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What is the evolutionary reason for synesthesia?

Sensory interaction in the brains of humans can often be complex. When humans sense a visual stimulus, light enters the eye and a signal is transmitted to the brain for processing (Shubin 2009). The eye receives the signal, but the brain is responsible for understanding what it means. However, what if the pathway between the eye and the brain was intercepted, and multiple senses were somehow triggered by this visual stimulus? This type of interception may be at the root of a phenomena called synesthesia, or when one stimulus causes sensation in more than one of the five senses. For example, when someone hears music and it causes them to see a color, this can be referred to as a kind of synesthesia. Interestingly, the specific colors that are triggered by specific audio stimuli tend to be consistent across a human lifespan, indicating that the links between a sound and its associated color are stable in any individual person (Brang et al., 2011). This could mean that every individual with synesthesia has a unique but unchanging perception of the world. Being able to make such rich sensory associations could be advantageous or disadvantageous, depending on the context.

Understanding the genetics of synesthesia may lead to a better understanding of its benefits. The specific genes involved in synesthesia are still unknown, however the condition in humans is thought to be passed down through multiple genes (Brang et al., 2011). Since the reason for its continued persistence in the human population is undetermined, its evolutionary meaning can only be conjectured. One idea is that synesthesia helps enhance the memory and talents of creative individuals and therefore persists in the population through positive selection. Artists with synesthesia for example may have unique interpretations of environmental stimuli that can be reflected successfully in their work (Safran et al., 2015). It could also be that the genes for synesthesia are present in every individual but only expressed in a select few. Evidence for this idea lies in the fact that drug-induced hallucinogenic states often confer synesthesia effects in people without the condition, indicating that the potential for cross-sensory effects is present and only needs to be turned-on (Brang et al., 2011). The idea that all human individuals are capable of synesthesia is interesting because it implies that we can theoretically alter our brains to induce these effects. It could also mean that other animals could have evolved to harbor synesthesia genes as well.

References

Brang D, Ramachandran VS. Survival of the Synesthesia Gene: Why Do People Hear Colors and Taste Words? PLoS Biology. 2011;9(11). doi:[10.1371/journal.pbio.1001205](https://doi.org/10.1371/journal.pbio.1001205)

Safran AB, Sanda N. Color synesthesia. Insight into perception, emotion, and consciousness. Current Opinion in Neurology. 2015;28(1):36–44. doi:[10.1097/WCO.0000000000000169](https://doi.org/10.1097/WCO.0000000000000169)

Shubin, N. 2009. Your Inner Fish. 1st ed. New York (NY): Vintage Books. Chapter 9, Vision; p. 148-157.