The Evolution of Language

An Introduction for Students

First Edition

A collaborative resource from the OpenEvo Educational Innovation Lab, the Department of Comparative Cultural Psychology, and the Department of Linguistics and Cultural Evolution at the Max Planck Institute for Evolutionary Anthropology

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Preface

To the curious reader

Have you ever wondered what life would be like without language?

No conversations. No texting. No questions. No jokes, no songs, no stories.

No way to explain your thoughts — or understand someone else's. Language is so much a part of who we are that we often forget how strange and incredible it really is. Every word we speak or sign is part of a system built over thousands of generations — shaped by our ancestors, our cultures, our brains, and the environments we live in.

This reader is an invitation to explore one of the greatest mysteries in science:
How did humans come to have language, and what does that say about us?

You don't need to be an expert to start asking big questions. This guide is built to help you:

- See language from many different perspectives
- Learn how scientists study something that leaves only limited traces
- Discover how language connects to thinking, cooperation, and culture
- Reflect on your own experiences with words, symbols, and meaning
- Learn to live with and use language in a way that fosters well-being and sustainability

As you read, we hope you'll not only learn new things, but also begin to notice language in your everyday life: how people speak, how they listen, and how powerful just a few words can be.

Language isn't just something we inherit. It's something we grow and change together.

Let's explore where it came from, what it can do, and where it might take us next.

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📘 Introduction: What Is This All About?

How humans came to speak, think, and connect — and why it matters today

Right now, you're using one of the most powerful tools ever created by evolution: **language**. You're reading it. You probably used it earlier to talk to someone, ask a question, or share something online. You might even be using it in your head right now — thinking in words, making a plan, or imagining a conversation.

But where did this incredible ability come from?

How did humans go from simple gestures and sounds to complex languages with grammar, poetry, slang, and science? Why do some animals communicate, but none quite like us? And how does the way we use language affect the way we think, feel, and work together?

Those are the questions at the heart of this guide.

🔍 Why study the evolution of language?

Studying how language evolved helps us understand:

- What makes humans unique (and what we share with other animals)
- How our brains and cultures grew together over time
- Why we have thousands of different languages, and why many are disappearing
- How language helps us cooperate, share ideas, and solve big challenges

It also helps us reflect on **how we use language today** — in our relationships, our communities, and the world.

🧠 This guide is about ideas and about you

In the pages that follow, you'll explore nine different lenses for understanding language:

- From animal communication and ancient fossils...
- to child development, cultural diversity, cooperation, and computer models,
- all the way to how language can help us build a better future.

You'll learn how scientists ask questions, look for clues, and use tools from different fields — like anthropology, psychology, linguistics, and artificial intelligence.

But you don't have to be a scientist to get involved.

This guide is also about **how you experience language** — in the way you talk, listen, learn, think and connect with others. By the end, we hope you'll see language not just as something you use, but as something you can **explore, question, and shape**.

🌍 Why now?

In today's world, communication moves faster than ever. We need language to understand complex problems like climate change, misinformation, polarization, and inequality. We also need it to listen across cultures, speak up for what matters, and imagine new possibilities.

Understanding the evolution of language can help us become not just better learners, but **more thoughtful humans**.

Let's begin.

1. Cross-Species Comparisons

What do other animals teach us about language?

Have you ever heard a parrot say a word or seen a chimpanzee use sign language? It might seem like animals are speaking our language, but are they really?

Lots of animals communicate. Bees dance to show where flowers are. Elephants rumble to stay in touch with the herd. Dolphins use clicks and whistles that seem to have different meanings. Whales communicate through songs. Some monkeys use alarm calls to warn their group members of predators, and different alarm calls even refer to different kinds of predator species. This kind of communication is powerful and important. But it's still not quite the same as human language.

Human language is **special** in a few important ways:

- We use **symbols**, like words or signs, that stand for things.
- We follow **rules**, like grammar, to organize those symbols.
- We can talk about things that aren't right in front of us, like the past, the future, or imaginary worlds.
- We can create **completely new sentences** that nobody has ever said before and still be understood.

Scientists have tried to teach animals some of these skills. For example:

- **Nim Chimpsky**, a chimpanzee, was taught to use sign language. He could string together a few signs like "Give me banana eat." But he never used full grammar, and most of his sentences were just about getting things he wanted.
- **Alex**, a famous African grey parrot, could name objects and even count. But researchers still debate whether he *understood* language or just learned clever tricks.

So what do we learn from all this?

By comparing animal communication to human language, scientists can better understand where language came from. Maybe early humans started with gestures, like apes. Maybe vocal sounds slowly took over. Maybe language didn't appear all at once, but evolved piece by piece over time.

To find out, scientists:

- Observe animals in the wild (like how chimpanzees gesture to each other)
- Use creative ideas to work with animals in Zoos to understand their communication
- Record and analyze sounds in labs (like dolphin whistles or whale songs)
- Compare how animals and young children learn symbols

These studies help answer big questions:

What parts of language are shared with other animals?

And what makes human language truly one-of-a-kind?

2. Child Development

How do babies become language speakers?

Think about a baby you've met. At first, they don't say anything. Then suddenly they start pointing, babbling, and saying their first words. Before long, they're asking questions, telling stories, and even arguing!

Language seems to grow naturally in humans. Most babies don't need to be *taught* to talk like they're taught math or reading. Instead, they learn language just by being around people who speak it. That's because human brains are wired for it, but only if we grow up among other humans.

Scientists who study how children learn language have discovered some fascinating facts:

🧠 Our brains are ready, but only at the right time

There's something called a **critical period** — a window of time when our brains are especially good at learning language. If a child hears and uses language during this time, it becomes second nature. But if they miss that window, learning language later can be much harder.

👶 Learning starts before we can talk

Even before babies say their first word, they're watching and listening. They pick up on patterns in speech. They notice where people are looking or pointing. These early skills, called **joint attention**, are the building blocks of communication.

🧩 Words grow from experience

At first, babies learn words for things they see and use every day, like "ball," "shoe," or "dog." As they grow, they learn more abstract words like "before," "if," or "idea." Scientists call this *cognitive development* — the way thinking and understanding grow over time.

💬 Language grows *because* we connect

Talking isn't just about saying words — it's about connecting with others. Babies and young children use language to share how they feel, ask for help, and understand what others mean. In a way, **language is a social superpower** that lets us learn from each other.

To study how language develops, researchers:

- Record babies and toddlers during play or story time
- Track how quickly children learn new words

- Use simple games to see how they understand pointing, emotions, or questions

This kind of research shows just how amazing human development is and how much it tells us about the evolution of language. After all, every child is a little example of how language takes root and grows in a human mind.

3. Ancient Ancestors

What clues from the past help us understand how language began?

If you time-traveled back 500,000 years, you probably wouldn't hear anyone chatting. But people still worked together, shared knowledge, and lived in groups. Did they use language like we do today? That's one of the hardest — and most exciting — questions in science.

The problem is, **language leaves traces in the form of written text, but these only go back some thousand years and aren't found everywhere.** We can't dig up a sentence or record the voice of an early human. But scientists have found clever ways to look for clues.

🦴 Bones and body shapes

Some fossils give us hints about whether ancient humans *could* speak. For example:

- The **hyoid bone** in the throat supports speech sounds. Fossils of Neanderthals show they had a similar hyoid to ours.
- The shape of the **skull and vocal tract** affects how many sounds we can make.
- The **FOXP2 gene**, found in both humans and Neanderthals, is linked to speech and language abilities.

These clues suggest that our ancestors had the physical tools for speaking, but that's only part of the puzzle.

🛠️ Tools, art, and early symbols

Language isn't just about speaking — it's about thinking symbolically. That means using something (like a word or picture) to stand for something else. And guess what? Early humans left behind signs of **symbolic thinking**:

- Carved beads and ochre markings (over 75,000 years old)
- Cave art showing animals, people, and abstract designs
- Complex tools that required planning and teaching

These artifacts suggest that early humans were already sharing ideas and meanings. And they likely needed **some kind of language** to do that.

🧠 Language and cooperation

Many scientists think that language evolved alongside **cooperation**. Imagine trying to hunt or build tools without speaking or signing. Groups that could communicate — even in basic ways — had a big advantage. Over time, those communication skills became more advanced, and language began to take shape.

Some researchers believe it all started with **gestures**: pointing, miming, and using body language. Over time, sounds may have replaced gestures so people could communicate while using their hands.

To explore these ideas, scientists:

- Study ancient skeletons and brain structures
- Analyze tool-making and how it compares to sentence-building
- Create models of how language might have evolved over time

All of this helps us ask:

When did language begin? What came first — speaking, signing, or storytelling?

We may never know exactly when language arose, but the clues from our ancient ancestors help us understand how it slowly came to life.

4. Cultural Diversity

Why are there so many languages and what can they teach us?

Today, humans speak around **6,500 to 7,000 different languages**. Some use clicks or tones. Others are signed instead of spoken. Some have one word for both “blue” and “green.” Others have dozens of ways to describe directions or shapes. Some have words for many numbers, while others distinguish only between “few” and “many.” There are languages in which the verb sits between the subject and object, as in English “Kim drinks water”; others place the verb in front of the subject and object, like Arabic or Welsh “Drinks Kim water.” Why so much variety? And what does it tell us about human language?

🌏 Language and culture go together

Languages don’t exist in a vacuum. They grow and change along with the people who use them. When a community faces new environments, technologies, or social systems, its language adapts. That’s why people in some cultures have many words for different types of snow, or why certain emotions get their own names in specific languages, like the German word *Weltschmerz*, which means a feeling of sadness about the world.

At the same time, all languages serve similar purposes: to **connect people**, **share knowledge**, and **express identity**.

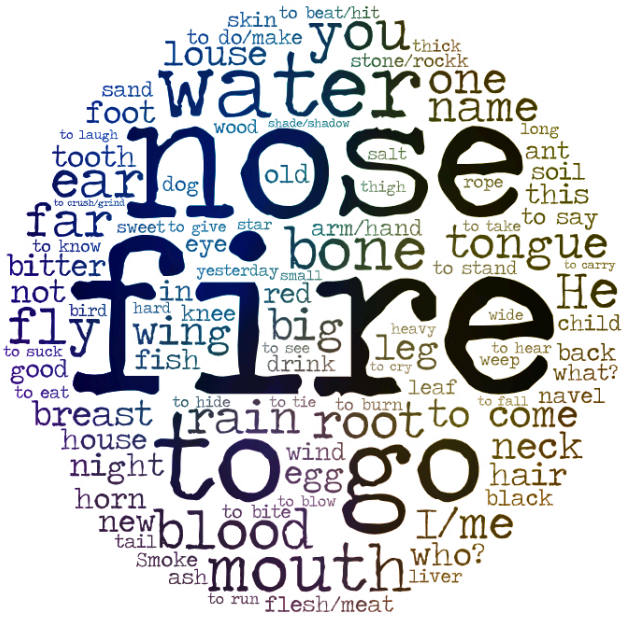
🔁 Languages change over time

Have you ever read something written in English from hundreds of years ago? It’s almost like a different language! That’s because languages are always evolving. New words appear, old ones fade, meanings shift. And when groups of people interact, their languages can mix and borrow words.

For example:

- English borrowed *piano* from Italian and *beef* from French.
- Japanese borrowed *pan* (bread) from Portuguese.
- Swahili includes words from Arabic, like *raia* (citizen)..

These changes tell us about migration, trade, colonization, and cultural exchange.



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Words in the Leipzig-Jakarta-List — a list of 100 words for which an original word also exists across 41 languages. Scaled by semantic stability over time.
Image source: Susan Hanisch, CC-BY-SA 4.0

🌳 Tracking language families

Just like people have family trees, so do languages. Scientists use similarities in words and grammar to group languages into families. For example, English, Spanish, and German all come from an older “parent” language called Proto-Indo-European.

By comparing “cognates” (words that have the same root, like *mother*, *madre*, and *Mutter*), linguists can build **language trees** and trace how languages split and spread.

🗺️ Saving endangered languages

Not all languages are thriving. Every two weeks, a language disappears forever. When a language dies, we lose more than just words — we lose **stories, knowledge, and worldviews**.

That’s why researchers do fieldwork: traveling to remote communities, recording languages, and learning how they’re used in everyday life. These efforts help keep languages and the cultures they belong to alive.

To explore cultural diversity in language, scientists:

- Record and analyze languages in real communities
- Compare patterns in grammar and meaning
- Use computers to map how languages evolve and spread

All of this shows us just how **creative**, **flexible**, and **deeply human** language is.

5. Our Minds

How does language connect to thinking and feeling?

Imagine trying to go a whole day without using any words — not speaking, not texting, not even thinking in words. It would be nearly impossible. That's because language doesn't just live in our mouths or hands — it lives in our **minds**.

Language and thinking are tightly connected. We use language to:

- Organize our thoughts
- Remember the past and plan the future
- Simulate possibilities
- Interpret and judge what we experience
- Talk to ourselves in our "inner voice"
- Make sense of how we feel

But how exactly does this work?

🧠 Language shapes thought

Some scientists believe that the language you speak can **influence, but does not fully determine,** how you perceive and understand the world. For example:

- Russian speakers use two different words for light and dark blue, and they can spot tiny differences in shades more easily than English speakers.
- Some languages use directions like "north" and "south" instead of "left" and "right," which helps speakers stay better oriented in their environment.
- In some cultures, emotions are described more by physical sensations ("a heavy heart") than by labels like "sad" or "guilty."

This doesn't mean language completely controls your thoughts, but it does shape **how** and **what** you pay attention to.

💬 Your inner voice

Even when we're not speaking out loud, we're often talking in our heads. This "inner voice" helps us make decisions, solve problems, and reflect on experiences. But it can also **become overwhelming**, especially if we get stuck on negative thoughts.

That's why some scientists study how language affects **mental health**. Learning to notice and question your inner thoughts can help reduce stress and anxiety. Some call this skill "defusion": the ability to *see* your thoughts instead of being *trapped* by them.

> Try this: The next time you catch yourself thinking something like "I'm going to fail," imagine saying, "I'm *having the thought* that I might fail." Does it feel different?

❤️ Words for feelings

Language also helps us **understand and manage our emotions**. When you can name what you're feeling, like "frustrated" or "nervous", it's often easier to deal with the feeling. That's why children with a bigger emotional vocabulary are often better at calming themselves down.

Different languages have different words for emotions. Some have words that don't exist in others. For example:

- **Saudade** (Portuguese): a deep emotional state of longing for something or someone
- **Iktsuarpok** (Inuit): the feeling of anticipation when waiting for someone to arrive
- **Kilig** (Tagalog): the butterflies you feel when something romantic happens

Learning these words expands your emotional world and helps you connect with others across cultures.

To study language and the mind, scientists:

- Explore how words influence memory, attention, and decisions
- Use brain scans to see what areas are active during speaking and listening
- Observe how children and adults talk about emotions

By looking inside the mind, we see that language isn't just something we *use* — it's something that *shapes* who we are.

6. Cooperation and Social Games

How does language help us work together?

Imagine playing a game where you and your teammates have to solve a puzzle. You can't see each other's pieces, so you have to explain what you see, ask questions, and share ideas. How well you do probably depends on one thing: **communication**.

Humans are incredibly good at working together, but only because we're also good at using language.

Language allows us to:

- **Share plans** ("Let's meet at the big rock after sunset.")
- **Explain goals** ("We're trying to trap the antelope, not scare it away.")
- **Coordinate roles and make rules** ("You watch the path, I'll climb the tree.")
- **Build trust** ("You can count on me.")

Without language, none of these would be easy. That's why many scientists believe that **cooperation played a huge role** in the evolution of language.

🎮 Learning through games

To explore how language supports cooperation, researchers use **social games**: real or digital situations where people must make decisions together. These games test how we:

- Share limited resources
- Solve problems fairly
- Deal with conflicts or cheaters
- Build group trust

Sometimes, even a small change in wording can make a big difference. For example:

- Saying "We're in this together" can make people more generous.
- Using "I" instead of "you" in a disagreement can reduce tension.

- Naming a group (“Team Green”) can make people feel more united.

This shows that **words don’t just describe reality — they influence how we behave** in social situations.

🤝 Language makes big groups possible

In small groups, people can rely on body language and shared experience. But as groups grow larger, communication needs to scale up. That’s where **stories, symbols, and shared values** come in.

With language, we can create group identities, pass down traditions, and teach rules that help us get along. It’s what lets us cooperate not just with friends and family, but with thousands or even millions of people we’ve never met.

To study this, scientists:

- Run experiments to test how communication affects group behavior
- Observe how different cultures use language to teach cooperation
- Model group decision-making with computer simulations

Language isn’t just about chatting — it’s a survival skill for navigating the social world.

7. Shared Resources and Group Identity

How does language help us manage what we all rely on?

Imagine a village that is based beside a river. Everyone needs water for drinking, cooking, and farming. But what happens if one person takes too much? Or if no one speaks up when the water gets dirty?

To solve problems like these, people need more than rules — they need **shared understanding**, **trust**, and **clear communication**. That's where language comes in.

🌳 The power of shared words

When we talk about resources like forests, oceans, or clean air, we often use words like:

- "Our land"
- "Common good"
- "Protect for future generations"

These phrases don't just describe reality — they create a sense that *this belongs to all of us*. That shared identity can motivate people to act more fairly and think long-term.

Language helps people:

- Name a problem ("The fish population is shrinking.")
- Agree on solutions ("Let's take turns using the lake.")
- Create systems for fairness ("Everyone gets one fishing day per week.")

🏛️ Building cooperation in big groups

Long ago, humans mostly lived in small bands. But today, we live in towns, cities, and countries, i.e., huge groups where most people never meet face to face. So, how do we still feel connected?

Language lets us build **group identity** using:

- Symbols (like flags, songs, or slogans)

- Stories (about history, ancestors, heroes)
- Beliefs (shared values and worldviews)

This sense of belonging can lead to amazing cooperation, like building schools or protecting nature together. But it can also cause conflict if different groups feel threatened or misunderstood.

🧪 Studying how language shapes groups

Scientists who study cooperation and resource-sharing often run experiments using **“commons games.”** In these games:

- Players decide how much of a shared resource to use
- They talk (or don’t) before making decisions
- Researchers see what makes people act selfishly or cooperatively

The results show that communication matters. People who can talk to each other, even briefly, are much more likely to share fairly and protect what they have.

So when we ask:
How do humans work together at such large scales?

The answer often starts with:
We talk. We name. We imagine. We connect.

8. Digital Tools and Models

How can computers help us study language?

Language is incredibly complex. It changes over time, looks different across cultures, and is shaped by biology, culture, and society all at once. So, how do scientists keep track of all this?

One answer: **computers**.

Today, researchers use digital tools and models to understand how language works and how it might have evolved. Computers help analyze patterns too big or too slow for humans to spot on their own.

🧮 Modeling language evolution

Imagine trying to figure out how language might have developed 500,000 years ago. We can't go back in time, but we *can* build simulations.

In these digital “worlds,” scientists:

- Create artificial languages
- Set rules for how words are passed on
- Run the model for hundreds of generations
- Watch how languages change, split, or disappear

This helps test big questions, like:

- Can a group develop grammar just by talking?
- What happens when two language groups mix?
- How does cooperation affect how language spreads?

These models give clues about how real languages might have formed and why some survive while others fade away.

🌐 Mapping language families

Computers are also used to build “family trees” of languages, showing how modern languages like Spanish, Hindi, or Russian evolved from ancient ones.

By comparing thousands of words and grammar rules, scientists use algorithms to trace:

- Which languages are most closely related
- How languages spread across continents
- When key changes happened

It's kind of like doing ancestry DNA testing — but for languages!

🧠 Helping us understand the mind

Digital tools also help us study how we use and learn language today. For example:

- Apps can track how babies or adults pick up new words
- Speech recognition tools can study pronunciation and grammar
- Artificial intelligence can model how the brain might process meaning

Some computer models even try to simulate the experience of learning a language from scratch, just like a human baby would.

> Cool fact: Some researchers use robots to test how early humans might have linked sounds to objects, kind of like teaching a robot baby to talk!

Computers don't replace scientists, but they give them superpowers for exploring questions that were once impossible to answer.

9. Language and the Future of Our Planet

Why does understanding language matter for global challenges?

Language isn't just something we *study* — it's something we *use* every day to shape the world around us. The words we choose can bring people together, spark action, or sometimes create division and confusion.

That's why understanding how language works is so important for tackling the biggest issues we face today, like **climate change**, **social justice**, and **sustainability**.

🌱 Talking about the future

Have you ever noticed how much of the language we use is about things that aren't right in front of us? We talk about the past, imagine possible futures, and describe ideas like "freedom" or "responsibility."

This is one of the superpowers of human language:
It lets us **think and act beyond the present moment**.

That's exactly what we need to solve global problems. For example:

- Talking about climate change means understanding systems we can't see directly (like carbon in the atmosphere).
- Promoting equality means imagining a better world and communicating what that could look like.
- Solving conflicts means listening to different voices, across cultures and perspectives.

📣 Whose voices get heard?

In many parts of the world, powerful decisions are made using just a few major languages. But what happens when other voices — especially Indigenous communities — aren't included?

When a language disappears, we don't just lose words. We lose:

- Unique ways of understanding nature
- Traditional knowledge about farming, medicine, and ecosystems
- Cultural wisdom about cooperation, identity, and belonging

That’s why protecting language diversity is part of protecting the planet.

> Example: Some communities have dozens of words for types of snow or ocean waves. These words carry knowledge passed down through generations — knowledge that can help scientists and decision-makers today.

🧠 Using language wisely

Language can inspire action, but it can also spread fear, misinformation, or blame. That’s why scientists, journalists, and activists are careful with how they frame messages.

For instance:

- Saying “climate emergency” might motivate some people, but overwhelm others.
- Using terms like “climate justice” connects environmental issues to fairness and human rights.

Learning how language shapes people’s thinking is a powerful tool for change. It helps us talk across cultures, build trust, and imagine new possibilities.

To build a better future, we need more than science and technology.
We need **conversations**.
We need **stories**.
We need **language that brings people together.**

🎯 Final Reflection: What Will You Do With This Knowledge?

Language: Our Superpower, Our Story, Our Shared Future

You've now explored nine different ways of understanding the evolution of language — from the gestures of apes to the thoughts in our minds, from ancient tools to future technologies.

What do all these pieces show us?

They show that language is:

- A **biological** ability, shaped by evolution
- A **social** tool, grown through interaction
- A **cultural** treasure, passed from generation to generation
- A **cognitive** force, shaping what we think and feel
- A **global** responsibility, connecting us to one another and our planet

Whether spoken or signed, ancient or modern, whispered or shouted, language is how we **create meaning**. It's how we **remember the past**, **imagine the future**, and **solve the problems of today**.

✏️ Think about it:

- What new ideas did you learn about where language comes from?
- How does your own language shape how you see the world?
- How can you use language more thoughtfully — in school, in your community, or online?

🚀 What's next?

You don't need to be a scientist to explore these questions.
You can:

- Interview people about the words they grew up with
- Create your own mini dictionary of emotions
- Try learning a few words from a language that's new to you
- Pay attention to how language is used to solve (or cause) problems in the world

Every time you learn a new word, tell a story, ask a question, or listen closely to someone else, you're participating in something ancient and amazing:
The ongoing evolution of language.

And that means the next chapter of this story?
It's partly up to **you**.

➕Appendix

❓About this resource

Our introductory guide for students has been years in the making, both because there are so many relevant and fascinating dimensions of linguistic research, and because the topic goes from the core of our everyday experience, all the way to the most complex abstractions of computational models. We have gone through many iterations, edits, notes and discussions on how to frame the most relevant topics, in the most accessible way, while highlighting the interconnected themes that come to light when we look at the world through the languages humans use. We view this as an evolving document, having used some LLMs to help keep each section concise and consistent for younger readers, while reflecting some of the complexities that may be accessible for older readers. Educators and researchers across the Department of Comparative Cultural Psychology and the Department of Linguistics and Cultural Evolution have informed the substance and refined the accuracy of any LLM processed text.

⏭️ Further resources

Human evolution – Symbols and language – OpenEvo
Our evolving collection of educational resources related to the evolution of language, many of which informed the creation of this reader.

Embracing Complexity
A guide to exploring the mind in educational settings through evolutionary and behavioral science.