**St. Michael's reports second known case of patient developing synesthesia after brain injury**

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About nine months after suffering a [stroke](http://www.medicalnewstoday.com/articles/7624.php), the patient noticed that words written in a certain shade of blue evoked a strong feeling of disgust. Yellow was only slightly better. Raspberries, which he never used to eat very often, now tasted like blue - and blue tasted like raspberries.

High-pitched brass instruments - specifically the brass theme from James Bond movies - elicited feelings of ecstasy and light blue flashes in his peripheral vision and caused large parts of his brain to light up on an [MRI](http://www.medicalnewstoday.com/articles/146309.php). Music played by a euphonium, a tenor-pitched brass instrument, shut down those sensations.

The patient said he was initially frightened by the mixed messages his brain was sending him and the conflicting senses he was experiencing. He was so worried that something was seriously wrong with him that he raised it with a nurse only as he was leaving an appointment at St. Michael's Hospital in downtown Toronto.

Physicians and researchers immediately recognized he had synesthesia, a neurological condition in which people experience more than one sense at the same time. They may "see" words or numbers as colours, hear sounds in response to smells or feel something in response to sight.

Most synesthetes are born with the condition, and include some of the world's most famous authors and artists, including author Vladimir Nabakov, composer Franz Liszt, painter Vasily Kandinsky and singer-songwriter Billy Joel.

The Toronto patient is only the second known person to have acquired synesthesia as a result of a brain injury, in this case a stroke. His case was described in the August issue of the journal Neurology by Dr. Tom Schweizer, a neuroscientist and director of the Neuroscience Research Program at St. Michael's Li Ka Shing Knowledge Institute.

Dr. Schweizer examined the patient's brain activity in a functional MRI and compared it to six men of similar age (45) and education (18 years) as each listened to the James Bond Theme and a euphonium solo.

When the James Bond Theme was played, large areas of the patient's brain lit up including the thalamus (the brain's information switchboard), the hippocampus (which deals with memory and spatial navigation) and the auditory cortex (which processes sound).

"The areas of the brain that lit up when he heard the James Bond Theme are completely different from the areas we would expect to see light up when people listen to music," Dr. Schweizer said. "Huge areas on both sides of the brain were activated that were not activated when he listened to other music or other auditory stimuli and were not activated in the control group."

The patient and members of the control group also viewed 10-second blocks of words presented in black (which elicits no emotional response in the patient), yellow (mild disgust response) and blue (intense disgust response).

Reading blue letters produced extensive activity in the parts of the patient's brain responsible for sensory information and processing emotional stimuli and similar but less intense responses for yellow letters. Control groups showed no heightened brain activity in response to the different coloured letters.

Dr. Schweizer said the fact that the patient had very targeted and specific responses to certain stimuli - and that these responses were not experienced by the control group - suggests that his synesthesia was caused as his brain tried to repair itself after his stroke and got cross-wired.

The patient's stroke occurred in the thalamus, the brain's central relay station. That's the same part of the brain affected by the only other reported case of acquired synesthesia.

**FAQ for synesthesia**

What is synesthesia?

Synesthesia is a neurological condition in which one sense, such as hearing, is simultaneously perceived by one or more additional senses such as sight. The word synesthesia comes from two Greek words, syn (together) and aisthesis (perception); literally, "joined perception." People who report such experiences are known as synesthetes.

What are the symptoms?

Synesthesia can involve any of the senses. The most common form occurs when someone sees a certain color in response to a certain letter of the alphabet or number. For example, a synesthete might see the word "plane"as green or the number "4" as brown. Some synesthetes hear sounds in response to smell, who smell in response to touch or feel something in response to sight.

Who has it?

Most synesthetes are born with this condition. There has been only one previously reported case of someone acquiring synesthesia as a result of an accident or other medical condition such as a stroke. This is the first reported case of acquired synesthesia manifesting itself in multiple senses. Some celebrated people who may have had developmental synesthesia (meaning they were born with it) include:

Russian author Vladimir Nabokov describes his relationship with letters and colours, which he called "coloured hearing," in his autobiography, Speak, Memory: "The long a of the English alphabet ... has for me the tint of weathered wood, but the French a evokes polished ebony. This black group also includes hard g (vulcanized rubber) and r (a sooty rag being ripped)."

British painter David Hockney, who perceives music as color, shape, and configuration, and who uses these perceptions when painting opera stage sets but not while creating his other artworks

Duke Ellington, who saw notes in colours and textures. Saxophonist Harry Carney playing D was dark blue burlap, while Johnny Hodge playing G was light blue satin

Billy Joel, who associates musical genres and letters -- particularly vowels -- with color. He has said that softer, more intimate songs such as "Lullaby (Goodnight My Angel)" and "And So It Goes," are blues or greens, while songs with a heavier beat and faster rhythm such as "It's Still Rock n Roll to Me" suggest the red-orange-yellow end of the spectrum.

The only previously reported case of acquired synesthesia was a 35-year-old American woman who felt tingling on her body in response to sounds after suffering a stroke.

What causes it?

Scientists believe that synesthesia results from "crossed-wiring" in the brain. They hypothesize that in synesthetes, neurons and synapses that are supposed to be contained within one sensory system cross to another sensory system.

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