Analysis on Aphantasia's Symptom

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ABSTRACT
A mental illness that has just been named in recent years is called aphantasia. This paper will discuss its symptoms' impact on the human body and it is written by collecting information on the internet and related experiments on aphantasia. Through the data collected, aphantasia doesn't have issues in the daily work of different organs of the human body, especially the memory system; and almost will not affect the daily life of patients, even research shows that people who have aphantasia will be less affected by PTSD, which is Post-Traumatic Stress Disorder.

Keywords: *Aphantasia, Mental disorders, Psychology, Neuroscience, Rare diseases*

1.INTRODUCTION

When people have no visualization in their mind, there is a mental disease called aphantasia comes into their nervous system, which is a rare condition that can't be imagined in a small percentage of people worldwide. Three aspects of the disease deserve attention: will aphantasia have a negative impact on people's daily life? Like career choice, some occupations that require people's imagination may not be chosen because of this disease. And what is aphantasia? In recent years, the research on it has become more and more, but it is still not enough for humanity getting know the whole picture about it. Few of the general public know what kind of symptoms it has, so history, analyses and experiments about it are going to be discussed in this paper. Finally, which direction should scientists work on about aphantasia in the future? Several hypotheses and suggestions will be given at the end. The purpose of this paper is to make/help more people （to） fully understand this mental issue, and check whether they have this disease; also make some hypotheses for the next research direction, because all the research on it is still in the preliminary stage.

2.ANALYSIS ON APHANTASIA'S SYMPTOM

The history of discovering aphantasia needs to be known first. The most groundbreaking and influential research of aphantasia that needs to be discussed, is the study of a patient—A man known as MX. In 2009, MX underwent a small operation, and then he realized that he could no longer imagine images in his mind[5]. MX went to consult Adam Zeman for help, a neuroscientist at the University of Exeter. But this psychiatrist has checked almost all the medical literature, and none of them can explain why this person can't produce visual images in his mind. Fortunately, this event was reported by the media, causing great social concern. Because of this, many of the patients who had the same symptom found that they can't imagine anything, but the difference was that most people are brain-blind ever form birth, and the next paragraph will talk about this. Moreover, the word "aphantasia" is a new popular word. It was officially created in 2015 by Adam Zeman. "Phantasia" is a word used by Aristotle to describe fantasy, and the professor adds an "a" before the word to indicate a negative or missing meaning. Therefore, aphantasia stands for a mental illness that makes people can't focus to visualize or memorize images [1]. Back to the topic, Zeman and his colleagues are still working hard to analyze and test the visual imagination of MX in several ways. Compared with the control group, MX scored very low in the questionnaire of visual image generation ability [2]. Surprisingly, he was able to accomplish tasks that usually involve visualization. For example, when asked which is light green (Green or pine), most people decide by imagining grass and trees and comparing them. MX was right to say that pine trees are darker than grass, but he insists he didn't use visual images to make decisions, he just knew the answer. Moreover, he also has done a good job on a test of the ability to rotate objects mentally. Scientists showed him photographs of two three-dimensional objects and let him say whether they were the same

object. A photograph rotating after and before around the axis of the object, or different objects [2]. However, he took longer to decide, compared with the control group, and the amount of time he spent did not depend on the degree of rotation. For most people, the greater the difference in the direction of the objects, the longer they spent mentally rotating.

In 2010, after Zeman's team released a study of MX, and the situation began to change. Discovery magazine reported this discovery, which led some people to come forward. They all said that they had never been able to create spiritual images [3]. Then, Zeman and two colleagues had 21 respondents answer a questionnaire about their visual experience, including a vivid questionnaire called VVIQ [1]. Most of the 21 people said they realized that other people could evoke images in their minds only during adolescence and early adulthood (through conversation or reading). Although many interviewees have dreams or visual images when they are awake, all of them are basically or completely unable to deliberately evoke images in their mind, such as past holidays or even their own weddings. Since 2015, aphtanasia has been the subject of newspaper articles, TV reports, blogs and podcasts. In Blake Ross's book, Ross also describes his inability to create visual images. In part because of the release of VVIQ by the BBC, thousands of people filled in VVIQ. It and another questionnaire are also posted on eye's mind. Based on the first 700 or so surveys, Zeman estimates that the phantom affects about 2% of the population [2].

Then what are the specific symptoms and the network of brain areas it affects? Imaging technique has shown which part of the brain that aphtanasia effects, it includes frontal and parietal lobes, Memory areas, and the primary visual cortex [6]. But interestingly, aphantasia does not seem to damage the creativity of patients. Many people with aphantasia have achieved success in creative-related businesses, such as the former president of Disney [4]. According to the patient's own expression, aphantasia is a mental disorder that cannot be described in terms of prominent signs and symptoms as in any other physical illness. Unlike other mental disorders, it is not associated with confusion, stress, mood swings or any other common factors that indicate you are a hallucination carrier. It will make patients unable to imagine or imagine anything; unable to see the image as a result of patients' supposition. If this situation continues, the brain remains empty, and does not respond by producing images of imagined or thought output, then the individual must consult a physician to confirm the diagnosis of aphantasia.

Adam Zeman and his colleagues associate aphantasia with visual blindness [6]. Is a visual stimulus processing disorder caused by impairment of the visual center? This visual center is located in the occipital lobe and does not allow visual agnostics to recognize objects and faces, even if they are able to see objects clearly. Most patients with aphantasia are able to describe objects approximately, at least in terms of visual memory. Hypothetical phantom patients could not do this. Therefore, phantoms are a special form of visual blindness while at the same time can be described as the most extreme type of blindness. As a reason for the absolute inability to visualize, the first authors had severe defects in the brain regions involved. So far, there are not enough published studies to demonstrate what is accurate in causing aphantasia. Whether genetic factors such as genetic mutations, or external factors such as toxin intrusion may contribute to this mental disorder remains unclear. Some patients with visible hallucinations reported symptoms since birth. Others attribute the onset of their disease to major traumatic events in their lives, such as the death of a loved one or a severe car accident, among others. It is also probable that the innate form of the Aphantasia differs so far from the acquired one, that it must be assumed that there are various diseases [6].

Although objective measurement of mental images has historically been difficult, significant progress is being made through innovative behavioral, physiological, and neuroimaging paradigms. In addition to our recent research showing that asymptomatic individuals lack sensory visual images, we also show different physiological responses to stories that usually evoke visual images. Specifically, asymptomatic individuals do not show the same skin conductance changes when reading fear situations [9]. Preliminary work based on the research of Laeng and sulutvedt shows that they lack content-specific pupil response to imaginary images with different brightness[23]. These objective measures further confirmed the lack of self-report of the visual image in this group, which also showed that with the development of experimental research, the diagnosis of aphantasia became more simple and objective.

Human beings have many different cognitive abilities, but memory is probably the most closely related to visual imagery. Most people experience very real memories when they recall the past, just like a movie playing in their mind. The role of image in memory is related to both short-term memory (i.e., visual working memory)[19] [20][21][22] and long-term memory (i.e., autobiographical memory)[13][17] [18]and eyewitness reports [16]. Therefore, it may be thought that the visual memory of aphantasia patients may be seriously damaged. However, from the data collected so far, this does not seem to be the case. The visual working memory performance of aphantasia patients is not affected by the lack of visual image, which is found by the latest research of Keogh and pearsonde's Laboratory [14]and previous case studies [15]. They had very different memory strategies from

those without aphantasia. Although most of the general population reported that they remembered them by imagining images, individuals with congenital aphantasia reported using a memory strategy called "Tagging". In this strategy, they quickly identify the iconic features of the image and create a verbal label that they remember for future use. For many participants, this marking strategy has developed a habit. Preliminary studies have shown that even in very complex visual memory tasks, such as tasks with a large number of item changes or small changes, this marking strategy is still very effective for these individuals. It seems that although they have no ability to imagine, they still have their own system to memorize images in case of abnormal memory in the future. Scientists believe that this technology has been learned and perfected in their lifetime, so we can expect that patients with postnatal aphasia will show visual working memory impairment, because they can use visual image as a cognitive tool in the past. However, another explanation for visual working memory preservation is that aphantasia patients unconsciously acquire visual images, and the strategy they report is incidental. More research in the future will allow us to sort out strategies and memory storage used by individuals with aphantasia in such tasks. Moreover, many reports of poor autobiographical memory in individuals with aphantasia [13] indicate that aphantasia may have a greater impact on this field than working memory, but these are hypotheses, and it needs more research to prove this.

Aphantasia[11][12], the scientific research on this topic is still in its infancy. At present, the existing research can not provide too much information, but can only provide some research directions and key issues. First, whether there is a subtype of aphantasia. It is not clear whether aphantasia represents a persistent extreme discrete state, or a group of States, if it seems to have several subtypes. The existence of subtypes is possible, with different manifestations in the complex brain, and these changes are the result of visualization. Facial cognitive impairment, autobiographical memory impairment or autism spectrum disorder all point to the discrete subtypes of aphasia, which is the problem to be solved in the next research.

Second, the relationship between autobiographical memory and aphantasia, whether aphantasia can lead to autobiographical memory loss. According to the preliminary data, many patients with aphantasia reported a lack of autobiographical memory [7][10] and memory is not detailed. These characteristics are perfectly consistent with the characteristics of severe autobiographical memory deficit syndrome. SDAM is a kind of mental illness with "self-reported selectivity, and unable to vividly recall the events of personal experience from the perspective of first person" [8]. Some aphantasia patients also reported experiencing SDAM. The relationship between aphasia and SDAM needs to be further clarified.

Whether aphantasia affects emotions. So far, some anecdotal reports of patients with aphantasia describe their relative immunity to nostalgia, disgust and fear of recalling images, as well as their ability to "live in the moment". The previously mentioned finding that the skin conductivity of patients with aphantasia decreases when imagining terrible situations [9] is consistent with these statements. The same is true of the preliminary data obtained from the trauma emotional response questionnaire. That is to say, people with aphantasia reported much less involuntary invasive memory than those in the control group, although they experienced emotional changes associated with stressful life experiences[7]. On the contrary, visual imagery is often used to revisit the past and imagine the future. Many patients with aphantasia can't even imagine the faces of their friends and relatives. So according to the current data, people with aphantasia have low sensitivity to some extreme emotions. Of course, this is just a hypothesis. In the future, it is better to study the relationship between emotion and aphantasia.

3.CONCLUSION

All in all, the research on aphantasia is still in its infancy, and there are still many unknown parts for human beings. Most hallucinators don't even realize that their experiences are any different from those of others, which is one of the biggest reasons for the difficulty in data collection. But it's not a terrible disease. It's just a part of their body, and it has little impact on their lives. Adam Zeman, the neuroscientist who invented the term "aphantasia", described it in a BBC radio interview as "a fascinating change in human experience, not a medical disease.”.

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