and the medial prefrontal cortex, which facilitates the generation of creative ideas through the default mode network. **Subjective creativity**, in particular, requires the ability to access information and ideas that have not been explicitly learned, an ability facilitated by effective integration between the emotional system and cognition. **Emotional intelligence** and intuition share processes related to emotional evaluation and rapid decision-making, supported by the amygdala and ventromedial prefrontal cortex (vmPFC), areas that help regulate emotions and generate intuitive responses (Pessoa, 2008; Jung et al., 2013).

However, not all gifted people have high levels of emotional intelligence or subjective creativity. This variation can be explained by differences in the development and functioning of the neural networks responsible for these processes. Gifted people who do not exhibit high creativity or emotional intelligence tend to have less connectivity between the cortical areas involved in emotional and cognitive integration, such as the vmPFC and the amygdala, or between the cognitive networks and the default mode network. Dopamine, a neurotransmitter that promotes cognitive flexibility, and serotonin, which regulates emotions, play critical roles in sustaining creative and emotional processes. In gifted people who are not creative or have difficulties processing emotions, there may be a lower modulation of these neurotransmitters, leading to a disconnection between the cognitive and emotional systems (Limb & Braun, 2008; Beaty et al., 2016).

Thus, the reason why many gifted people do not show high subjective creativity or emotional intelligence may be related to a functional disconnection in the brain networks that integrate abstract cognition and emotional processing. Although gifted individuals may have an advantage in executive control and logical reasoning, the lack of robust connectivity between the prefrontal cortex, the amygdala and the areas associated with creativity and emotional regulation may prevent the full manifestation of these abilities. This highlights the importance of the interaction between cognitive control, emotional flexibility and the ability to generate new ideas, which, when not optimized, can limit creative and emotional development, even in individuals with high cognitive ability (Pessoa, 2008; Jung et al., 2013).

DEFAULT MODE NETWORK

The **default mode network** (DMN) is a set of brain regions that are highly activated when the individual is at rest or focused on internal thoughts, such as autobiographical memory, daydreaming or reflecting on the future. The main regions that make up the DMN include the **medial prefrontal cortex (mPFC)**, the **posterior cingulate cortex (PCC)** and the **precuneus**, as well as the **inferior parietal cortex** (angular gyrus) and the **hippocampus**. The **mPFC** is crucial for self-reflection and evaluation of personal experiences, and is responsible for simulating future scenarios and taking a social perspective (Andrews-Hanna et al., 2014). The **PCC** and **precuneus**, on the other hand, are associated with the consolidation of autobiographical memories and the integration of information from the "self" with the social environment, being fundamental for the construction of internal narratives.

Connectivity within the DMN allows for the integration of memory, emotion and cognition. The **inferior parietal cortex**, especially the **angular gyrus**, facilitates the integration of sensory and conceptual information, collaborating with imagination and creativity. The **hippocampus** plays a central role in retrieving memories and combining past experiences with creative thinking, allowing the mind to travel into the past and the future. This network works in the opposite way to executive systems that require external focus, but there are dynamic interactions between the DMN and cognitive control networks, especially during creative activities and introspective decision-making (Raichle, 2015).

From a neurobiological point of view, **dopamine** and **serotonin** play important roles in regulating the DMN. Dopamine, associated with motivation and reward, facilitates the exploration of inner thoughts and creativity, while serotonin regulates the emotional state, allowing reflection and the construction of coherent narratives. These neurochemical interactions help maintain the balance between introspection and engagement in external tasks, modulating the cognitive flexibility required for creative and self-reflective thinking (Bzdok et al., 2016).

DISCUSSION

The relationship between high intelligence and intuition can be a parameter for understanding this quality. There is growing evidence that gifted individuals tend to be more precise in intuitive decisions. This can be explained by the greater efficiency of these individuals' neural processing, which allows them to quickly and effectively integrate previous information without the need to resort to deliberate conscious reasoning (Pretz et al., 2014). Functional neuroimaging indicates that this cognitive advantage is related to robust connectivity between executive control areas, such as the dorsolateral prefrontal cortex (dlPFC), and limbic regions, including the amygdala and hippocampus. This enhanced connectivity facilitates the transition between analytical and intuitive thinking, which may explain why gifted people are often more effective at making quick and accurate decisions in uncertain or new situations.

However, it's not just neural efficiency that seems to contribute to intuitive ability in gifted people. Genomic studies point to the influence of specific genetic variants that modulate cognitive flexibility and emotional processing, critical factors for intuition. For example, the **COMT** gene, which regulates dopamine in the prefrontal cortex, has variants that directly influence the speed and accuracy with which gifted people process information and make decisions (Goldman et al., 2005). Individuals with variants that promote greater dopaminergic activity in the prefrontal cortex tend to exhibit greater cognitive flexibility, which allows them to access and use information more efficiently. In addition, polymorphisms in the **5-HTTLPR** gene, which affects the serotonergic system, have been associated with differences in emotional regulation, with a direct impact on intuition. Individuals with a greater ability to regulate their emotions can make intuitive decisions more accurately, as they are able to integrate the emotional aspects of information more effectively with deliberative cognitive processes (Canli et al., 2005).

This complex interaction between genetics, neurobiology and cognitive ability suggests that, although gifted people have clear advantages in the use of intuition, not everyone has the same level of emotional intelligence or subjective creativity. Intuition, especially in its most creative and emotionally informed form, depends not only on cognitive efficiency, but also on the ability to integrate brain networks that involve emotional control. Gifted individuals with less connectivity between the ventromedial prefrontal cortex (vmPFC), responsible for emotional regulation, and the limbic system, may be less able to access emotional and creative intuition, which explains why some highly intelligent individuals do not exhibit high levels of subjective creativity or emotional intelligence. This points to the importance of an integrated neurobiology, in which connectivity between cognitive and emotional areas is essential for the full expression of intuition.

Therefore, intuition in gifted people seems to be the result of a complex interaction between more efficient brain architecture, greater neural connectivity, and specific genetic influences that modulate both cognitive and emotional processing. This ability, far from being a mystical phenomenon, is a critical component of cognition, enhanced in gifted individuals by the fluid integration between the brain networks involved in memory, emotion and decision-making. Further research into the neurobiological and genetic bases of intuition could provide valuable insights into understanding not only giftedness, but also individual variations in the ability to make intuitive decisions effectively.

FINAL CONSIDERATIONS

The study on intuition, using gifted people as a reference, brought clearer conclusions about the morphological circuitry of intuition. Less intuitive gifted people are those who have lower emotional and social intelligence and subjective creativity, which differs from creativity focused on what has been learned. Intuition results from a good interaction between intelligence, as measured by IQ tests, and emotional intelligence, which is related to social intelligence and creativity. For enhanced intuition, in terms of neurotransmitters such as dopamine and serotonin, it is necessary for the **COMT** gene, which regulates dopamine, to promote greater dopaminergic activity in the prefrontal cortex, and for the **5-HTTLPR** gene, which regulates emotions, to act in sync.

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The default mode network (DMN) system in the brain must function effectively, involving connectivity between the ventromedial prefrontal cortex (vmPFC), which is responsible for emotional regulation, and the limbic system. Good interaction is essential between the medial prefrontal cortex (mPFC), the posterior cingulate cortex, the anterior cingulate cortex, the precuneus, as well as the inferior parietal cortex (angular gyrus) and the hippocampus. Gifted people, depending on their condition, can effectively concentrate skills such as logic, abstraction, literalness, interpretation and creativity based on acquired knowledge, as well as emotional interpretation, more effectively in the frontal region of the brain. However, there may be less modulation of dopamine and serotonin in the frontotemporal area.

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