“Ayahuasca turned on my mind’s eye”: Enhanced visual imagery after ayahuasca intake in a man with “blind imagination” (aphantasia)

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Background and aims: Aphantasia (“blind imagination”) is a poorly described condition with an uncertain etiology, characterized by reduced or lack of voluntary visual imagery. Preliminary evidence in humans suggests that hallucinogenic or psychedelic drugs that act as agonists of cortical 5-HT_{2A} receptors [lysergic acid diethylamide, psilocybin, and dimethyltryptamine (DMT)] enhance visual imagery. **Methods:** Interview and description of the case are presented in this study. **Results:** A man self-diagnosed with long-lasting aphantasia that he attributed to a traumatic separation from his father when he was young and to a difficult relationship with him described sustained improvements in his visual imagery following ingestion of a single dose of the South American botanical hallucinogen ayahuasca, which is rich in DMT. Although improvements were modest, they were sustained and significant for the subject. **Conclusions:** It is suggested that the described improvements were possibly attributed to biological and psychological processes, including stimulation of cortical 5-HT_{2A} receptors, subsequent increased activity in the visual cortex, enhanced imaginative and imagery capacities, and psychosomatic resolution of a previous psychological trauma. Further trials could elucidate the role of 5-HT_{2A} agonists, especially ayahuasca, in aphantasia.

Keywords: aphantasia, visual imagery, psychedelics, hallucinogens, ayahuasca

INTRODUCTION

Visual imagery is usually experienced by humans in memory processes, day-dreaming/mind-wandering, dreaming, imagination, and creativity. Some techniques, such as breathing exercises, imagery training, and psychoactive drugs, can and have been used to stimulate visual imagery and creativity (Schultes & Hofmann, 1992). The neural basis of voluntary imagery involves activation of frontal and parietal brain regions associated with memory and executive functions and of occipital regions related to visual processing (Zeman, Dewar, & Della Sala, 2015).

Aphantasia is a term proposed by Zeman et al. (2015) to describe a rarely recognized phenomenon characterized by “reduced or absent voluntary imagery.” The neural basis of this apparently rare condition is not well-understood but seems to involve deficits of information processing in the same brain regions that are involved in visual imagery, i.e., frontoparietal and occipital cortices. Moreover, deficits in visual memory and other cognitive functions also seem to be involved (Zeman et al., 2015; Zeman, Dewar, & Della Sala, 2016). Some authors have suggested that aphantasia may have a psychological origin, instead of an organic basis (de Vito & Bartolomeo, 2016). Consistent with this perspective, aphantasia is often associated with depressive, anxious,

and dissociative disorders. Thus, several possible interacting factors may contribute to this condition. To the best of the authors’ knowledge, there are no treatments for this condition.

Ayahuasca is a psychoactive botanical preparation with a long history of ritual and therapeutic uses in the northwestern Amazon. It is prepared by the decoction of the stalks of the harmine-rich liana *Banisteriopsis caapi* together with the leaves of the *Psychotria viridis* bush, which contains dimethyltryptamine (DMT; Schultes & Hofmann, 1992). Harmine and related beta-carbolines are reversible inhibitors of monoamine oxidase, and DMT acts as an agonist at cortical 5-HT_{2A/2C/1A} receptors. Open-label and controlled studies showed that a single ayahuasca dose was associated with significant reductions in depressive symptoms in patients with treatment-resistant depression (Palhano-Fontes et al., 2018; Sanches et al., 2016). Interestingly, ayahuasca – as other agonists of cortical 5-HT_{2A/2C/1A} receptors, such as lysergic acid diethylamide (LSD)

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and psilocybin – enhances visual imagery (Carhart-Harris et al., 2016; de Araujo et al., 2012; dos Santos, Osório, Crippa, & Hallak, 2016; Roseman et al., 2016).

In October 2016, the authors were contacted by a 39-year-old man, Scotty Enyart (SE), who claimed that ayahuasca improved his aphantasia.

CASE PRESENTATION

SE believed that his symptoms began early in his life, since he recalls from an early age that his “inner experiences were different from others.” According to SE, he was diagnosed with poor visual imagery in elementary, middle, and high schools. For instance, reading never evoked visual imagery and at the age of 16, he could not visualize the patterns of words, and he described his spelling ability as: “*was that of an eleven-year-old and my reading comprehension was even more delayed than my spelling.*” Moreover, during this period, he had low self-esteem and had to receive special education classes and extended hours of practicing tasks, including typing: “*Looking back at my life it became clear that my spelling ability developed to an age appropriate level only when I learned how to type. A component of being a good speller is remembering patterns of words; so, when someone can’t recall how to spell a word they will visualize the word. Learning how to type allowed me to understand words through touch, so if I can’t recall a word I will use my fingers, muscle memory, to feel the word out.*”

At that time, in the mid 1990s, there was not a formal diagnosis of aphantasia since the term had not been proposed yet. SE first noticed that he had aphantasia in 2001, during a cognitive psychology course in his undergraduate program, when he was 24 years old: “*The professor asked us students to close our eyes and recall an image of a clock. Once we identified an image he then asked us to draw that image on a piece of paper. The other students began to draw detailed clocks. I closed my eyes several times trying to bring forth an image of a clock, yet nothing came.*” He self-diagnosed his aphantasia in 2015 after watching a BBC special report on a man with the same diagnosis (Gallagher, 2015). SE explained to us that: “*When I close my eyes I cannot see my wife’s face, I cannot see my children. If I close my eyes and think about my wife or kids I sense physical space, facial features that are unique to my wife and kids are not seen but the feeling of these features is there. I can sense my emotional attachment to them deeply. I can hear their voices, I can sense their touch, but I cannot see them.*” Moreover, he told us that he does not see anything in his dreams: “*My dreams are felt spatially and emotionally but the visual doesn’t exist. When dreaming about being chased by a monster I can feel I am moving through space and I experience intense fear, but the monster has no form, it is a terrifying felt presence that is coming after me.*”

SE reported that when he was a teenager, he experimented with hallucinogens/psychedelics, such as LSD and psilocybin, but according to him, these experiences were “external” with visual effects experienced only with opened eyes: “*The settings were with others walking around during the day hours watching walls melt in public places or seeing people with distorted faces pass by in the parks. We all sat*

around laughing and watching the lines formed by our hands as we waved them in front of our faces.” According to SE, these early experiences with hallucinogens brought about meaningful experiences to him. However, there were no eyes-closed effects on visual imagery.

While doing a PhD in psychology, he traveled to the Amazon region to try ayahuasca. Thirty minutes after ingesting a single dose, he began vomiting and described the experience of being physically in the Amazon jungle, but his mind was “back in the city”: “*I saw my life being acted out in front of me as if I was watching a play from the balcony.*” Suddenly his experience changed into fear, when he felt “spiraling through a colorful tunnel.” The healer started chanting and calmed him. With his eyes closed, he saw his father, who had passed away years ago: “*I could see him clearly, hear his voice, and even smell the distinct smell that he picked up from working in the oil fields. I was seeing in visual imagery for the first time in my life as I laid there with my eyes closed.*”

SE then described a complex scene involving the difficult relationship that he had with his father, who left him when he was very young. This early separation seemed to be quite a traumatic and painful event to SE, who later developed a difficult relationship with his father: “*My father left when I was too young to remember. My first memory of my father was seeing him years later and of him getting upset at me because I didn’t know who he was. My brother and I used to travel during the summer breaks to visit him. These visits were pleasant but short and, as I grew older, confusing. My father used to take me into grocery stores and put food into my clothes and walk out of the store without paying. He would tell me, my brother, and my step-brother to steal televisions from the store while he distracted the store clerk – and if we got caught he would punish us in front of the clerk. I have many similar stories, stories that made no sense to me, but their importance lies not in the facts but in the pain under the stories. We were never close, and when he eventually moved back to be closer with us, I was an angry teenager. This anger of course made me want to reject him, and his response was to put as much blame back on me as he could.*”

This difficult relationship persisted until the death of his father some years: “*When I was 19 he was burned in a steam fire and developed a staph infection. We knew he was dying and one day after my classes at the local city college I visited him. I was alone with him and at this point he no longer was breathing on his own, and he lay there unresponsive. The nurse encouraged me to speak to him, saying that he could hear me, but I couldn’t say anything. I just sat there in the corner of the room watching his chest go up and down with the timing of the machine. I was young and didn’t know what to feel or how to process all of the mixed emotions. I left without saying a word or even touching him. The next day I was told that he had passed away.*”

SE then reported that he saw his grandfather in a peaceful place, but his father was in a state of agony since he “*could not visit my grandfather because I had not released him from his guilt. My anger became evident to me and I felt it in all cells in my body. I didn’t realize it was still there after all these years. I was convinced I had dealt with it. But it was there, and it had control over me.*”

My anger transformed into hurt, a feeling of abandonment overcame me, and then the feeling of worthlessness became stronger than ever."

The scene then developed into SE forgiving his father and accepting their differences: *"My father pleaded for me, not to forgive him, but to forgive myself. He wanted me to know that none of what I felt was my fault and he opened himself up to make it all clear to me. I began to cry, and my father was finally able to move on to be with my grandfather. I had forgiven him; I had forgiven myself. A drum started to beat lightly, and it gradually intensified deep in my heart. This vibration overcame my entire body until I was chanting strongly aloud. I felt worthy. I felt like a good person. When I released my father from his guilt, he released me from my feelings of not being good."*

After the experience, SE developed the ability to visualize: *"I can now bring forth faint pictures in my mind. They fade quickly but they are there. When dreaming I now see faint, quickly fading images. It feels like this experience with ayahuasca has slightly opened up my mind's eye and allowed me to experience internal images like I have never had before. Ayahuasca turned on my mind's eye, even if it is faint."*

While the authors have never met him personally, he approved and actively participated in the manuscript production. Since we did not know SE before his experience with ayahuasca, it was not possible to assess his imagery skills before that time. Thus, to have an idea of his experience, we asked SE to retrospectively answer the Vividness of Visual Imagery Questionnaire used by Zeman et al. (2015) in his research. SE answered the questionnaire in December 2017 and his score was 30, which, according to Zeman et al. (2015), would classify him in the "minimal imagery" group (score >16, range: 17–30), compared with the "no visual imagery" (score = 16) and control (score >57) groups. Although his score was no more than "minimal" group, SE felt that his imagery had improved, as reported above.

DISCUSSION

Recent neuroimaging studies with LSD and psilocybin, agonists of cortical 5-HT_{2A/2C/1A} receptors as DMT, suggest that imagery is heightened by these drugs. It seems that these drugs induce more parts of the brain to process visual information, and that the brain interprets these effects like "real" visual perceptions (Carhart-Harris et al., 2016; dos Santos et al., 2016; Roseman et al., 2016). Regarding ayahuasca, an open-label study showed that, during an imagery task, ayahuasca induced significant activation in the primary visual area comparable to the activation levels of a natural image with the eyes open (de Araujo et al., 2012).

It is interesting to note that SE reported previous use of other hallucinogens that act as 5-HT_{2A/2C/1A} agonists, such as LSD and psilocybin, but improvements in his aphantasia were noticed only with ayahuasca. Although these drugs share a common pharmacological mechanism, SE reported that his previous experiences were meaningful but at the same time were restricted to visual alterations with opened

eyes, and usually happened in public places, such as parks, suggesting recreational use. Although ayahuasca also has harmine and related beta-carbolines in its composition, the main role of these compounds in the human pharmacology of ayahuasca seems to be restricted to the reversible inhibition of peripheral monoamine oxidase, which renders oral DMT active. Moreover, it is highly unlikely that a single ayahuasca dose could have induced structural, permanent changes in SE's brain.

Thus, another possible explanation could be related to non-pharmacological or environmental factors, such as the difference between the contexts where he had his experiences. For instance, ayahuasca was used in a ritual and therapeutic setting where SE experienced a meaningful curative experience that was emotionally intense and apparently cathartic. This experience was characterized not only by visual perceptions, but also by emotionally charged memories and insights, which seem to have caused a psychological change in him. Those aspects were not present in his experiences with LSD and psilocybin, which were used in recreational contexts and did not cause meaningful or emotionally intense feelings in him. Therefore, it is plausible to speculate that his absence of voluntary imagery was related to a confused relation with his father and thus to a psychological origin, especially when we consider his statement: *"I traveled back in time through my visual memory and discovered the traumatic moment in which the mind's eye closed."* Moreover, SE reported that *"... in moments in which I feel most centered, most confident in myself, the most sure of my path, is when the images are strongest."*

The last possibility is that SE was depressed and/or had posttraumatic stress disorder (PTSD), and ayahuasca could have caused an antidepressant response in him (Palhano-Fontes et al., 2018; Sanches et al., 2016). Thus, we could speculate that the trauma could have induced a functional deficit that was resolved by ayahuasca. However, this is unlikely because SE did not report depressive or PTSD symptoms.

Considering that aphantasia has a low incidence but is usually lifelong and no treatment is available, future research should assess if people with aphantasia may improve after using ayahuasca or other serotonergic hallucinogens. Future studies should also assess whether aphantasia is due to trauma or something else (such as functional changes in brain dynamics), so that the theory proposed here can be tested.

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