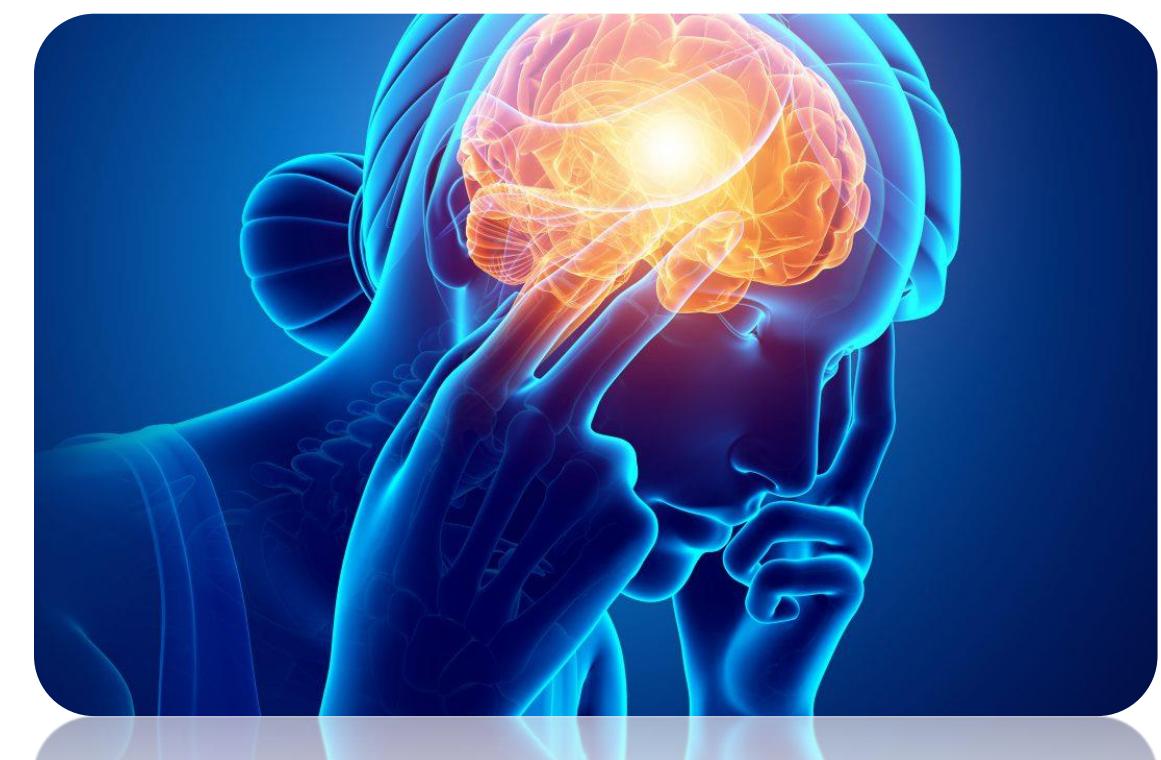


Alice in Wonderland Syndrome: A Real-Life Fairy Tale

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What is Alice in Wonderland Syndrome? Introduction

Alice in Wonderland Syndrome (AIWS) is a rare neuropsychological condition.^[4] Like the character, the rare few that experience this syndrome perceive themselves to be smaller or even larger than their surroundings and other things like that. Like how Alice's body fluctuated in size during her adventures. The conception of sight, touch, hearing, sensation, and time temporarily changes in a person with AIWS, and are different from person to person, of course. AIWS is a mysterious disturbance of perception rather than a psychological or optical condition that can be easily diagnosed, so it is associated with a lot of other disorders. At the molecular level, calcium channel blockers thwart calcium ions from moving across the cell membrane. This blockage allows the blood vessels to relax, counteracting the vessel constriction that contributes to a migraine. AIWS appears in episodes—usually in children or young adults.

Visual Distortions of AIWS

Most often, the changes in perceptions are in the form of **micropsia**, which is when a person sees objects as smaller than they are, like Alice, and **teleopsia**, which is where objects appear farther than they actually are. There's also:

- **Macropsia:** objects appear too big (Picture B)
- **Metamorphopsia:** height and width appear inaccurate
- **Pelopsia:** objects appear too close
- **Altered perception of body image, time, and size:** For example, a person with AIWS may feel that the image or size of their own body, or those of the people around them, is changing. Body parts may be perceived as a different size than it actually is (Picture A). Sometimes there's no sense of time. Time may go by too fast or too slow. [3,7]

Other Symptoms of AIWS

- Fever-like symptoms (like general weakness)
- Migraines
- Epileptic seizures
- Nausea
- Dizziness

The Mystery of AIWS

- It is unclear what causes AIWS, which is part of what makes it so mysterious. What is known, is that the syndrome isn't an optical problem or a hallucination.
- Because of the short duration of AIWS episodes (which could last a few seconds or minutes), the syndrome may go underdiagnosed as it won't last long enough for there to be concern to go to the doctor—especially in young children who may not understand the quick change in their surroundings.
- Family members of subjects being evaluated for the syndrome don't own up to having episodes on the first go round. Dr. Grant Liu of the Children's Hospital of Philadelphia who interviewed 48 patients who had AIWS as children between 1993 and 2013, says that it took time for the family members to admit that they had had the syndrome or that they still had it. "They were almost too embarrassed. People want to be told that they're not crazy." This makes it harder to uncover the truth about AIWS. However, this may hint that AIWS is not as rare as it was originally believed to be. [6]

Diagnosis of AIWS

Rather than performing a test to diagnose AIWS, a doctor will use other tests as a process of elimination to rule out possible causes and explain symptoms.^[2]

- An MRI scan or an electroencephalography (EEG) will measure the electrical activity of the brain, as unusual brain activity often characterizes people with AIWS.
- Blood tests can reveal the presence of or lack of infections that could explain the symptoms of AIWS.



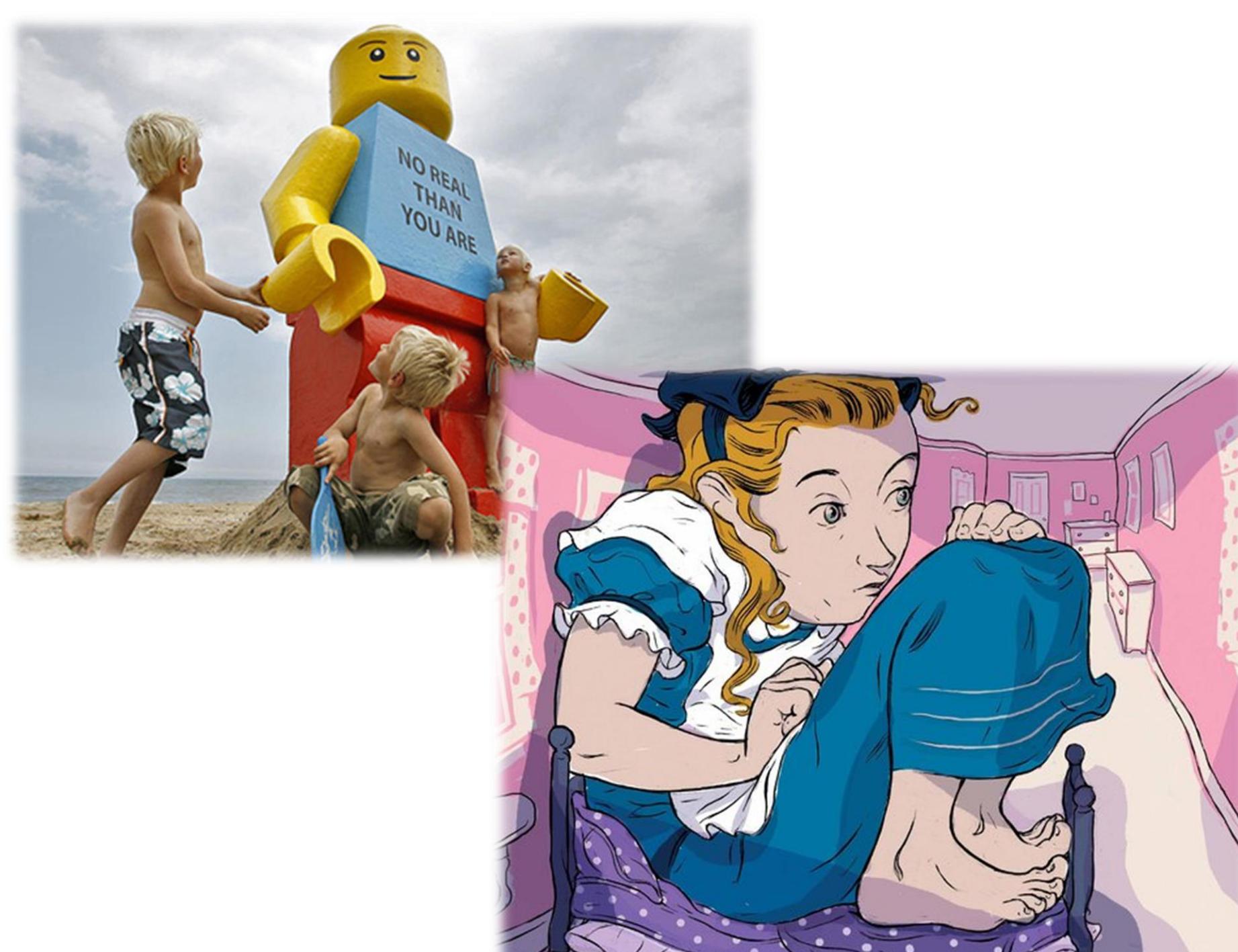
Cases of AIWS

One case study had a patient seeing moving objects "slowing down or speeding up," including failure to see any motion at all. [4] This would fit into the time distortion category of symptoms.

These visual distortions are not considered to be hallucinations. When the episodes occur, the person is aware that they are not real, despite the distortions looking very real.

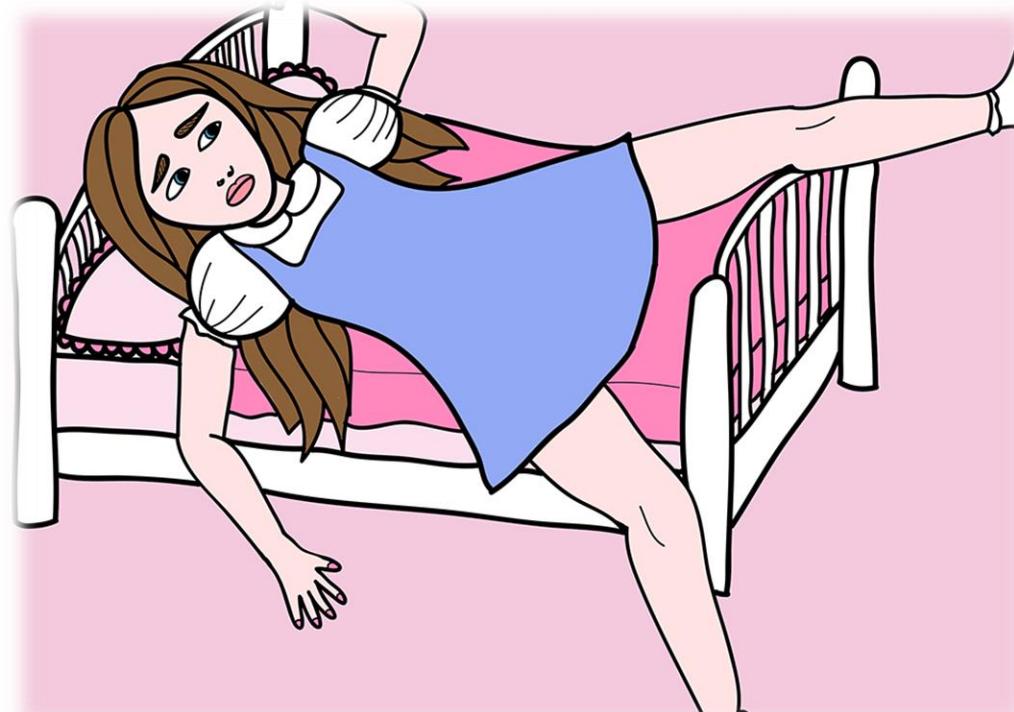
Risk Factors of AIWS

- **Family histories** of migraines and AIWS increase the risk for experiencing AIWS. Helene Stapiński knew what her 10-year-old daughter, Paulina, was talking about when her daughter suddenly said before bedtime that everything in the room looked "really small." Though the episodes Helene experienced faded as she got older, her and her daughter could both relate to the furniture a few feet away seeming "small enough to fit inside a dollhouse." She soon found out that her 14-year-old son also experienced episodes for years without her knowledge. Her mother experienced AIWS as a young girl, her sister who had lots of migraines, too, and her brother had it while he was sick with mono. Even her first cousin had bouts of it while in her 20s as she experienced one of the possible causes of AIWS—stress, usually in children or young adults. [6]
- **Migraines:** Though AIWS cannot always predict migraines, it is thought as a sensory warning of an oncoming migraine.^[1] There's also speculation that AIWS could be a rare subtype of migraines.
- **Early stages of the Epstein-Barr virus (causes mono)**



Possible Causes

- Unusual electrical activity in the brain
- Abnormal blood flow in parts of the brain
- Infection
 - Influenza A virus
 - Epstein-Barr virus
- Epilepsy
- Stress
- Stroke
- Brain tumors
- Brain lesions
- Head Trauma
- Migraines



These underlying causes are what the focus of treatments are since AIWS itself is untreatable as of right now. The most common cause of AIWS appears to be migraines, so in the absence of a standard treatment plan for AIWS, its association with migraines is often the focus. Calcium channel blockers are used to treat the migraines that accompany AIWS. [5] Without the blockage, calcium ions act as second messengers in cell signal transduction pathways, so they can spread rapidly throughout the cell by diffusion once triggered by G-protein coupled receptors. After the ligand binds to the cell surface or inside the cell, transduction begins to convert that first messenger into a second messenger, in this case calcium. The calcium channel opens to let calcium ions flow out and increase their concentration in the cytosol. When the calcium channel is blocked, by compounds like verapamil or nimodipine, to treat migraines, calcium ions cannot cross the cell membrane. [5] Calcium ions are often stored in the endoplasmic reticulum and are released during transduction. Increased calcium ion concentration in the cytosol leads to cellular responses that are involved in muscle contraction. Their blockage allows the smooth muscle walls of blood vessels to relax, counteracting the vessel constriction that contributes to a migraine.

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