

# Aphasia Insights!

August 2023  
Volume 5, Issue 14  
August 8, 2023

*Voyager 2* space probe was launched in 1977 with messages to any extraterrestrial beings, and “the astronomer Carl Sagan was the record producer, and he chose sights and sounds that captured our species and its accomplishments. He included greetings in fifty-five human languages and one “whale language,” a twelve-minute sound essay made up of a baby’s cry, a kiss, and an EEG record of the meditations of a woman in love, and ninety minutes of music sampled from the world’s idioms...”

Steven Pinker, [How the Mind Works](#) (1997). W.W. Norton & Company. New York, London. pp. 149.

[Aphasia Nation, Inc.](#) is committed to educating the wider public about stroke and aphasia and the “*Aim High for Aphasia!*” international Aphasia Awareness campaign.

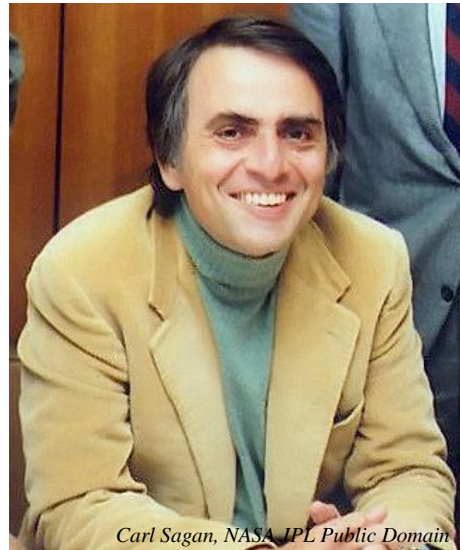
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## Carl Sagan, the world-famous astronomer: Evolution, Endocasts and Broca’s Brain.

By Tom Broussard, Ph.D.

This is the next in a series of articles about the science and scientists behind the brain, stroke, aphasia, plasticity and recovery.

**Carl Edward Sagan (November 9, 1934 – December 20, 1996)** was a world-famous astronomer who always talked about the “billions and billions” of stars in the universe.



Carl Sagan, NASA JPL Public Domain

His best known scientific contribution is his research on the possibility of [extraterrestrial life](#); he sent his first messages into space with the [Pioneer plaque](#) and the [Voyager Golden Record](#), with the universal message for any extraterrestrial intelligence that might find them.

Sagan also presented at the [Gifford Lectures](#) in Scotland in 1985 with many other presenters preeminent in their field including [William James](#), [John Dewey](#), [Charles](#)

[Sherrington](#), [Santiago Ramon y Cajal](#), and [Steven Pinker](#). He developed [myelodysplasia](#) and died of pneumonia at the age of 62 on December 20, 1996 ([Wikipedia](#)).

Sagan spent most of his career at [Cornell University](#) as the director of the Laboratory for Planetary Studies. He published more than 600 scientific papers and articles and was author, co-author or editor of more than 20 books. He wrote

many popular science books and movies, such as the [Pale Blue Dot](#), [Cosmos](#), and [Contact](#) ([Wikipedia](#)).

Sagan wrote another book that is much less known, entitled [Broca's Brain](#), which is about “the exploration

of the universe and ourselves” and the search for life beyond Earth. Many of his ideas for the book started as various presentations; the William Menniger Memorial Lecture at the American Psychiatric Association, the National Space Club, the Smithsonian Institute, Cornell and the American Association for the Advancement of Science (Sagan, 1978).

The topics ranged from science, [evolution](#), space, the future and

God, and the first chapter of the book is the same as the title, *Broca's Brain*. The quote from Chapter 1 is about evolution, Broca himself and the Broca's area.

“They were apes only yesterday.  
Give them time.”

“Once an ape—always an ape.” ...  
“No, it will be different...Come back here in an age or so and you shall see...”

The gods, discussing the Earth, in the motion picture version of H.G. Wells' *The Man Who Could Work Miracles* (1936).

Sagan visited the [Musee de l'Homme, Museum of Man](#) in Paris near the Eiffel Tower to learn more about our ancient human ancestors.

A staff researcher took Sagan behind the scenes to a remote corner of the museum where Sagan saw an amazing assortment of “gray, convoluted objects, stored in formalin to retard spoilage--shelf upon shelf of human brains” (Sagan, 1978).

As he gazed at row after row of large and labeled glass bottles, he saw a label that read *P. Broca*. He took it down and realized he was holding Broca's brain (Sagan, 1978).

[Paul Broca](#) was a French physician, surgeon, and [anthropologist](#). He studied the brain and discovered that language is localized in the left [frontal region](#) of the [cortex](#). That area of the brain, often called the language center, is called the [Broca's area](#) named after him for

his work studying the brains of people with stroke and [aphasia](#).

The Broca's area is located in the [left third frontal convolution](#) of the brain. It contains so many [neurons](#) in that area that it has created a noticeable indentation in the skull ([cranium](#)) about the size of a thimble. It was “among the first identifiable external brain areas to be implicated in a specific function” ([Tattersall, 2012](#)).

Scientists have made “rubber-latex casts of the insides of skulls of human and related beings” and mold the “interior of the cranium, of what the brain must have been like” (Sagan, 1978). These are called endocranial casts or [endocasts](#) and are used to study the minute physical structure of the brain.

[Anthropologists](#) have been peering back into [evolutionary history](#) to determine when our ancient ancestors started to speak. They discovered the existence of the Broca's area in the endocast of a [Homo Erectus Nariokotome skeleton](#) who lived about 1.5 million years ago near the Nariokotome river in northern Kenya ([Rubalcaba, 2010](#)). He was a young boy, about eleven years old, and was the “most complete early hominid skeleton ever found” and was named [Turkana Boy](#) and subsequently, [Nariokotome boy](#) (Walker et al. 1993).

Anthropologists discovered that the earlier primitive [hominid](#) skulls did not have a Broca's area but later primitive hominid skulls did have a

Broca's area that includes the Nariokotome skeleton. That period of time includes the shift into the speaking world for the current homo sapiens.

In any event, all humans today have a Broca's area in their head and it is about time that people know they have it and know what it does!

Thanks to Carl Sagan for helping us learn more about the brain through his story about the “billions and billions” of brain cells in Broca's Brain!

Signed: *The Johnny Appleseed of Aphasia Awareness*

The author is a three-time stroke survivor and has aphasia as a result of the strokes. He continues to recover his language skills.

He is Founder and President, Aphasia Nation, Inc., a non-profit organization whose mission is educating the wider public, national and international, about aphasia and plasticity, the foundation of all learning.

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