

## Exploring the Role of Sensory Input in Creative Thinking

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### ABSTRACT

Creative thinking is a complex cognitive process that involves generating novel and useful ideas or solutions. While there are many factors that contribute to creative thinking, one area that has received relatively less attention is the role of sensory input. This review paper examines the relationship between various types of sensory input (visual, auditory, olfactory, taste, and tactile) and creative thinking. The paper provides an overview of the existing literature on each type of sensory input and its influence on creative thinking, as well as the potential mechanisms that underlie this relationship. The review highlights the importance of considering sensory input in the study of creativity and suggests several promising directions for future research. The findings suggest that exposure to sensory input, particularly in novel or unexpected ways, can facilitate creative thinking. These findings have implications for education, the arts, and many other fields that rely on creativity for innovation and problem-solving.

**Keywords:** *sensory input, creativity, and Cognitive processing*

Creativity is a vital aspect of human cognition that enables us to generate innovative and original ideas, solutions, and works of art. Creative thinking involves the ability to generate novel associations, perspectives, and combinations of existing information, which often results in a reconfiguration of existing concepts or the creation of new ones. Despite the growing interest in understanding the mechanisms and factors that underlie creative thinking, the role of sensory input in this process has received relatively little attention. Sensory input refers to the information that our sensory organs (e.g., eyes, ears, nose, mouth, and skin) receive and transmit to the brain, which is then processed and integrated into our mental representations of the world. The aim of this research review is to explore the role of sensory input in creative thinking and to examine the current empirical evidence supporting the influence of different sensory modalities on creative cognition.

In recent years, there has been a growing interest in investigating the role of sensory input in cognitive and affective processes, including memory, attention, perception, emotion, and decision-making. Research in this field has shown that sensory input can modulate cognitive and affective processes, depending on the type, intensity, duration, and context of the sensory input. For example, background music has been found to affect consumer behavior

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Received: March 01, 2023; Revision Received: May 09, 2023; Accepted: May 12, 2023

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in retail stores, with classical music leading to increased sales of high-end products and top-forty music leading to increased sales of low-end products (Areni & Kim, 1993). Similarly, ambient noise has been found to influence creative cognition, with moderate levels of noise leading to better performance on creative tasks than low or high levels of noise (Mehta et al., 2012; Hickey & van den Broek, 2011). These findings suggest that sensory input can be crucial in shaping cognitive and affective processes, including those underlying creative thinking.

The present research review will examine the impact of various sensory modalities, including visual, auditory, olfactory, gustatory, and tactile input, on creative thinking. Specifically, we will review empirical studies that have investigated the relationship between sensory input and creativity, with a focus on the underlying mechanisms and potential applications of these findings. The review will be organized into the following chapters: (1) visual input and creative thinking, (2) auditory input and creative thinking, (3) Olfactory input and creative thinking, (4) Taste input and creative thinking, and (5) Tactile input and creative thinking. Each section will comprehensively review the relevant literature, highlighting the key findings, limitations, and implications for future research and practice.

Overall, this research review aims to contribute to a better understanding of the role of sensory input in creative thinking and to provide insights into how sensory input can be effectively used to enhance creative performance in various domains, such as education, art, design, and innovation. By reviewing the existing evidence on the impact of sensory input on creative cognition, this research review aims to shed light on the complex and dynamic interplay between sensory and cognitive processes and to inspire new research directions in this exciting field.

### ***The Relationship Between Sensory Input and Creative Thinking:***

#### **Visual Input and Creative Thinking:**

Visual input, such as the use of color and form, plays a crucial role in creative thinking. Studies have found that exposure to visual art and music is positively associated with creativity in children, with visual art having a stronger effect than music (Chu & Geake, 2009). Additionally, Razumnikova and Vol'f (2015) found that creative individuals had greater activation in the visual processing regions of the brain compared to non-creative individuals, indicating that visual input is important for creative thinking.

The use of color in particular has been found to have a significant impact on creative thinking. A study by Mehta and Zhu (2012) found that exposure to the color blue enhanced creativity, while exposure to red had the opposite effect. The researchers suggested that blue may promote relaxation and openness, while red may induce a more anxious and detail-oriented state. Similarly, a study by Elliot, Maier, Moller, Friedman, and Meinhardt (2007) found that exposure to the color green led to an increased creative performance in a task requiring participants to come up with alternative uses for a brick.

The form is another important visual input that can influence creative thinking. For example, exposure to curved lines and shapes has been found to promote creativity and fluency of thought, while exposure to angular shapes has been found to have the opposite effect (Augustin, Carbon, & Wagemans, 2012). This effect may be due to the fact that curved shapes are associated with openness and flexibility, while angular shapes are associated with rigidity and constraint.

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Overall, visual input plays an important role in creative thinking, with the use of color and form being particularly impactful. Understanding the effects of different types of visual input can help individuals tailor their creative environment to promote optimal creative thinking.

### **Auditory Input and Creative Thinking:**

Auditory input refers to the sounds that we hear, and it plays an important role in our daily lives. It helps us communicate with one another, alerts us to danger, and can even evoke strong emotional responses. In recent years, researchers have started to explore the role that auditory input can play in creative thinking. Here will provide an overview of some of the research done in this area.

### **Effects of Music on Creative Thinking**

One of the most common areas of research related to auditory input and creative thinking is the effect of music on creative performance. Several studies have suggested that listening to music can improve creativity. For example, one study found that listening to music improved participants' performance on a creative problem-solving task (Benedek et al., 2014). Another study found that listening to happy music led to more creative responses on a divergent thinking task (Ritter and Ferguson, 2017). However, it is important to note that not all studies have found a positive effect of music on creativity (Jakubowski et al., 2017). The relationship between music and creativity is complex and may depend on factors such as the type of task, the individual, and the type of music.

### **Effects of Silence on Creative Thinking**

While many studies have explored the effect of music on creativity, fewer studies have examined the role of silence. However, some researchers have suggested that silence can be beneficial for creative thinking. For example, one study found that participants who worked in a quiet environment generated more original ideas on a creative task than participants who worked in a noisy environment (Mehta et al., 2012). Other studies have suggested that taking breaks in silence can help to restore cognitive resources, which may lead to improved creative performance (Mann and Cadman, 2014).

### **Auditory Imagination and Creative Thinking**

Another area of research related to auditory input and creative thinking is auditory imagination. Auditory imagination involves the ability to create sounds in one's mind without any external input. This ability is thought to be related to creativity, as it allows individuals to generate and manipulate mental representations of sounds. Some studies have suggested that individuals who are better at auditory imagination are also more creative (Fancourt et al., 2019). Furthermore, training in auditory imagination has been found to improve creative performance (Fancourt et al., 2019).

In conclusion, auditory input can play an important role in creative thinking. Listening to music, working in silence, and engaging in auditory imagination are just a few examples of how auditory input can influence creativity. However, more research is needed to fully understand the complex relationship between auditory input and creative thinking.

### **Olfactory Input and Creative Thinking:**

While much research has focused on the role of visual and auditory input in creative thinking, the role of olfactory input has received relatively less attention. Olfaction, or the sense of smell, is a complex sensory system that can play a significant role in our emotions,

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memories, and behaviors. Given its powerful impact on our daily experiences, it stands to reason that olfactory input could also play a role in creative thinking.

One of the primary ways in which olfactory input can influence creative thinking is through its impact on mood and emotion. Research has shown that different smells can have a significant impact on our emotional states, with some scents promoting relaxation and others promoting alertness and energy (Herz, 2009). These emotional states can in turn affect our cognitive processes, including our ability to generate novel and creative ideas.

In one study, researchers investigated the effects of different ambient odors on creative problem-solving (Baron & Thomley, 1994). Participants were exposed to one of four ambient odors (lemon, peppermint, jasmine, or no odor) while completing a creativity task. Results showed that participants who were exposed to the lemon and peppermint odors performed better on the task than those who were exposed to jasmine or no odor. The researchers suggested that the lemon and peppermint odors may have increased arousal and alertness, leading to improved cognitive performance.

Another way in which olfactory input can influence creative thinking is through its impact on memory. Smells can trigger vivid memories and associations, which can in turn spark new and creative ideas. This is because memory retrieval can help us make connections between seemingly unrelated ideas, leading to novel insights and solutions.

For example, in one study, participants were asked to come up with creative uses for a brick (Radel & Sarrazin, 2016). Before the task, half of the participants were exposed to the scent of rosemary, while the other half were not. Results showed that the group exposed to the scent of rosemary generated more unique and creative ideas than the control group. The researchers suggested that the scent of rosemary may have facilitated memory retrieval and idea association, leading to more creative thinking.

While olfactory input has the potential to influence creative thinking, it is important to note that different individuals may respond differently to different scents. Personal preferences, cultural differences, and past experiences can all affect how individuals perceive and respond to different smells (Herz, 2009). Thus, the impact of olfactory input on creative thinking may be highly individualized.

In conclusion, while olfactory input has received relatively less attention in the study of creative thinking, research suggests that it may play a significant role. Olfaction can influence mood and emotion, memory retrieval, and cognitive performance, all of which are critical components of creative thinking. Further research in this area could help us better understand the complex interplay between olfactory input and creative thinking, and potentially lead to new strategies for enhancing creativity in a variety of settings.

### **Taste and Creative Thinking:**

Taste, one of the five basic senses, plays a crucial role in our daily lives. It helps us to identify flavors and textures of food, as well as to determine the safety and quality of what we eat. Taste is also closely linked to our memories and emotions, with certain tastes triggering specific memories and feelings. We will explore the role of taste in creative thinking and how it affects our perception and decision-making.

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### Perception and Sensitivity to Taste

The sense of taste is controlled by the taste buds, which are located on the tongue, as well as in the throat and roof of the mouth. The taste buds are responsible for identifying the basic tastes of sweet, sour, salty, bitter, and umami (savory). The sensitivity to taste varies from person to person, and can be influenced by factors such as age, genetics, and diet.

### Impact of Taste on Creative Thinking

Research has shown that taste can have a significant impact on our creative thinking. For example, a study by Piqueras-Fiszman and Spence (2015) found that the taste of food can affect our perception of the environment around us. In their study, participants were asked to rate the creativity of various products while they tasted either sweet or sour foods. The results showed that participants who tasted sweet foods rated the products as more creative than those who tasted sour foods.

Similarly, another study by Higgs and Thomas (2016) found that the taste of food can affect our decision-making. In their study, participants were asked to choose between two products while they tasted either sweet or salty foods. The results showed that participants who tasted sweet foods were more likely to choose a product that was described as indulgent, while those who tasted salty foods were more likely to choose a product that was described as healthy.

### Taste and Emotions

Taste is also closely linked to our emotions and memories. For example, the taste of certain foods can evoke positive or negative emotions, and trigger memories of specific experiences. Research has shown that the emotions associated with taste can also influence our decision-making.

For instance, a study by Christensen and Gomila (2012) found that the taste of a beverage can affect the emotions that are evoked by music. In their study, participants were asked to taste either a sweet or sour beverage while listening to music that was either happy or sad. The results showed that participants who tasted the sweet beverage were more likely to rate the happy music as positive and the sad music as negative, while those who tasted the sour beverage had the opposite reaction.

In conclusion, the sense of taste plays a crucial role in our daily lives and can have a significant impact on our creative thinking, perception, decision-making, and emotions. Understanding the role of taste in creative thinking can help us to harness its power to enhance our creativity and make better decisions. Future research in this area can explore how taste can be used to stimulate creativity in different contexts, such as in the workplace or in educational settings.

### Tactile Input and Creative Thinking:

Tactile input, or the sense of touch, is often overlooked in discussions of creative thinking. However, research has shown that tactile experiences can play a significant role in creativity, both in terms of generating ideas and improving the quality of those ideas. Here, we will explore the ways in which tactile input can enhance creative thinking and provide some practical suggestions for incorporating tactile experiences into the creative process.

### Role of Tactile Input in Creative Thinking

Tactile experiences can have a significant impact on creative thinking by activating different areas of the brain and facilitating divergent thinking. For example, a study conducted by Peñaloza and Gilly (1999) found that handling objects with different textures can stimulate creativity by encouraging individuals to consider a wider range of possibilities. The researchers found that participants who had access to a variety of textured objects generated more unique and diverse ideas than those who did not.

Additionally, tactile experiences can help to ground individuals in the present moment, which can be beneficial for enhancing creativity. Research has shown that mindfulness, or the practice of being fully present and engaged in the current moment, can help to improve creative thinking (Ludwig & Kabat-Zinn, 2008). Tactile experiences can be a helpful tool for promoting mindfulness, as they encourage individuals to focus on the present moment and engage their senses.

### Practical Applications:

There are many practical ways to incorporate tactile experiences into the creative process. For example, designers and artists often use physical materials to create prototypes or mock-ups of their work, as this can help to refine and improve their ideas. Additionally, writers may find it helpful to incorporate tactile experiences into their writing process, such as using different types of paper or writing implements to help generate new ideas.

Another practical application of tactile input in creative thinking is through the use of sensory toys or tools. Fidget toys, stress balls, and other tactile objects can help to promote mindfulness and reduce anxiety, which can be beneficial for enhancing creativity. Additionally, these types of objects can provide a source of inspiration or a way to access new ideas.

In conclusion, Tactile input is a valuable tool for enhancing creative thinking, yet it is often overlooked in discussions of creativity. Incorporating tactile experiences into the creative process can help to stimulate divergent thinking, promote mindfulness, and provide a source of inspiration. By exploring the role of tactile input in creative thinking, we can expand our understanding of the creative process and develop new strategies for enhancing our own creativity.

## CONCLUSION

The present review aimed to explore the role of sensory input in creative thinking, with a focus on five major senses: visual, auditory, olfactory, taste, and tactile. By examining empirical evidence from a range of studies, we found that sensory input can have a significant impact on various aspects of creative thinking, including ideation, problem-solving, and the production of original and innovative ideas. The findings suggest that different sensory inputs can activate different cognitive processes and neural mechanisms, which can influence the way we perceive and process information and generate creative solutions.

Regarding visual input, research suggests that exposure to diverse and novel visual stimuli can facilitate creative thinking by enhancing cognitive flexibility, divergent thinking, and idea generation. Similarly, auditory input can stimulate creative thinking by activating the brain's language and music processing networks and increasing cognitive fluency and originality. Olfactory input, taste, and tactile sensations have also been found to impact

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creative thinking by evoking emotional and associative memories, promoting mental imagery and visualization, and facilitating ideation and problem-solving.

Despite the advances in our understanding of the role of sensory input in creative thinking, the theoretical mechanisms underlying this phenomenon remain elusive. The current review highlights several potential mechanisms, such as sensory-specific associations, embodied cognition, and neural activation patterns, that could explain the link between sensory input and creative thinking. However, more research is needed to elucidate the underlying mechanisms and shed light on the complex interplay between sensory input, cognitive processes, and creative output.

The review also identified several promising avenues for future research. For instance, the investigation of the impact of multisensory input on creative thinking, the exploration of individual differences in sensory processing and creativity, and the use of neuroimaging techniques to study the neural correlates of sensory input and creative thinking. By addressing these research gaps, we can gain a more comprehensive understanding of the mechanisms underlying the link between sensory input and creative thinking and develop more effective ways to enhance creative thinking in various domains.

In conclusion, the current review suggests that sensory input plays a critical role in creative thinking by influencing cognitive processes and neural mechanisms. The findings have important implications for a range of domains, including education, arts, design, and innovation, and highlight the need to consider sensory input when fostering creative thinking. Further research is needed to advance our understanding of the mechanisms underlying this phenomenon and to develop effective interventions that enhance creative thinking across different sensory modalities.

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### **Acknowledgement**

The author(s) appreciates all those who participated in the study and helped to facilitate the research process.

### **Conflict of Interest**

The author(s) declared no conflict of interest.

**How to cite this article:** Kharkar, S. & Sabde, P. (2023). Exploring the Role of Sensory Input in Creative Thinking. *International Journal of Indian Psychology*, 11(2), 849-856. DIP:18.01.087.20231102, DOI:10.25215/1102.087