

# Lost for words—the devastation caused by aphasia

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Credit: AI-generated image ([disclaimer](#))

Aphasia is a devastating diagnosis that affects your ability to speak or understand language. It's a little-known condition that effects 300,000 Europeans every year and recently made headlines when actor Bruce Willis announced he was diagnosed with it.

Aphasia is a language disorder that is caused by a [brain damage](#) to the part of the [brain](#) that controls language. It often arises as a result of a stroke, [brain tumour](#) or a neurodegenerative disease, such as Alzheimer's.

Hollywood actor and star of "Die Hard" Bruce Willis recently announced his retirement following a diagnosis of [aphasia](#). The condition affects a person's ability to speak or understand coherently.

Many had never heard of aphasia before learning this sad news, which is perhaps surprising given there are 300,000 new cases in the EU every year.

## **Devastating diagnosis**

"People tend to focus on the underlying causes," said Dr. Nicoletta Biondo, a psycholinguist at the University of California, Berkeley, "But not being able to communicate can be devastating—you wake up one day to find you've lost part of your capacity to speak or understand."

She added, "Aphasia is really unexplored territory, but we're starting to see more research in this area. We hope this will give us a better understanding of how the language system works and provide scientific bases for therapies that can give people a better quality of life."

Damage to any part of the brain that facilitates language can result in aphasia. The nature of the symptoms is determined by the location and size of the injury.

Some people with aphasia may simply not remember the word for "orange." Others may be able to write 'orange' but not read it back. Others may say 'apple' instead of "orange" and insist they are right. There are those who may attempt to say 'orange' but the sound they

produce bears no resemblance to the word. A further subset is unable to repeat 'orange' after it's said to them. And yet another group simply doesn't understand the meaning of "orange."

## Sub-types

"With better [diagnostic tools](#), we'll be able to determine which sub-type of aphasia a person is suffering from, and clinicians will be able to direct patients to the correct therapy without wasting time," said Dr. Seçkin Arslan, a neurolinguist leading the EU-funded research project [ProResA](#), which aims to better understand the connection between pronoun usage and aphasia. "Currently there is no way to stop aphasia but there are therapies to maintain language abilities for longer."

Primary progressive aphasia (PPA) is a relatively rare form of the condition, though the prevalence is rising in an ageing society. Generally, it is brought on by a stroke or progressive brain degeneration (for instance in those with dementia).

People with PPA often show an unusual use of pronouns (words like you, she and it) instead of saying the name of a person or object, they opt for the generic pronoun.

"Pronoun processing can be difficult because it requires a well-functioning memory. After hearing a noun or name, you must reactivate the memory trace of the thing or person you're talking about," said Dr. Arslan, adding, "It's not that pronouns are the most important aspects of grammar, but they are a small detail that can be used to test how disease or a stroke have impacted general language abilities."

The ProResA team aim to better understand the 'markers' of aphasia and to develop tools that precipitate a diagnosis of aphasia. They will predict who will develop aphasia even before there are obvious signs of the

condition and enable degenerative brain disorders, like Alzheimer's, to be identified earlier.

Currently, standard international tests to diagnose and grade aphasia are only available in English, making it impossible to compare the severity of the condition across all countries.

To date, the EU-funded [Collaborations of Aphasia Trialists](#) and their many international collaborators have adapted standard aphasia assessment tools into 15 languages.

## Eye-tracking

For the first time, data are being collected using eye-tracking technology—a tool that has already proven useful in dementia diagnosis. Typically, people who go on to develop Alzheimer's disease [show signs of eye movement impairment](#) before any cognitive symptoms appear.

Participants participate in a "visual world paradigm," listening to a series of sentences while looking at pictures on a computer screen. When there's a match between spoken word and image, the participant clicks a mouse.

An infrared camera shoots a beam at the subject's eyes, which allows the flickering eye movement to be tracked. The camera records where a person looks at the screen and for how long. The accuracy of each "fixation," the time taken to analyse an image, and the speed of the mouse click are recorded.

"If we can eventually develop a database of people with PPA by tracking their eye movement while they are processing language, we will have a predictive tool for people with milder dementia who will go on to develop aphasia," said Dr. Arslan.

## Brain damage

A separate strand of ProResA focuses on using magnetic resonance imaging (MRI) to identify those areas of the brain that are not functioning properly. They will create a detailed map of brain damage and its correlation with specific types of language impairment.

[T.I.M.E](#) is another European project using MRI. Dr. Biondo, who leads the project, is focused on identifying the brain areas and networks that cause time impairment.

Some people with aphasia speak 'telegraphically,' using phrases without verbs that give no sense of time. "We say a lot with a verb—it's the core of a sentence and conveys important time-related information, said Dr. Biondo. But when someone says "I breakfast," we don't know if this thing happened in the past, will happen in the future or is happening now."

Very little is known about why this happens, though some believe the problem is not purely linguistic but relates to difficulty conceptualising an event that isn't happening now.

## Simple tasks

Dr. Biondo will be setting patients simple tasks (like putting a series of photos of celebrities in age order) and correlating the results with brain scans that highlight the precise location of a lesion.

"Once we have a better understanding of what is really going on, we can try to help people in a more meaningful way—for instance, we can work on practical ways to train the brain to recover or regain whatever loss there has been."

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