Introduction

The Mysteries of Language

Beyond Words is a book driven by big questions.

What exactly is language, and where did it come from?
How do we learn our first language, and what happens when we try to learn another?
How do we use and understand language in everyday life?
And how, sometimes, do we lose it?

This book began as an exploration of psycholinguistics. What's that, exactly? (No, it's not the study of psycho linguists or linguistics for psychos.) It's the science of how we learn, use, understand, and sometimes lose language. A fusion of linguistics and psychology, psycholinguistics examines the intricate relationship between language and the human mind. The linguist Thomas Scovel once described it as a window into how the mind works. It's a field with many roots, stretching across disciplines, and as linguist Jean Aitchison put it, it's like a hydra, the many-headed creature of Greek myth. Cut off one head, and more appear.

Many of the big questions we've touched on fall under the banner of psycholinguistics. But pretty quickly, it became clear that this journey couldn't be boxed into just one field. The questions driving this book inevitably lead us across the wider landscape of linguistics. Alongside

core psycholinguistic topics, we dip into what language *is* (that's descriptive linguistics), where it came from (evolutionary and historical linguistics), how language shapes and is shaped by society and culture (sociolinguistics), and the deep connection between language and the brain (neurolinguistics). These threads are woven together to paint a richer, more complete picture of how language really works. This book unravels the mysteries of language, its origins, diversity, use, and loss, and shows how language gives us a unique window into the human mind.

As we'll see, the story of language science is full of surprising twists and turns and fascinating characters, colorful, curious, and sometimes controversial, who have shaped its growth across history.

Our capacity for language has fascinated humankind for millennia. Some of the earliest reflections on language and the mind come from ancient Egypt, one of the first civilizations to develop writing. Around 1700 BCE, a scribe compiled a catalog of head and spinal injuries in a document now known as the Edwin Smith Surgical Papyrus (named after the American collector who later purchased it). The text is thought to preserve medical knowledge dating back even further. Remarkably, it includes what is believed to be the first recorded case of aphasia, a language disorder that affects a person's ability to speak or understand speech. Case 20 describes a patient who, after a head injury, "speaks not at all, although he is conscious." Despite these early observations, the Egyptians didn't think much of the brain. In fact, they removed it during embalming, assuming it served no purpose. (Embalmers likely used hooks to liquefy and extract the brain before burial.) Instead, they believed the heart was the seat of thought, emotion, and consciousness.

The Greek physician Hippocrates was one of the first to argue that the brain, not the heart, was the true center of thought, sensation, and language. Around 400 BCE, he wrote *On the Sacred Disease*, a treatise on epilepsy that offered an astonishingly modern view of the mind. "Men ought to know," he wrote, "that from nothing else but the brain come joys, delights, laughter and sports, and sorrows, griefs, despondency, and lamentations … and by the same organ we become mad and delirious … and by this same organ we speak." Drawing on his observations of patients who had suffered head trauma, from battle wounds, chariot accidents, or falls, Hippocrates noted how injury to the brain often led to disrupted or lost speech. His ideas stood

in sharp contrast to the dominant view of the time, which held that language loss was a supernatural punishment. Instead, Hippocrates proposed something radically different: that speech, emotion, and even mental illness had physical, biological roots in the brain. It was an idea far ahead of its time, and one that would eventually shape the entire field of language science.

The Greek philosophers were the first to write extensively about language, especially Plato, who, like Hippocrates, believed that the brain was the seat of intelligence. In *The Republic*, Plato pondered the meaning of words, most famously through his Allegory of the Cave. In this thought experiment, prisoners are chained inside a cave, able to see only the shadows of objects cast on a wall by firelight. As "sign-bearers" name the objects, animals, plants, and everyday items, the prisoners mistakenly associate the names with the shadows rather than the real things. Plato's point was that language represents the world indirectly: The words we use are often tied more to our perceptions than to reality itself. Understanding, then, is an act of the mind. As we'll see, Plato returned to questions of language in other writings too, notably in *Cratylus*, a dialogue exploring whether names are arbitrary labels or somehow intrinsically linked to the things they represent.

The early history of psycholinguistics was filled with philosophical speculation, but if we trust the historians, there were also a few questionable attempts at experimentation. These early "studies" wouldn't stand a chance with modern ethics committees. In each case, infants were raised in extreme isolation, with caretakers either instructed not to speak or unable to communicate verbally. The goal? To discover what language, if any, children would develop on their own. The accounts vary. According to Herodotus, the Egyptian Pharaoh Psamtik I (seventh century BCE) claimed the children began speaking Phrygian, an ancient language of Anatolia (modern-day Turkey).

During the Middle Ages, Holy Roman Emperor Frederick II reportedly conducted a similar experiment, though tragically, all the infants died. In the fifteenth century, King James IV of Scotland is said to have tested the same theory by raising children on the remote island of Inchkeith. Supposedly, they emerged speaking Hebrew, though this strains credibility. A century later, Mughal Emperor Akbar the Great of India tried a version of the experiment too. While he failed to uncover a "natural

language," there's some suggestion the children may have developed a rudimentary form of sign language, perhaps modeled on gestures used by their caretakers.

In the modern era, a quirky cast of characters contributed to the story of language and the mind, none of whom would have called themselves "linguists," but all of whom helped shape the field in their own way. Take Wolfgang von Kempelen, an eighteenth-century Austrian inventor and something of a showman. He was a pioneer in speech synthesis, creating one of the earliest "speaking machines" designed to mimic human speech, an ancestor of today's Siri and other voice assistants. Kempelen's device was the first working model of the vocal tract, using bellows as lungs and a vibrating reed to simulate the voice box, channeling sound through a chamber that acted as the mouth. Played like a musical instrument, it produced childlike sounds and eerily spoke simple words like "mama" and "papa." It could even utter short phrases such as "You are my friend – I love you with all my heart" and "Come with me to Paris."

In 1791, Kempelen published *Mechanismus der menschlichen Sprache* ("Mechanism of Human Speech and Language"), a detailed examination of human speech's origins, its sounds, and the organs behind them. A genius with a flair for the dramatic, Kempelen was also a bit of a trickster. His most famous invention, the "Chess Turk," was a turbaned automaton that seemingly played chess against opponents. But it was all smoke and mirrors. A hidden human chess master controlled the moves from inside the cabinet, baffling audiences and even besting greats like Napoleon Bonaparte and Benjamin Franklin. It's likely that Kempelen's speaking machine was created to add a haunting voice to his mysterious chess player, blending science with spectacle.

Cognitive science also plays a key role in our story. In the nineteenth century, German physiologist Franz Joseph Gall pioneered the study of brain anatomy and was an early advocate of brain localization, the idea that specific parts of the brain are responsible for particular mental functions, including language. (Gall is perhaps best remembered for inventing phrenology, the now-discredited practice of reading personality and mental traits by feeling bumps on the skull. For example, he believed that people with bulging eyes had better memories for words.) While phrenology

was debunked, Gall's research laid important groundwork for understanding how language is localized in the brain.

Soon after, French physician Paul Broca proposed a connection between brain regions and language loss, though he knew that only direct anatomical evidence, not feeling skull lumps and bumps, could prove it. When a patient with speech loss died, Broca's postmortem examination uncovered an egg-sized lesion in the left frontal lobe, now famously called Broca's area, confirming his theory. About a decade later, German neurologist Carl Wernicke encountered a patient with fluent but nonsensical speech and poor comprehension. After the patient's death, Wernicke identified a lesion in the temporal lobe. This led him to propose a second key language area of the brain, now known as Wernicke's area, linked to understanding, rather than producing, language. These landmark discoveries were vital for understanding brain injury, dementia, Alzheimer's, and other conditions that affect language abilities.

The emergence of language is another fascinating chapter in this story. Philosopher Jean-Jacques Rousseau was an early voice in exploring how we acquire language. In his influential book *Emile, or On Education*, Rousseau argued for a "natural" approach to childhood learning, favoring observation and experience over rote drills in reading and writing. He encouraged parents and teachers to pay close attention to children's development. *Emile* stirred controversy for its progressive religious views: The Church denounced it, copies were publicly burned, and the book was banned in both Paris and Geneva. Still, its impact on developmental psychology has endured, inspiring later thinkers like Jean Piaget.

Rousseau's work also influenced philosopher Dietrich Tiedemann, who began a detailed diary tracking the development of his son Friedrich over his first thirty months, with special attention to the child's emerging language. This style of diary study gained popularity after Charles Darwin published his own account, sometimes affectionately dubbed "The Daddy Diaries," about the development of his son William. Darwin didn't stop there. In *The Expression of the Emotions in Man and Animals*, he examined animal communication, and in his wider evolutionary work, he speculated about how human language itself may have evolved.

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In the previous century, British judge William Jones made a surprising discovery. While studying Sanskrit, he noticed that many words bore striking similarities to their counterparts in Greek and Latin, even though the people who spoke these languages lived thousands of miles apart. These resemblances couldn't be coincidental, he thought. The languages must have "sprung from some common source." This idea sparked the concept of a proto-language, an ancient linguistic ancestor from which multiple languages have evolved. It also reignited a much older question: How did the earliest humans begin to speak in the first place?

One line of thinking holds that language is innate, a built-in capacity of the human mind shaped by our evolutionary development. That idea found a strong proponent in Darwin's cousin Francis Galton, who believed that intelligence and talent, including the faculty for language, were inborn traits. He's the one who coined the now-famous phrase "nature versus nurture." (Unfortunately, Galton was also a proponent of eugenics. In fact, he originated this term too, and was the movement's founding figure.) On the other side of the argument, seventeenth-century philosopher John Locke described the human mind as a *tabula rasa*, or blank slate, at birth, shaped by experience and environment. Of course, this debate stretches back even further. Plato emphasized inborn knowledge, while his student Aristotle championed the role of learning and observation. In one form or another, we're still wrestling with those same questions today.

The nineteenth century marked the beginning of psycholinguistics as its own field. Dutch physiologist Franz Donders was a pioneer in mental chronometry, a method that measures how long it takes for people to process information mentally. Using a phonautograph, the earliest known device for recording sound (which he whimsically dubbed the "understanding-swiftness-writer"), Donders measured the time it took to identify sounds, colors, and numbers. Today, this approach remains fundamental in research, helping scientists track how long it takes us to produce speech or recognize words. For example, eye-tracking technology reveals the intricate ways our brains process written and spoken language. Interestingly, this technology has also found a place outside the lab, in marketing, where it tests how consumers respond to advertisements and product packaging.

In 1879, Wilhelm Wundt became the first person to call himself a "psychologist" and established the very first psychology laboratory in Leipzig, Germany. For Wundt, psycholinguistics was as much about the mind as it was about language. His influential book *Die Sprache* ("The Language") unified many psycholinguistic ideas, covering child language acquisition, language use and comprehension, and even sign language. Because of this, Wundt is often called "the Father of Psycholinguistics."

He shares that title with psychologist Jacob Kantor, who first introduced the term "psycholinguistics" in his 1936 book *An Objective Psychology of Grammar*. Ironically, both Kantor and his one-time colleague B. F. Skinner championed behaviorism, an opposing theory that claims children learn language through imitation, practice, and reinforcement. Skinner's best-known work, *Verbal Behavior*, argued that kids pick up language because parents reward the "right" ways to speak and discourage the wrong ones. (Though it's worth noting that his research was largely based on experiments with rats and pigeons.)

The book's premise famously prompted linguist Noam Chomsky to write a scathing rejoinder. He argued that no amount of conditioning could explain the infinite creativity and systematic nature of human language. This clash brought new attention to the nature versus nurture debate, with Chomsky firmly on the nativist side. He proposed that humans are born with an innate ability to acquire language, a specialized mental faculty unique to our species. His ideas helped usher in the "cognitive revolution," a new focus on internal mental processes like language learning, comprehension, and production. It also introduced the concept of the mind as an information processor, something like a computer.

Chomsky's impact on linguistics is hard to overstate. He famously distinguished between "competence," our internal knowledge of language, and "performance," or how we actually use that knowledge in real-world speech. This echoed an earlier distinction made by Swiss linguist Ferdinand de Saussure between *langue*, the structured system of language, and *parole*, the act of speaking.

These are just a few of the key players we'll encounter throughout the chapters ahead.

Modern technology has revolutionized psycholinguistics. The field has taken off with the rise of neuroimaging techniques like PET scans (positron

emission tomography), fMRI (functional magnetic resonance imaging), and TMS (transcranial magnetic stimulation), which allow researchers to watch the brain in action, lighting up as we read, listen, or speak. Tools that once seemed like science fiction now offer real-time insights into the inner workings of language in the brain.

These tools have revealed that language isn't stored in one tidy spot in the brain, it's distributed across a network of regions. For instance, words related to tools, like *hammer* or *shovel*, activate areas involved in both recognizing the object and controlling the physical motions used to operate it. Meanwhile, the modern boom in artificial intelligence has opened new frontiers. AI is now used to simulate human language processing, from virtual assistants like Siri to autocorrect, translation tools like Google Translate, and large language models such as ChatGPT.

As we've seen, psycholinguistics has a rich, and at times, turbulent, history. It's a field shaped by ideas and insights, but also by fads, fallacies, and fierce rivalries. Born at the intersection of theory and experiment, psycholinguistics has been influenced by a diverse cast of doctors, teachers, linguists, philosophers, psychologists, cognitive scientists, and other curious minds, each bringing their own perspective to the question of how language and the mind intersect.

But this history isn't just about scientific breakthroughs. It's also about real people and real stories. In this book, we explore remarkable case studies of so-called "feral" or wild children, like Genie, who reveal what happens when language development is disrupted. We meet individuals who have lost language due to injury or illness. Figures such as the Russian revolutionary Vladimir Lenin, left nearly speechless by a series of strokes, or the poet Charles Baudelaire, whose strokes left him with the single phrase, *"Cré nom!"* (French for "holy shit!").

There are eccentric characters too, like the Reverend Spooner, whose verbal slips earned him linguistic immortality, and true polyglot savants who speak a dozen languages or more. We also look beyond the human species, to signing gorillas, scent-trailing ants, color-communicating chameleons, and dancing honeybees, and ask: Where is the line between communication and language?

Psycholinguistics, and the fields that surround it, give us profound insight into our humanity by exploring how we learn, use, and lose language, our most defining trait.

These are questions that captivate many, not just scientists. The subject can often feel weighed down by terminology and jargon, but this book doesn't assume any prior knowledge of linguistics. *Beyond Words* breaks it all down in an accessible, engaging style, written in a friendly, conversational tone. You might say it's "linguistics without tears" (or headaches).

This book takes us down plenty of rabbit holes. It's packed with astonishing research and surprising discoveries. It's about fierce debates and contentious topics that have fascinated us since ancient times, and still do today. It's a book of big questions, and big answers, some of which inevitably lead to even more questions. And that's perfectly fine. There's a lot we don't know yet, but there's also plenty we do.

Rather than a many-headed hydra, perhaps this topic is better seen as a vast jigsaw puzzle, with countless pieces, each representing a different facet of language and the mind. Our task is to understand not only the individual parts, but how they all connect. The puzzle isn't finished yet, but its image is slowly coming into focus, drawing us ever closer to the heart of what it means to be human.

What we do know is this: Language is weird, but wonderful. It's intricate and inventive, confusing and complex, mysterious, and above all, it's deeply multifaceted.

Language is beyond words.

1

What Is Language?

Before we can explore how we learn, use, and lose language, we first need to define what it is, and what it isn't. Over the centuries, many have attempted to describe language. Aristotle stated, quite simply, that language is sound with meaning. Swiss linguist Ferdinand de Saussure, a pioneer of modern linguistics, described language as a storehouse of word-images in the minds of community members. He also emphasized its social dimension, calling it "a sort of contract signed by the members of a community."

Austrian philosopher Ludwig Wittgenstein likened language to a game, an ever-evolving tool of communication between individuals and across societies. Early linguist Edward Sapir defined language as "a purely human and non-instinctive method of communicating ideas, emotions, and desires by means of a system of voluntarily produced symbols." Renowned linguist Noam Chomsky describes language as a natural part of the human mind, an innate computational system we use to create and interpret thought.

These wordy definitions, however, don't always capture how speakers themselves experience their language. In her Nobel Prize acceptance speech, celebrated African American writer Toni Morrison put it this way: "We die. That may be the meaning of life. But we do language. That may be the measure of our lives."