

THE IN A HURRY SERIES

Language *in a Hurry*

The thing that makes us human

Max Brocklesby

BOOKSINAHURRY.COM

Contents

The Whole Thing in One Page 4

Why You Should Care 5

The Core Ideas 7

How It Actually Works 21

What People Get Wrong 32

Use It 37

Terms 42

Go Deeper 46

Notes and Sources 48

Bibliography 53

The Whole Thing in One Page

A movement in one body can place an idea inside another. Breath leaves a mouth, or hands cross a field of vision, and somebody else looks towards a cup that is not being touched, understands that an action belongs after lunch, and knows which Maya is meant. The physical signal lasts seconds. The listener can refuse, delay, question or pass the plan to a third person. Its content can concern yesterday, next year, a possible mistake, an imaginary creature or a rule that outlives everyone present.

That is the peculiar force of language. It is a public system built by private brains. No speaker owns English, Arabic or British Sign Language, yet each speaker carries enough of a shared pattern to make new meanings with other people. Words matter, but a word list is not a language. Small contrasts become reusable pieces; pieces enter structures; structures meet a situation; speaker and listener repair the result until it works.

The channel is not the system. Speech is common because hearing and vocal movement make a fast, portable pair, but signed languages are complete natural languages with their own contrasting forms and grammars. Gesture accompanies both. Writing stores language outside a living exchange and lets it travel across distance and generations, but human beings had language long before they had scripts.

Children do not receive a finished code. They rebuild one from the speech, sign, attention, action and response around them. Their brains find patterns, test expectations and connect forms with intentions. In doing so, each generation preserves a language imperfectly enough to change it. Accents move, meanings drift, endings wear down, new distinctions appear and communities borrow from one another. Standards can help strangers coordinate, while also turning one group's habits into another group's test of intelligence or belonging.

Language interacts with thought without containing all thought. It gives planning, memory and classification a powerful external handle, yet infants, animals and adults with impaired language can still perceive, choose and

reason. Nor does one gene or one patch of cortex hold the faculty. Speech, sign, meaning and conversation depend on linked biological and social systems whose contributions can separate under injury or disorder.

Calling language the thing that makes us human therefore needs care. Other animals communicate, learn signals and sometimes combine calls in meaningful ways. People who cannot speak, who lose language or who never receive accessible language are no less human. The claim worth keeping is about our species' form of collective life: language lets communities make absent and hypothetical worlds jointly actionable. It supports promises, lessons, laws, institutions, disputes and records, so knowledge can accumulate beyond one mind and one lifetime.

The loop closes where it began. A language exists because people coordinate through shared signs. That coordination creates a cultural world into which new learners arrive, and their learning rebuilds the signs that will coordinate the next generation. Language is neither a private possession nor an abstract code floating above its users. It is the repeated achievement of minds attending to one another.

That is the book.

Why You Should Care

Language is the infrastructure people notice when it fails. A colleague hears criticism where you intended efficiency. A doctor asks a question whose grammar hides the choice being offered. A child knows more than a school task lets them display. A witness and an interviewer use the same word for different events. The failure may sit in vocabulary, sentence structure, reference, tone, background knowledge, status or timing. Treat every problem as bad wording and you repair the wrong layer.

The subject also changes how you judge other people. Accent is easy to hear and hard to ignore, so listeners often convert a social signal into a verdict on competence. A standard variety can widen access to education, law and national institutions, yet it remains one selected variety with a

history, not grammar itself. Dialects, mixed varieties and code-switching have patterns even when institutions refuse to reward them. Hearing a system before judging its prestige is both more accurate and more useful.

Children make the stakes concrete. A young learner needs language they can access through hearing, vision or touch, embedded in responsive interaction. Copying contributes, but copying cannot explain novel sentences, systematic errors or the speed with which children extract recurring structure. Early experience matters, though development is not governed by one birthday after which learning becomes impossible. For a deaf child, delayed access to a usable first language can carry costs that later instruction may not erase. The relevant choice is access, not a contest between speech and sign.

Language sits inside power because public decisions have to be framed. Categories determine what gets counted. Labels gather unlike cases or split similar ones. Passive grammar can hide an agent; technical vocabulary can expose a mechanism or keep outsiders away. A promise, contract or verdict works because institutions recognise what certain words, spoken by authorised people under certain conditions, are allowed to do. Language does not replace material power, but material power repeatedly travels through definitions, records and commands.

It matters for thought as well. Words can help you hold distinctions steady, rehearse a plan, compare alternatives and share a problem with someone who sees it differently. They can also tempt you to mistake a label for an explanation. Naming a bias, illness or strategy does not show that you understand its mechanism. Different languages may encourage attention to different features in some tasks, but no language seals its speakers inside an intellectual cell. Influence is plausible and measurable in bounded settings; destiny is not.

The issue also appears wherever institutions meet people whose strongest language differs from the official one. Interpretation, translated information and time for clarification can determine whether consent, care or legal participation is meaningful. Word substitution alone may miss a local

concept, institutional role or implied choice.

Modern machines make the distinction urgent. A system can learn statistical regularities across enormous bodies of text and produce fluent sentences. Fluency alone cannot tell you which capacities produced it, what has been grounded in experience or whether the system understands as a person does. Human beings make the same error with one another when polished grammar is treated as proof of knowledge, or hesitant expression as proof of its absence.

Finally, language gives you a better model of humanity without turning it into a ranking device. Our linguistic capacity helps explain cumulative teaching, remote coordination, moral argument and institutions that persist beyond their founders. It does not set a test that every person must pass. The humane conclusion is also the scientific one: language is a species-level achievement carried by unequal bodies, diverse communities and many channels. To understand it is to see how much of an individual mind was made possible by other minds.

The Core Ideas

Core Idea 1: A language lives between people

A sign works when people can treat it as a sign. There is no physical resemblance between the sound pattern of *cup* and a drinking vessel that forces one to mean the other. Another community uses another pattern. Even an iconic sign, whose shape or movement resembles what it depicts, depends on shared habits of attention. Resemblance offers a clue; convention stabilises the clue into something others can recognise and reuse.

This makes language social before it is grammatical. Two people must coordinate on what counts as the same signal, what it points to and what response is relevant. Pointing looks transparent until several objects lie in the same direction. Is the finger identifying the blue cup, its colour, its location, the act of moving it or a warning that it is hot? Shared attention

narrows the possibilities. Previous talk, gaze, activity and knowledge of one another narrow them further.

The result is common ground: information participants treat as shared for the present purpose. Some of it comes from the room. Some comes from earlier conversation. Some is cultural, such as knowing that lunch names a recurring part of the day. Speakers design utterances against their estimate of this background. They say *the book* when they expect one book to be identifiable and *a book* when they introduce one. Listeners use the same estimate to recover what sparse words leave unsaid.

Common ground is fallible. People overestimate what others know, misread attention and disagree about what was established. Language therefore includes ways to test and repair alignment: questions, repetition, reformulation, facial expression, pauses and corrections. A conversation is less like sending a sealed parcel than keeping two changing models close enough for the next move.

No individual invents the whole arrangement. A child enters practices already under way and discovers that recurring forms predict recurring intentions. Adults inherit those forms too. Dictionaries record part of the settlement after communities have made it; they do not legislate every meaning in advance. A word changes because enough uses move, and a new expression succeeds because enough people recognise what to do with it.

Convention does not mean conscious agreement. English speakers did not vote to place an adjective before a noun in *blue cup*. Nor is a convention arbitrary in every respect. Forms can be shaped by ease of production, perception, memory, analogy and social history. Once established, however, a pattern coordinates because people expect others to expect it. That nested expectation is what turns a private noise or movement into a public resource.

This view avoids two opposite errors. Language is not a code stored wholly outside people, since it exists only through what users know and do. It is not

a private mental object either, since one person's idiosyncratic association cannot carry public meaning by itself. Individual brains learn, predict and produce; communities supply the conventions those brains are learning.

The deepest unit is therefore not the word alone but coordinated use. A request changes what another person is expected to do. A name lets attention converge. A correction restores an endangered distinction. Language begins between people, and every later layer of grammar remains answerable to that social fact.

This also explains why language boundaries are often untidy. Neighbouring speakers may understand one another across a chain of varieties while people at the distant ends struggle. A named language can be held together by schooling, media, script and identity rather than one shared form. The social fact is not decorative background added to a linguistic system. It helps decide where users perceive the system's edges and which differences count as belonging inside it.

Core Idea 2: The channel is not the language

Language reaches other people through a physical channel. For most hearing communities, the main channel is speech: controlled airflow, vibration, movement in the vocal tract and patterns arriving at the ear. Speech is fast, works in darkness, leaves the hands free and permits rapid alternation between participants. Those advantages help explain its frequency. They do not make sound a requirement for language.

Signed languages make the separation clear. British Sign Language, American Sign Language and other signed languages are not manual encodings of nearby spoken languages. They have conventional vocabularies, systematic contrasts, ways of building words and sentences, and resources for asking, denying, referring, joking and telling stories. Handshape, location, movement, orientation and facial or bodily features can distinguish forms, much as sound contrasts distinguish spoken words. The details belong to each language rather than to one universal signed grammar.

Sign also exposes a misleading use of the word *gesture*. Speakers gesture while talking, and signers can gesture while signing. Gesture may depict a shape, mark rhythm, point or display attitude without belonging to the conventional linguistic system in the same way as a sign. The boundary can be porous, and both channels recruit the body. Calling a signed language gesture does not recognise its visual nature; it removes its organised linguistic structure.

Writing is different again. A script represents parts of language through visible marks. Alphabetic systems often map letters imperfectly onto sound units. Syllabaries use signs for syllables. Other systems combine signs associated with words, morphemes and sounds. Reading recruits visual and language systems and supports forms of analysis that fleeting speech does not invite. A written sentence can be revisited, rearranged, copied and compared with a version produced centuries earlier.

Yet writing is a cultural technique, not the source of language. Most of human linguistic existence preceded it, many languages have flourished without a traditional script, and children acquire spoken or signed language without being taught to read. Punctuation and spaces can make units look cleaner than they are in live speech. The page encourages the false belief that conversation consists of complete written sentences pronounced aloud.

Every channel changes what is easy. Speech carries pitch, rhythm and voice quality. Sign distributes information across hands, face, gaze and space, sometimes simultaneously. Writing preserves detail while discarding much immediate timing and embodiment unless the writer recreates them. Touch can carry linguistic structure for people using tactile sign. Digital conversation adds typing indicators, reaction symbols, recorded voice and video, mixing channels that older categories kept apart.

The distinction has practical consequences. A language difficulty may concern hearing, articulation, vision, motor control, lexical access, grammar or social opportunity. Changing the channel can reveal competence that one test concealed. Conversely, transferring the same words to another medium may fail because the audience loses prosody, gaze, shared surroundings or

time to ask for repair.

Language is therefore an organised capacity for making meanings with conventional forms, realised through bodies and technologies. The body matters greatly. The mistake is to identify one body's preferred route with the system itself. Once channel and language are separated, signed languages stop looking like exceptions and speech stops looking like the definition.

Core Idea 3: Small contrasts build unbounded meaning

A language does not need a separate signal for every possible thought. It builds expressive reach by reusing a limited inventory at several levels. Spoken languages divide continuous sound into categories that matter for distinguishing forms. English listeners treat the opening sounds of *pin* and *bin* as different enough to separate words, while ignoring many physical differences among pronunciations of the same category. Other languages draw other boundaries. Signed languages create contrast through handshape, place, movement, orientation and non-manual features.

These contrastive units are not miniature meanings. A phoneme such as /p/ contributes to many words without meaning anything by itself. The economy comes from duality of patterning: a limited set of meaningless contrasts combines into meaningful pieces, which combine again into larger expressions. A child does not memorise every whole sentence because the system allows stored parts and productive patterns to do most of the work.

Morphemes are among those meaningful pieces. *Walk, walked, walker* and *walking* share material while adding different functions. Some languages place much more information inside one word; others distribute it across several. A word may mark person, number, time, evidential source, social relation or direction. The important point is not that every language packages the same categories in the same places. It is that recurring form can support recurring contrasts.

Syntax organises pieces into relations. *The dog chased the child* differs from

The child chased the dog because English order helps assign who did what to whom. Case marking, agreement, particles or context may carry more of that work elsewhere. Structure can also place one expression inside another, coordinate alternatives and mark dependence. Recursion is one resource among several, not an agreed magic switch that separates human language from everything else.

Compositionality makes new meanings tractable. A listener can infer much of *the tired astronaut opened the blue umbrella on Mars* from familiar parts and their arrangement without having heard that sentence before.

Composition is not perfect. Idioms, constructions and context can make the whole more than a mechanical sum. Ambiguity persists because efficient systems reuse forms and leave predictable work to context.

Productivity is the practical result. Speakers routinely understand combinations they have never stored, reject combinations that violate learned patterns and extend old patterns to new material. Children reveal this when they produce forms such as *goed*. The error is evidence of a generalisation: the child has found a past-tense pattern and applied it too widely. Memorised imitation alone would preserve *went*.

No known human language is a loose bag of labels. Every language organises contrasts and combinations, although the units and boundaries differ. Nor does expressive power require maximum structural complexity at every point. Languages can lose endings and rely more on order, or develop new endings from formerly independent words. Complexity moves rather than following a ladder from primitive to advanced.

The reusable hierarchy changes the scale of communication. A finite learner can master enough patterns to describe unencountered events, propose rules and revise plans. Language gains its open reach from disciplined reuse, not from an infinite warehouse. Small differences matter because the system places them where other minds know how to build with them.

Core Idea 4: Meaning is negotiated beyond the sentence

Words and grammar constrain meaning, but they rarely finish the job. Consider *Can you reach the window?* The sentence asks about ability. In an ordinary room it can function as a request to close or open the window, depending on what has happened before. A competent listener does not accuse the speaker of asking the wrong question. They infer the likely action from literal content, shared circumstances and expectations about why somebody spoke now.

Semantics studies the conventional contribution made by forms and structures. Pragmatics studies how people use that contribution in context. The distinction is useful, though live understanding does not wait for two separate departments to report. A listener combines lexical meaning, syntax, prosody, visible action, common ground and the unfolding exchange. Several interpretations may remain possible until a later turn settles them.

Reference shows the dependence clearly. *She left it there yesterday* can be grammatically complete while remaining useless to an outsider. Pronouns, demonstratives and time words rely on a reference frame. Even apparently stable nouns can shift. *The bank* might mean a financial institution, a riverside or a particular building already under discussion. Language economises because participants supply what the sentence does not encode.

Inference also lets speakers imply without saying. Asked whether a candidate writes well, a referee might answer that the candidate is always punctual. The reply may be positive on its surface yet conversationally damaging because its relevance has to be recovered. The listener reasons that a more direct endorsement was available and was withheld. This kind of implicature can be cancelled or challenged; it is an inference licensed by the exchange, not a secret second dictionary meaning.

Prosody and visible conduct shape the action. Stressing *I* in *I sent the file*

contrasts the speaker with somebody else. A pause before agreement can display reluctance. A raised eyebrow can turn a repeated phrase into a challenge. In sign, facial and bodily features may be grammatical, prosodic or gestural depending on the construction. Meaning is spread across coordinated resources rather than packed wholly inside a string of words.

Conversation supplies its own organisation. Participants take turns with remarkably little dead time while still avoiding constant overlap. They anticipate likely completion from syntax, rhythm, gaze and activity. A question makes an answer relevant; an offer makes acceptance or refusal relevant; an accusation changes what silence can imply. These are not rigid laws. They are public expectations that let one action make another intelligible.

Repair is therefore part of successful language, not proof that success has failed. Speakers replace a word before finishing, listeners ask which Maya was meant, and both parties reformulate after discovering different assumptions. Conversation works partly because it can expose and correct its own trouble. A perfectly encoded message would need no recipient; human exchange succeeds through manageable incompleteness plus repair.

This makes meaning an achievement with unequal conditions. Status can determine who is allowed to interrupt, whose ambiguity is tolerated and whose accent is treated as a problem. Institutions may freeze one interpretation in a form or ruling. Yet even formal wording depends on communities trained to recognise its categories. Sentences provide constraints. People, situations and sequences turn those constraints into actions.

Core Idea 5: Children rebuild the system from biased learning and social use

A child hears no spaces between spoken words and receives no complete inventory of rules. The input is noisy, repetitive, interrupted and tied to daily life. Yet within a few years most children have built a working system rich enough to understand unfamiliar sentences, make jokes, repair misunderstandings and adapt to different people. Explaining that achievement requires more than saying that children copy adults or that grammar unfolds untouched by experience.

Learning begins before stable words. Infants attend to voices, faces, rhythm, recurring sound patterns and the relation between another person's gaze and nearby events. They can detect statistical regularities in sequences, including which syllables tend to occur together. Such sensitivity can help identify candidate units. It does not by itself supply meaning, intention or a complete grammar. Patterns become useful inside a broader social and cognitive setting.

Interaction changes what information is available. An adult follows the child's attention, names an object, responds to a point and expands an incomplete expression. The child sees which attempt produced the intended result. In Patricia Kuhl and colleagues' study of American infants exposed to Mandarin, live social sessions supported learning of a phonetic contrast that matched audio-visual recording alone did not produce under those conditions. The experiment does not prove that every feature requires face-to-face teaching. It shows that social presence can alter learning even when linguistic exposure is otherwise closely matched.

Children bring strong biases and capacities to the task. They seek patterns, group variable examples, track intentions, remember recurring forms and favour interpretations that fit what speakers are doing. Human brains are prepared to learn language, but preparedness need not mean that every detailed rule is genetically written. The major theories disagree over how much structure belongs to an inherited language-specific system, how much emerges from general learning and communication, and how repeated

cultural transmission reshapes what must be learned.

Children's errors reveal construction. A child who says *two foots* has not copied that form. The child has inferred that a plural can be made by adding a recurring ending, then applied the pattern to an exception. Later experience separates productive rules from stored irregulars. Similar overextensions occur in meaning when one word is used for a wider or narrower set than adults use. Development is a sequence of changing analyses, not a march from random noise to correctness.

Input also varies greatly. Children grow up with one language, several languages, different registers, signed and spoken combinations, or communication affected by migration, illness and unequal access. Bilingual development does not place two incomplete monolingual systems inside one child. Knowledge is distributed across people and activities, so vocabulary in each language may differ by topic while total communicative resources remain broad.

Timing matters without reducing development to a closing gate. Early access supports the formation of phonological, lexical and grammatical systems. Adults can learn new languages, but native-like outcomes become less common across several dimensions as first exposure is delayed. Evidence from deaf people who lacked accessible language in childhood is especially important because it separates late first-language acquisition from ordinary second-language learning. Later education can bring substantial gains while some effects of deprivation remain.

A child therefore rebuilds language through an encounter between a prepared learner and a structured social world. Biology makes the learning possible; communities provide usable forms, attention and consequences; the learner generalises beyond each example. Because rebuilding is active rather than exact copying, acquisition also becomes one route by which languages change.

Core Idea 6: Languages vary and change without becoming defective

Variation is not damage around a perfect centre. Every speaker has a repertoire shaped by place, family, age, work, friends, medium and purpose. People pronounce, choose and arrange forms differently while remaining mutually intelligible, and they shift among those resources as situations change. A dialect is a patterned variety, not standard language with errors added.

A standard variety is useful because institutions need repeatable expectations. Shared spelling, terminology and formal conventions can reduce friction among strangers and preserve records. The mistake is to confuse that selected and taught variety with language itself. Standards usually reflect political centres, printing, education and administrative power. Their prestige can make historical accidents sound like natural superiority.

Judgements about grammar often mix separate questions. Is a form patterned in the speaker's variety? Is it accepted in the institution that will evaluate it? Does it communicate clearly to this audience? A double negative may be systematic in one dialect and rejected in formal edited English. Advising a student to command the institutional standard can expand options. Telling the student that their home variety lacks grammar misdescribes the system and the power relation.

Languages also change in every generation. Pronunciations shift, words acquire new meanings, constructions spread and older distinctions disappear. Repeated phrases can compress into grammatical markers. Independent words may become clitics or endings; endings may erode and leave order or context carrying more work. Contact adds borrowing, code-switching and new mixed practices. Change can begin below conscious notice and later become a symbol of identity.

No living language is an earlier evolutionary stage: each descends through full linguistic systems used by previous generations and meets the demands of present social life. Communities without a traditional writing system still

possess phonology, grammar, discourse and specialised knowledge. A small language may encode distinctions absent from English; English may have institutional vocabulary unavailable until another language's speakers need it and create or borrow it. Expressive adequacy grows with use, not with a place on a civilisational ladder.

Creoles expose the prejudice sharply. They develop in contact settings where speakers need new shared systems, often amid enslavement, plantation rule or colonial inequality. Older scholarship sometimes treated them as simplified or exceptional languages. Modern work shows systematic grammar and ordinary historical development, while scholars still debate the balance among source languages, innovation, learning and social history in particular cases. The exceptional thing is often the documented violence of the setting, not a defective linguistic type.

Language loss is different from natural change. A community may shift because schooling, employment, media, punishment or state policy make another language necessary. When intergenerational transmission breaks, knowledge encoded in names, oral forms and local practices can become difficult to carry. Revitalisation can create teaching materials, public domains and new speakers, but no programme can reproduce a lost social world exactly. Speakers may also choose shift for rational reasons under unequal conditions.

Variation creates boundaries as well as resources. Accent can trigger discrimination before content is assessed. A named language may contain varieties less mutually intelligible than two varieties assigned different national names. Political borders, scripts, schooling and identity help decide what counts as one language. Political authority can stabilise a boundary that structural similarity alone would leave uncertain. Power matters, though it cannot replace linguistic analysis.

Change does not mean that every form serves every purpose. Readers need stable conventions; safety instructions need constrained ambiguity; courts need records that survive local context. The rational response is repertoire, not purity. Learn which patterns belong to which communities

and which institutions control access. A language remains alive by varying enough to fit new lives while staying shared enough for other people to follow.

Core Idea 7: Language lets communities accumulate absent worlds and institutions

Many animals communicate about immediate opportunities and dangers. Humans can also make an event that is absent, denied, imagined or conditional relevant to coordinated action now. We discuss a hunt that failed last season, a meeting next Tuesday, a person who has died, a rule that applies in a case nobody has encountered and a world that exists only inside a story. Displacement gives collective life a larger working space than the visible present.

The capacity depends on the earlier ideas. Conventional signs let attention converge without the object being present. Combinatorial structure distinguishes who did what, when and under which condition. Pragmatic inference connects sparse expressions to shared knowledge. Turn-taking and repair let participants test whether the same absent situation has been constructed closely enough for the next decision.

Once an absent world can be jointly maintained, promises and plans become possible. A promise creates a future expectation tied to a speaker. A rule classifies later conduct before it occurs. A lesson lets one person's experience alter another person's choice without requiring the second person to repeat the danger. None of these acts is made of words alone. Trust, enforcement, memory and material capability matter. Language gives those forces a form that can be represented, challenged and transmitted.

Institutions amplify the process. Money, marriage, offices, contracts and courts depend on shared classifications and authorised performances. Saying the right words under the wrong conditions may do nothing; saying them under recognised conditions can change rights and obligations. Records extend the change beyond the witnesses. Writing, archives and digital storage make linguistic products persistent, searchable and

reproducible, allowing people who never meet to work inside a partly shared symbolic order.

This is one reason knowledge accumulates. A discovery can be described, criticised, corrected and taught. A technique can be decomposed into instructions and joined to demonstration. A community can preserve failed attempts as warnings instead of beginning again from silence. Language does not guarantee truth. Rumours, propaganda and bureaucratic fictions accumulate too. The same portability that preserves a correction can preserve an error backed by authority.

Other species force useful restraint. Birds and primates can possess learned call systems, audience-sensitive signalling and meaningful combinations. Experiments with Japanese great tits have found order-sensitive combinations of calls. A 2025 study reported compositional structure in bonobo call combinations, but a peer-reviewed reanalysis published in August 2026 challenged that interpretation. The result is therefore part of an active dispute, not settled evidence that bonobos possess human-like compositional language. Such findings weaken any claim that one isolated ingredient belongs to humans alone. They do not show that another species has the full open, culturally transmitted system used for human institutions, explanation and counterfactual debate.

Language may be distinctive as a configuration rather than through one magic property. Vocal or manual control, shared attention, intention reading, sequence learning, hierarchical combination, memory, turn organisation and cumulative culture reinforce one another. The evolutionary route is unresolved because language leaves no direct fossil and modern capacities need not reveal their original order of appearance. Genes, brains, bodies and social learning all contributed; no single date or mutation closes the case.

The causal loop now returns to Core Idea 1. Biological learners enter a social world already organised by conventional signs. They infer patterns, use them with others and alter them through use. Those altered conventions become the environment for the next generation. Human brains make

language learnable, while repeated learning and communication shape languages towards forms human brains can acquire and process.

The subtitle is defensible only at this collective scale. It does not make verbal fluency a measure of personhood. Infants, people with aphasia, nonspeaking people and people denied accessible language remain fully human. Language helps explain what human communities can build together: shared worlds that outlast the signals, minds and generations that made them.

Stories reveal the reach without requiring every statement to be true. A listener can enter a counterfactual situation, track what its characters know and compare its rules with ordinary life. Scientific models and legal hypotheticals use the same broad capacity under stricter constraints. They create a represented world, then ask what follows inside it. The linguistic achievement is not escape from reality. It is the ability to hold alternatives in public long enough to test, reject or adopt them.

How It Actually Works

Take an ordinary request: *Put the blue cup by Maya after lunch*. Nothing in the sentence is extraordinary. That is why it is useful. A private intention must become a structured bodily signal, survive noise, be rebuilt by another brain, connect to a shared situation and alter somebody's later action. Each stage is constrained, and none contains the whole message by itself.

Before a word is formed

The speaker begins with a communicative problem rather than a sentence stored complete. A cup needs moving, one possible person is Maya, the action belongs after lunch and the listener is expected to perform it. The speaker must decide what to make explicit. If only one cup is visible, colour may be unnecessary. If two people called Maya are present, a surname or gesture may be needed. Formulation therefore starts with an estimate of the listener's knowledge and attention.

The intended action is also social. An order, request, suggestion and reminder can point towards the same future movement while assigning different rights and obligations. Relationship, urgency and setting influence the choice. *Could you move the cup?* may be structurally a question and interactionally a request. The speaker packages content and stance together, even when no conscious planning is felt.

Conceptual preparation is not language-free in every respect. Familiar words can become active early and help stabilise distinctions. Yet the speaker can know more than they can retrieve, as the tip-of-the-tongue state shows. An intention can be present while one lexical form remains unavailable. That separation matters because failure to produce a word does not prove absence of the concept.

From intention to linguistic structure

The speaker selects lexical items and a construction that fits the intended relations. English order helps place the unspoken listener as agent of *put*, the cup as object, Maya as a landmark and lunch as a time anchor. The verb also carries expectations. *Put* normally calls for something moved and a destination, so *Put the cup* can feel incomplete when no location is recoverable.

Grammar turns a collection of labels into a proposition and an action. Articles help manage whether a referent is identifiable. Adjectives restrict a set. Prepositions relate objects, people, places and times. Inflection can mark tense, number or agreement. Languages distribute this labour differently. Another language may use case endings, particles, verb morphology or a different order while expressing a comparable request.

Selection is competitive. Related words become active, and a speaker may substitute *mug* for *cup* or begin one structure before changing course. Self-repair exposes the process: *Put the green, sorry, the blue cup...* The correction is not added after an otherwise perfect sentence generator fails. Monitoring and repair belong to production itself.

Frequency and context affect retrieval. Familiar words become available

faster, while a specialised term may require a route through related meanings. Naming a visible object can be harder after brain injury even when the person recognises it and knows its use. The production system must select a public form from knowledge that is organised more widely than that form.

From structure to movement

For speech, an abstract sequence must become a timed motor plan. Breathing supplies airflow. The larynx can produce voicing. Tongue, lips, jaw and soft palate continually reshape the tract. The resulting signal is not a row of clean acoustic beads. Movements overlap, and the physical realisation of a sound depends on neighbours, rate, speaker and context.

Listeners cope because they learn categories across variation. The /k/ in *cup* is not acoustically identical across speakers or even across repetitions by one speaker. What matters is whether the signal provides enough evidence for the distinctions used by the language. Prosody adds grouping, prominence and stance. Stress on *blue* can correct an earlier colour; stress on *Maya* can contrast her with somebody else.

For sign, linguistic planning becomes coordinated hand, arm, face, head, gaze and body movement. Elements can unfold sequentially and simultaneously. Spatial locations may be established and revisited for reference. The visual channel has its own timing, perceptual constraints and possibilities. The linguistic problem is comparable while the physical solution differs.

Rebuilding the signal

The listener receives energy, not words. In speech, pressure changes reach the ear and are transformed into neural activity. The signal may be masked by traffic, compressed by a telephone or altered by accent. Perception combines incoming evidence with learned expectations. A probable word can be recognised from incomplete sound when the surrounding sentence and situation constrain the options.

This predictive contribution is efficient, but it can mislead. Listeners may hear the familiar phrase they expected rather than the less likely one produced. Accent adaptation shows the system updating. Exposure to a speaker's recurring patterns can improve recognition because the listener adjusts how acoustic detail maps onto categories and words.

Visual language poses parallel tasks. The perceiver must track form across movement, separate linguistic contrasts from incidental variation and integrate facial and manual information. In both modalities, perception is active classification. It preserves distinctions useful for the language while discarding much physical detail.

Building a sentence from the recovered pieces

Recognised forms activate lexical knowledge: possible meanings, pronunciations, grammatical behaviour and associations. The listener does not wait until every word is complete before building structure. Partial evidence updates interpretations as the signal unfolds. Hearing *put* predicts a likely object and destination; *the blue...* narrows the object before *cup* arrives.

Ambiguity creates temporary competition. *Put the cup by Maya...* might initially make Maya the destination or identify the cup already near her. Later words and the visible setting can settle the analysis. Misparsing is ordinary because comprehension works under time pressure. The listener commits enough to continue, then revises when evidence demands it.

Compositional interpretation supplies a structured content: an action, object, landmark and time. Stored expressions and constructions can modify the calculation. *After lunch* refers to a culturally organised event, not a measurable time without context. The sentence offers a scaffold. The listener still has to locate its elements in a shared world.

Inferring what the speaker is doing

Reference now has to succeed. Which blue cup? Which Maya? What counts as *by* her: beside her chair, on her desk or in her possession? Participants use gaze, pointing, recent mention, physical salience and knowledge of the activity. A tiny gesture can do work that would require a long verbal description.

The listener also infers why the utterance was made and how strongly it commits them. Tone, relationship and sequence distinguish a reminder from irritation or an optional suggestion from an instruction. Politeness is not cosmetic decoration. It manages the social cost of asking another person to act and the relative entitlement of the participants.

Inference is controlled by plausible alternatives. If the speaker could easily have said *now* but specifies *after lunch*, timing is contrastive. If several cups are visible, *blue* is informative. If only one Maya exists in the shared setting, the name can be enough. Understanding grows from what was said against what could reasonably have been said.

Action, turn and repair

The request changes the exchange before the cup moves. The listener may acknowledge with *okay*, repeat *after lunch?*, refuse, ask which cup or begin another action that displays understanding. Responses are evidence. A nod can close the sequence; a puzzled pause can reopen it.

Turn-taking makes this rapid. Participants project when an utterance may finish from grammar, prosody and visible conduct. They prepare responses while still listening, which helps explain the small gaps common in conversation. Timing varies across languages and settings, but the pressure to coordinate entry is widespread. Silence itself gains meaning from the action that preceded it.

Repair protects the sequence. The speaker can clarify *Maya Khan*, *not Maya Lewis*. The listener can initiate repair with *who?* or repeat the uncertain part. Another person may correct an error, though conversation

often gives the original speaker an opportunity to self-correct first. The repaired version becomes new common ground.

The cup may never move despite perfect linguistic decoding. The listener can forget, disagree or lack authority. Language coordinates expectations; it does not control bodies at a distance. The endpoint is social action under material conditions, not a message declared successfully delivered by the sender.

More than one language in the same system

A multilingual speaker does not keep sealed dictionaries that take turns controlling the mouth. Knowledge can remain active across languages, and the speaker selects among forms according to audience, topic, identity and current task. A concept may be easier to retrieve in the language in which it was learned, while another language supplies the institutional term needed now.

Code-switching is therefore organised rather than evidence of confusion. A change of language can mark a quotation, address one participant, signal intimacy or separate a formal role from an informal comment. Grammatical constraints influence where switches are likely, while community practice gives them social meaning. Different bilingual communities develop different norms.

Selection carries a processing cost in some circumstances, yet multilingual experience does not produce one universal cognitive advantage or disadvantage. Findings depend on age, proficiency, task, social context and how groups are matched. The secure point is linguistic: one person can coordinate several overlapping systems, and use exposes how words, concepts, constructions and audiences are related without being identical.

From one exchange to a durable record

The spoken request disappears acoustically, but its consequences can be stabilised. A note might record that the cup was moved. A rota might assign responsibility in advance. A policy might define which objects are handled by whom. Each step turns local interaction into a more durable linguistic object that others can inspect without sharing the original room.

Writing changes the error pattern. It reduces dependence on memory and permits exact comparison, while losing the immediate repair supplied by gaze and next turns. Formal documents compensate with definitions, numbered provisions and revision procedures. Those devices do not eliminate interpretation. They organise where interpretation is allowed and who can settle it.

Records also create institutional memory. A later participant can act because of words produced by someone absent or dead. Copies, archives and search extend the audience, while authorship, access and preservation determine whose language survives. The signal now travels through technologies and authority as well as bodies. Language remains coordinated use, but the coordination can span people who never enter the same exchange.

A child enters the circuit

A learner encounters thousands of such sequences before understanding their parts. Recurring words occur with objects, actions and responses. Gaze and gesture reveal likely reference. Sentence frames expose distribution: forms appearing after *the* behave differently from forms appearing after *can*. Statistical patterns narrow hypotheses while social outcomes give them purpose.

The child predicts and tests. A point, sound or sign that brings an adult's attention is retained. A new verb heard across several scenes begins to separate from one specific event. Errors reveal the current model. Overgeneralised endings show a productive pattern; missing function words can reflect processing limits or an analysis still being assembled.

Adults alter input without supplying a formal grammar. They repeat, expand, recast, answer and place language inside routines. Child-directed speech often changes pitch, repetition and sentence length, though practices differ across communities. Children can learn in many interactional arrangements. The common requirement is accessible, patterned language connected to meaningful participation, not one universal parenting style.

New sign languages show the constructive power at community scale. In Nicaragua, deaf children brought together in schools from the late twentieth century developed an emerging shared sign system. Later cohorts acquired it from peers and elaborated some of its spatial and grammatical organisation. The evidence does not recreate the first human language. It shows how learners and interaction can turn a developing communicative system into a more structured language across cohorts.

A language changes as the circuit repeats

Every use is an act of inheritance and a possible small revision. Speakers reduce frequent sequences, extend patterns, borrow forms and attach old expressions to new situations. Listeners reconstruct a system from the distribution they encounter, not from access to previous speakers' private grammars. When enough reconstructions converge on a new pattern, change becomes communal.

Sound change can begin as ordinary coarticulation and become a stable pronunciation. Meaning can move through metaphor, euphemism or repeated inference. A word meaning *grasp* physically can develop an intellectual sense. Grammaticalisation can turn a lexical expression into a marker of tense, aspect or relation. Frequency helps forms wear down while preserving the distinction they carry.

Contact accelerates some pathways. Traders, migrants, conquerors, neighbours and families learn across linguistic boundaries. Borrowed words may retain traces of their route while adapting to the receiving sound and grammar system. Extended multilingual contact can produce new shared varieties. Outcomes depend on population, status, age, network and

purpose, so contact has no single linguistic result.

Transmission acts as a filter. Forms that are difficult to learn, process or distinguish may be regularised, reanalysed or supported by context, although social identity can preserve marked patterns. Laboratory transmission experiments show that initially unstructured signal systems can become more regular and learnable as they pass through chains of participants. The experiments isolate one mechanism; real language histories contain richer communities, meanings and power.

Brains without a language box

Producing and understanding language depend on distributed networks. Left frontal and temporal regions are often important, but the old picture of one production centre and one comprehension centre is too crude. Tasks recruit partially specialised language regions alongside hearing, vision, motor planning, memory, attention and social cognition. The pattern changes with modality and demand.

Aphasia makes separation visible. After stroke or injury, one person may speak fluently while producing empty or misplaced words; another may understand much but struggle to retrieve and sequence speech; reading and writing can differ from conversation. Lesion patterns and outcomes vary, and damage traditionally labelled as Broca's area does not by itself determine long-term speech production. Networks, connections, lesion size and surviving tissue matter.

Signed language uses the same broad language network while recruiting visual and spatial systems appropriate to the channel. This is powerful evidence that the brain's language organisation cannot be reduced to vocal movement or hearing. Modality shapes implementation without turning sign into a different cognitive category.

Genes enter at another level. Variants affecting FOXP2 were identified in a family with a severe speech and language disorder. The finding made the gene important, then public retelling promoted it into *the language gene*. FOXP2 participates in regulatory networks and affects development and

motor learning across species. Its disruption can impair several components. It neither encodes English grammar nor explains language alone.

Where the capacity came from

Language origins cannot be replayed. Vocal tracts, hands, brains and genes fossilise incompletely or not at all, while words leave no archaeological imprint unless attached to much later writing. Researchers therefore combine comparative anatomy, genetics, archaeology, developmental evidence, modern language structure and animal communication. Each source constrains possibilities without supplying a dated transcript.

Some components have deep precedents. Other primates track social relations and intentions. Birds can learn complex vocal sequences. Great apes gesture flexibly. Several species combine signals in ways affected by order and context. Human language assembled capacities with wider evolutionary histories rather than appearing from biologically empty ground.

The disputed issue is what changed, in what order and under which selection pressures. Proposals emphasise vocal control, gesture, shared intentionality, cooperative breeding, teaching, symbolic culture, hierarchical planning or cultural transmission. These mechanisms can complement rather than exclude one another. A small biological change can alter social learning, which changes the communicative environment, which changes later selection.

Language and brain may therefore have coevolved with culture. Early learners did not need to acquire a modern language overnight. More learnable conventions could spread culturally, while populations able to learn and use richer systems gained new coordination opportunities. The feedback is plausible and supported in parts by modelling and experiment. Its prehistoric sequence remains inferential.

How we know

Language leaves several kinds of evidence. Linguists compare contrasts, constructions and meanings across thousands of languages. Acoustic, articulatory and sign studies measure the physical signal. Conversation recordings reveal timing, action and repair. Infant experiments test discrimination, prediction and learning under controlled conditions. Longitudinal observation shows development across months and years. Emerging sign languages make cultural construction visible across cohorts. Historical records and comparative reconstruction recover paths of change. Brain imaging, lesion studies and genetics separate components while showing their interaction. Animal experiments test which capacities extend beyond humans.

Each method has limits. Laboratory tasks simplify social life. English and other well-resourced languages remain overrepresented. Brain activation does not prove that a region is necessary, and a lesion rarely respects theoretical boundaries. Modern hunter-gatherers do not preserve an unchanged prehistoric mind. Animal results depend on species ecology and experimental definitions. No direct evidence dates the first language or identifies one decisive biological event.

Confidence is therefore distributed. Human languages are structured, productive, socially learned and available through speech or sign. The exact balance among inherited constraints, general learning, interaction and cultural evolution remains disputed. The evidence supports a linked system more securely than any single-origin story.

What People Get Wrong

"A language is a list of words"

A phrase book can keep you fed and still leave most of a language untouched. Words have meanings, but they also carry grammatical possibilities, social histories and expectations about company. Knowing *give*, *book* and *Maya* does not by itself tell you how to distinguish Maya as giver from Maya as recipient, how to mark whether the event happened, or whether a proposed order sounds like a request.

Languages build with contrasts and relations. Sound or sign units distinguish forms. Morphemes add recurring functions. Syntax assigns dependencies. Prosody groups and contrasts. Pragmatics connects an expression to a situation and an action. The lexicon stores much more than labels, including irregular forms, idioms and information about where a word can appear.

This is why replacing every word one by one rarely produces a good translation. The receiving language may package time, agency, politeness or evidence differently. It is also why a person can know many terms in a field while failing to explain it. Vocabulary supplies pieces. Language resides in the organised capacity to use pieces with other people.

The word-list picture also encourages poor measurement. Counting named objects favours one kind of knowledge and can miss verbs, relations, morphology, gesture and the ability to manage a turn. A child or adult may communicate effectively with a smaller tested vocabulary because the available forms are deployed productively. Measure the action the system supports, not a pile of isolated labels.

"Grammar is whatever teachers say is correct"

Teachers usually teach a standard: conventions that institutions reward in writing and formal speech. That instruction can be valuable. A shared written norm lets readers process unfamiliar authors and gives students access to exams, employment and public records. It is still narrower than grammar.

Grammar is the patterned knowledge that lets speakers produce and interpret expressions. A child commands much of it before learning the word *noun*. Dialects rejected by schools contain regular sound, word and sentence patterns. A form can be grammatical in one variety, stigmatised in another and unwise in a particular formal setting. Those are three different judgements.

Prescriptive rules also vary in quality. Some prevent ambiguity or support a stable house style. Others preserve prestige preferences after ordinary usage has moved. The useful question is not whether standards should disappear. It is which rule serves which reader and who bears the cost. Command of a standard expands repertoire. Treating one repertoire as the only language converts social selection into a false scientific claim.

"Speech is the real form of language"

Speech is ancient, widespread and biologically well supported. That does not make it the substance from which every language must be made. Natural signed languages possess contrastive units, morphology, syntax, semantics, pragmatics and historical change. Deaf children exposed early to accessible sign acquire language through the visual channel rather than receiving a reduced substitute for speech.

Writing is not speech made visible either. Scripts represent selected aspects of language and create new possibilities for storage, comparison and revision. They can obscure live interaction by making words look neatly separated and sentences look complete. Gesture crosses both speech and sign without being identical to either.

Confusing channel with system has consequences. It can make a person with impaired articulation appear to lack language, treat sign as a rehabilitation tool rather than a community language, or assume that spoken instructions remain equally clear in writing. Ask what linguistic contrasts and meanings the person controls, then ask which channel exposes them. The route can fail while the language capacity remains.

"Children learn language by copying adults"

Imitation contributes. Children repeat words, routines and striking expressions, and adults supply models. Copying cannot explain the system they build. Children understand and produce combinations they have not heard as wholes. They regularise irregular forms, extend words too widely and create errors adults are unlikely to model. *Goed* is a small theory of English past tense.

Learning draws on several sources. Children detect distributional patterns, follow attention, infer intentions, map forms to events, remember constructions and test what produces a response. Their biological development makes these abilities unusually effective for language. Social interaction supplies relevant evidence and consequences. Theoretical disagreement concerns how the contributions are divided, not whether the child is an active learner.

The copying myth can also distort care. More recorded words are not automatically equivalent to accessible participation, and constant correction is not the engine of first-language acquisition. Rich interaction matters because language is being used for shared purposes. A child rebuilds a productive system from examples. The achievement lies in going beyond them.

"Some languages are primitive"

No community speaks an unfinished precursor to a modern language. Every living language descends through generations of full systems and supports the lives its speakers conduct. A language may lack a word for a newly imported technology, then borrow or create one. English has done this throughout its history. Vocabulary size in one published dictionary measures documentation and editorial decisions as much as expressive capacity.

Complexity is distributed differently. One language may have elaborate verb morphology and flexible word order; another may rely more on separate words and position. A language can make distinctions compulsory that English usually leaves to context, such as how information was obtained. None of this produces an overall ranking that places whole languages on one scale.

The label *primitive* often attaches to small, unwritten or politically subordinated communities. It confuses technological or state power with linguistic structure. Endangerment is then mistaken for inadequacy, when the pressure may come from schooling, labour markets and punishment. Languages can be marginalised. Their grammars are not failed attempts at the language of the dominant group.

"Your language determines what you can think"

Language influences cognition in useful, bounded ways. Labels can make a distinction easier to maintain. Grammatical habits can direct attention during particular tasks. Spatial frames, number words or colour categories may affect memory, speed or classification under some conditions. These findings are worth studying precisely because the effects depend on task, experience and alternative strategies.

Determination is a much stronger claim. Speakers learn new categories, translate ideas imperfectly but productively, invent technical terms and reason with diagrams, images and quantities. Infants and animals solve problems without adult human language. People with aphasia can retain substantial non-linguistic knowledge, even when language loss makes some

tasks harder to organise or communicate.

The opposite slogan, that language has no effect on thought, is too clean as well. Words provide tools for rehearsal, abstraction and joint reasoning. The rational position separates influence from imprisonment. Ask which linguistic distinction changes which performance, for whom and under what conditions. A language offers habitual routes through experience. It does not build walls around the possible mind.

"One gene or one patch of brain contains language"

Broca's area and FOXP2 became famous because each supplied a memorable handle. Neither is a container holding language. Frontal and temporal language regions operate as a network connected to systems for hearing, vision, movement, memory and control. Damage can produce selective difficulties, but lesion location, extent, connections and recovery all matter. The map is functional and distributed.

A neat brain diagram can hide variation as well. The same task may recruit somewhat different tissue after injury, across individuals or with a different modality. Group averages identify reliable patterns, not a set of borders printed identically in every skull. A region's activation also does not tell us whether it computes language, supplies a supporting process or responds to difficulty.

FOXP2 is a regulatory gene involved in development and motor learning. Particular variants can contribute to severe speech and language impairment. Many genes affect the growth and operation of the relevant systems, and the same gene has homologues and functions in other species. It does not encode a grammar or turn a non-linguistic brain into a linguistic one.

The search for a single switch persists because language feels unified from the inside. Evidence reveals components: perception can separate from production, words from articulation, reading from conversation, and language from some kinds of reasoning. Integration creates the experience

of one capacity. Explaining that integration requires levels from genes and neural circuits to learning, interaction and culture.

Use It

Find the shared reference frame

Before adding detail, ask what the other person can already identify. A message fails easily when *it*, *there*, *later* or *the usual one* points into private knowledge. Name the object, person, time or decision once, then compress after the reference is shared. In writing, where gaze and surroundings are absent, supply more of the frame.

This is especially useful in delegated work. *Can you sort the returns?* may hide which returns, what counts as sorted and when the result is needed. A better instruction fixes the action and endpoint: identify the parcels received today, match each to the order and record any mismatch before dispatch. The improvement is not longer wording for its own sake. It reduces the number of plausible worlds the recipient must choose among.

Test reference by asking what an intelligent outsider would attach each pronoun and category to. When two interpretations remain reasonable, the ambiguity belongs partly to the message, not wholly to the listener.

Diagnose the layer of failure

Do not treat every misunderstanding as a vocabulary problem. Separate the possible layers. Was the signal heard or seen? Was a word retrieved? Did the sentence assign the roles intended? Did both people identify the same object? Did tone change the perceived action? Did institutional knowledge remain unstated? Did status prevent the listener from asking?

The diagnosis changes the repair. Repeating louder helps only some signal failures. Defining a term helps lexical trouble. Reordering a sentence can expose agency. An example can build missing common ground. A diagram may outperform prose for spatial relations. An interpreter addresses a language boundary, while accessible sign or text may address a channel

boundary.

This prevents a familiar injustice: treating hesitant output as absent understanding. Give the person another route to display knowledge before judging the knowledge itself. Competence in the task, command of the institutional register and control of one physical channel are related but distinct.

Use contrastive tests rather than one repeated demand. Ask the person to point, choose, explain in another way or demonstrate the first step. If performance improves when the channel or wording changes, that difference is diagnostic. It shows which part of the original task carried the barrier and prevents a broad judgement from being built on one narrow failure.

Treat repair as part of communication

Plan for the second turn. Important instructions should make clarification easy and reveal what counts as success. Ask the recipient to explain the next action or show the first completed example rather than repeat your exact words. Repetition can reproduce a sentence without aligning its interpretation.

When somebody asks a basic question, treat it as information about the shared model. Their uncertainty may expose an ambiguous category, a missing decision or a hidden exception. A cheap repair early is preferable to a polished misunderstanding carried into execution. In meetings, pause after decisions long enough for challenge; in writing, state where questions should go and which assumptions must not be guessed.

Self-repair also protects trust. Correct the relevant part without restarting the whole message: *Thursday, not Tuesday*. That format identifies the changed contrast and preserves the rest. Communication becomes more robust when correction is expected rather than treated as embarrassment.

Hear systems before judging standards

When a form sounds wrong, ask whether it follows a different pattern.

Accent, dialect and code-switching can carry region, network and audience design without signalling low intelligence. Listen for consistent contrasts and meanings before assuming randomness. This does not require pretending that every variety receives equal institutional reward.

Teach standards as added control. Explain that a formal reader expects one form, what that convention achieves and where it matters. A student who can move between a home variety and edited English has expanded a repertoire; they have not replaced language with grammar. The same principle applies to professional vocabulary. Mastery includes knowing when a term improves precision and when it excludes the audience without benefit.

In recruitment, care and law, reduce accent and fluency bias by separating content from delivery where possible. Written follow-up, structured questions and alternative response channels can reveal knowledge that an unstructured spoken encounter hides.

Learn through prediction, retrieval and interaction

Language learning improves when the learner has to anticipate, retrieve and use forms for a purpose. Before revealing a line, predict the next word or construction. Retrieve a meaning from memory rather than rereading it. Use the form with another person, observe the response and revise. These activities expose the learner's current model.

Examples should vary enough to reveal the pattern. One memorised sentence may bind a word to one scene. Several contrasting uses show what remains stable. Feedback is most useful when it identifies the distinction that changed the meaning rather than marking every departure at once. Adults also need extensive exposure, but attention and explanation can make recurring structure more visible.

Keep the social goal alive. A perfect exercise score can coexist with difficulty entering a conversation, managing repair or understanding an indirect refusal. Practise the actions the language must perform: requesting, explaining, disagreeing, checking reference and recovering after a missed turn.

Design for the channel and the audience

Do not assume that the same wording survives every medium. Speech can rely on timing, prosody and immediate repair. Writing must carry more of its own context and lets the reader revisit dense material. Sign and video preserve visual-spatial information. Diagrams expose relations that linear sentences may bury. Choose the channel that fits the content and the user.

Accessibility belongs at the start. Captions need accurate timing and speaker identification. Alt text should communicate the function of an image rather than list decorative pixels. Spoken instructions may need written support; text may need plain-language explanation or interpretation. A person cannot use a message they cannot reliably perceive, however elegant its wording.

For high-stakes communication, layer the forms. State the decision plainly, give the necessary reason, define specialised terms and show the required action. Then provide a route for questions. Redundancy is wasteful when it repeats one unclear formulation. It is protective when different channels reveal different aspects of the same requirement.

Test the artefact with its intended users rather than with its authors. Writers know the missing background and automatically restore it. A first-time reader reveals where headings, labels or examples fail to establish the reference frame. Record the point of hesitation, then repair the structure before adding more explanation. Ease for the producer is weak evidence of clarity for the recipient.

The limits

Language analysis does not read minds. An utterance can support several reasonable interpretations, private motives may remain inaccessible and silence changes meaning across relationships and settings. The lenses above improve diagnosis; they do not guarantee agreement.

Clear language cannot remove a real conflict of interest. Two people may understand one another and still want incompatible outcomes. Institutions can use plain wording to impose an unfair rule, or obscure wording to conceal one. Material resources, authority and enforcement must be analysed beside the text.

Nor should every interaction become an audit. Intimacy, humour, art and community life depend partly on implication, play and shared history. Maximum explicitness can flatten what participants value. The aim is proportion: make hidden work visible where error is costly, while leaving room for the flexible inference that makes ordinary language efficient.

Scientific limits remain too. Advice drawn from one language, culture, disability group or laboratory task may not transfer unchanged. Test the local people and purpose rather than treating an attractive general principle as a universal rule.

The one thing to keep

Language works by distributing meaning across form, context and other people. When a message fails, resist the urge to blame one bad word or one bad listener. Find which layer carried too much hidden work, then make that work visible through a clearer contrast, shared reference or repair.

The same principle scales from a cup to a constitution. Private intentions become public only through conventions others can recognise, and public conventions stay alive only through use. Communicate under pressure as though understanding is a coordinated achievement rather than an object you can place intact inside somebody else's head.

Languages also change by descent. When communities separate, inherited

speech patterns accumulate different sound shifts, word forms and grammatical habits. Linguists group languages into families when systematic correspondences support a common ancestor, not merely because the languages share a few similar words. That branching helps explain linguistic diversity; the detailed histories of particular words belong to *Etymology in a Hurry*.

Terms

Phoneme. A contrastive sound category in a particular language. Changing one phoneme can distinguish words, although each category is realised through variable acoustic and articulatory forms called allophones in speech.

Allophone. One context-dependent realisation of a phoneme. Speakers may produce noticeably different sounds without changing a word's identity because their language groups those variants into one functional category.

Morpheme. The smallest recurring unit conventionally associated with meaning or grammatical function. A morpheme may be a whole word, an ending, a prefix or part of a complex grammatical form.

Lexicon. A speaker's organised knowledge of words and other stored expressions, including meanings, pronunciations, grammatical behaviour and connections. It is more structured than a mental dictionary list of labels.

Syntax. The patterns that organise words and phrases into larger expressions and assign relations among them. Languages use syntax alongside morphology, prosody and context rather than one fixed universal word order.

Grammar. The system of patterns governing forms and constructions in a language or variety. Grammar includes speakers' implicit knowledge; prescriptive school guidance selects only one socially valued part of it.

Semantics. The conventional contribution that words and structures make to meaning. Semantics constrains interpretation, while context, speaker

intention and conversational sequence supply further pragmatic and interactional inferences.

Pragmatics. The study of how people infer meaning and action in context. It covers reference, implication, shared knowledge, indirect requests, politeness and what an utterance is doing in the present exchange.

Prosody. Patterns of pitch, rhythm, duration, prominence and phrasing across an utterance. Prosody can mark questions, contrasts, boundaries, emotion or stance without changing the visible or audible sequence of words.

Deixis. Reference anchored to a speaking situation. Forms such as *I*, *here*, *this* and *tomorrow* require information about speaker, place, object or time to be interpreted correctly in context.

Implicature. A meaning reasonably inferred from what was said, how it fitted the exchange and what was omitted. It can usually be cancelled without contradicting the literal sentence itself.

Compositionality. The tendency for a larger expression's meaning to depend on its parts and their arrangement. The principle is powerful but qualified by idioms, constructions, conventional ambiguity and context.

Productivity. The capacity to use learned forms and patterns in new combinations. Productivity lets speakers create and understand expressions they have never stored as complete memorised previous examples.

Recursion. The reuse of a structural operation within a related structure, such as placing one clause inside another. It extends expressions but is not an uncontested single defining property of language.

Displacement. The capacity to communicate about entities and events beyond the immediate place and moment, including memories, remote people, future plans, possibilities, denials, inventions and counterfactual situations.

Arbitrariness. The absence of a necessary physical link between most

linguistic forms and their meanings. Convention maintains the pairing, although sound symbolism and iconic signs create important partial exceptions.

Iconicity. A motivated resemblance between a form and some feature of its meaning. Iconicity occurs in speech, sign and gesture, but resemblance still needs cultural interpretation and shared conventional use.

Duality of patterning. The organisation of individually meaningless contrasts into meaningful units, then those units into larger expressions. It gives a limited inventory great expressive reach through layered repeated recombination.

Common ground. Information participants treat as shared and relevant during an exchange. It may come from perception, earlier talk, cultural knowledge or assumptions about one another, and it can be incomplete or wrong.

Turn-taking. The interactional organisation through which participants coordinate who communicates when. Timing, syntax, prosody, gaze and action help project completion, response opportunities, overlap and locally meaningful silence.

Repair. Practices for detecting and resolving trouble in speaking, signing, hearing, reference or understanding. People correct themselves, request clarification, repeat, reformulate or supply a missing contrast or reference.

Register. A pattern of linguistic choices associated with an activity, relationship, medium or institution. One speaker may use different registers in court, at home, in research, in law and online.

Dialect. A systematic language variety associated with region, community or social network. Dialects can differ in sound, vocabulary and grammar; a standard language is also historically one selected and codified variety.

Idiolect. The changing linguistic repertoire associated with one person. It reflects communities, relationships, experiences and situations rather than forming a perfectly consistent private version of an otherwise public

language.

Language family. A group of languages supported as descendants of a shared ancestral language. Family relationships are reconstructed through systematic correspondences, not surface resemblance or geographical or cultural proximity alone.

Cognate. A word or morpheme in related languages inherited from a common ancestral form. Similar-looking borrowings and coincidences are not cognates in the strict comparative-historical sense.

Grammaticalisation. A process by which lexical words or looser expressions develop more grammatical functions through repeated use, often accompanied by changes in meaning, distribution and phonetic form.

Code-switching. Movement between languages or varieties within an interaction or expression. It can mark audience, identity, quotation, topic or emphasis and normally follows structured social, sequential and grammatical constraints.

Sensitive period. A developmental span during which particular experience has an unusually strong effect on later language outcomes. It describes a changing gradient, not one universal birthday or absolute biological barrier.

Aphasia. An acquired impairment of language, commonly following stroke or brain injury, that may affect production, comprehension, word retrieval, reading or writing in different functional combinations and degrees.

Go Deeper

The broad map

David Crystal, *How Language Works* (Penguin, 2007). Crystal moves from voice, hearing and grammar through acquisition, sign, writing, variation and language change. The range makes it a good next book after this one because unfamiliar terminology appears inside short explanations rather than one theoretical programme. Read it as a map of the field, then follow its chapters towards more specialised work. Its examples lean heavily towards English and other well-documented languages, so keep the diversity warning active. The chief gain is proportion: sounds, sentences, conversation, literacy and society become connected parts of one subject without being forced into one mechanism.

How children build a first language

Eve V. Clark, *First Language Acquisition*, third edition (Cambridge University Press, 2016). This is the strongest of the four for development. Clark follows infants from early attention and sound through words, morphology, syntax, conversation and later language use, while treating acquisition as evidence gathered in social settings. The detail is scholarly but organised clearly enough for a serious general reader. It also resists the idea that one headline experiment or one grammatical milestone can represent the whole process. Use it to test the acquisition chapter here, especially the balance among pattern learning, meaning, interaction, adult responses and children's own generalisations across different languages.

Biology, learning and cultural transmission together

Morten H. Christiansen and Nick Chater, *Creating Language: Integrating Evolution, Acquisition, and Processing* (MIT Press, 2016). Christiansen and Chater argue that languages adapt to the capacities of human learners and processors as they pass through communities. That emphasis makes the book especially useful for the causal loop developed here: brains learn cultural systems, and repeated learning reshapes what later brains receive. It is a defended theoretical synthesis rather than neutral consensus, so read its claims beside work from generative, usage-based and social-interaction traditions. Its strength is refusing to isolate origins, child learning and adult processing as three unrelated puzzles. Each constrains the possible answers to the others.

The case for linguistic structure

David Adger, *Language Unlimited: The Science Behind Our Most Creative Power* (Oxford University Press, 2019). Adger gives the clearest route into the structural and generative account of language: how speakers know patterns beyond the examples they remember and how syntax supports creative expression. His organising commitments differ from the broader social and cultural model used here, which makes the book valuable rather than redundant. It presents a strong rival view in accessible prose and shows why grammar cannot be reduced to frequency, etiquette or a phrase book. Read it for the architecture of sentences, then keep asking how that architecture is acquired, used in interaction, realised in sign and changed through communities.

Notes and Sources

Scope, definitions and the subtitle

The book treats language as a conventional, structured and socially used system available through speech, sign and, secondarily, writing. Hockett's design features remain a useful historical checklist, but no single feature is used here as a decisive species boundary. Fitch's work on language evolution and Cartmill and colleagues' comparison framework support the profile approach. The subtitle is interpreted at species and collective scale. It is explicitly not a claim that linguistic performance measures an individual's humanity.

Evans and Levinson document the scale of variation hidden by claims built from a narrow set of languages. Adger supplies a strong structural account, while Christiansen and Chater supply a strong cultural transmission account. The manuscript does not present either as a settled replacement for the other.

Convention, common ground and conversational action

The account of signs, joint reference and common ground draws chiefly on Clark's *Using Language*. The distinction among sentence meaning, speaker meaning and inferred action follows work associated with Grice, Austin and later pragmatics. The punctual referee example is an illustration of conversational relevance, not a reported exchange.

Turn organisation and repair draw on Sacks, Schegloff and Jefferson's turn-taking model, Schegloff, Jefferson and Sacks on repair, and Stivers and colleagues' ten-language comparison. That comparison found both broad organisation and cultural variation. It does not establish identical timing rules in every language or setting.

Speech, sign, gesture and writing

Sandler and Lillo-Martin provide the main comparative linguistic account of signed languages. MacSweeney and colleagues review the neural evidence that language organisation extends across signed and spoken modalities. The discussion avoids treating facial action as one thing: depending on the language and construction, it can contribute grammar, prosody, affect or gesture.

Coulmas supports the distinction among writing systems and the claim that scripts select aspects of language rather than transcribing speech perfectly. Olson supports the argument that durable written representation changes practices of inspection, comparison and analysis. The manuscript keeps these effects distinct from first-language capacity.

Contrasts, grammar, productivity and ambiguity

General descriptions of phoneme, morpheme, syntax, compositionality and productivity draw on Crystal, Adger and standard linguistic usage. The treatment of recursion is deliberately narrow. Hauser, Chomsky and Fitch distinguished a broad faculty from a possible narrow recursive component, but subsequent debate has not made recursion an uncontested single separator between human language and animal communication.

Piantadosi, Tily and Gibson argue that ambiguity can support efficient communication because context usually constrains interpretation. The manuscript uses the weaker point that reusable forms and contextual inference make some ambiguity compatible with an efficient system. It does not claim that every ambiguity is useful.

Acquisition and developmental timing

Saffran, Aslin and Newport demonstrated statistical learning over syllable sequences in eight-month-old infants under laboratory conditions. The result supports sensitivity to distributional regularity, not a complete account of word discovery or grammar. Kuhl, Tsao and Liu compared live Mandarin exposure with recorded exposure for American infants. The manuscript preserves the study's restricted design and does not turn it into a universal rule that language can be learned only face to face.

Clark provides the developmental overview. Grosjean supports the account of multilingual repertoires and language choice in social context. De Houwer supports the account of bilingual first-language acquisition. Mayberry and Kluender review evidence from late first-language exposure in American Sign Language and distinguish it from ordinary second-language learning. The term *sensitive period* is used because outcomes show gradients and component differences rather than one universal cut-off.

Senghas, Kita and Özyürek analyse cohort differences in Nicaraguan Sign Language. Their findings show children elaborating spatial devices in an emerging community language. Sandler and colleagues provide a separate case of systematic structure emerging in Al-Sayyid Bedouin Sign Language. Neither case is presented as a replay of prehistoric language origins.

Variation, standards, contact and change

Labov supplies the central evidence that socially distributed variation is structured and can drive change. Lippi-Green documents how accent and standard-language ideologies shape institutional judgement in English-speaking settings. Bybee and Croft support usage, reanalysis and grammaticalisation as linked pathways. Thomason and Kaufman provide the main account of contact-induced change. The claim that languages distribute complexity differently is qualitative; no universal total-complexity score is asserted.

DeGraff challenges the treatment of creoles as linguistically exceptional or deficient. The manuscript preserves active dispute over the histories and

source contributions of particular creoles while rejecting a general primitive-language category. Grenoble and Whaley support the distinction among language shift, endangerment and revitalisation, including the role of institutions and speaker choice.

Language, thought and cognition

Wolff and Holmes review linguistic relativity across domains and support the distinction between bounded influence and deterministic imprisonment. Fedorenko, Piantadosi and Gibson argue from behavioural and neural evidence that language is primarily specialised for communication rather than constituting thought itself. That thesis is influential and contested at the margins. The manuscript uses the narrower conclusion that language and thought are neither identical nor independent in every task.

Claims about infants, animals and aphasia retaining forms of cognition are used only to reject total identity between language and thought. They do not imply that language loss leaves reasoning, memory or social participation untouched.

Brain networks, aphasia and FOXP2

Fedorenko, Ivanova and Regev review the language network as functionally identifiable within the wider brain. Malik-Moraleda and colleagues report comparable network organisation across 45 languages and 12 language families in their sample. The result supports cross-language consistency at the level tested, not an identical neural map in every person.

Gajardo-Vidal and colleagues found that damage to Broca's area itself did not explain long-term speech production outcome after stroke in their lesion study. The manuscript uses this to reject a one-centre diagram, not to deny the importance of left frontal regions or connected networks.

Lai and colleagues identified a FOXP2 mutation in a family with a severe speech and language disorder. Fisher and Scharff review the gene's wider regulatory and comparative significance. The evidence supports an important contribution to relevant developmental systems, not the popular

label *the language gene*.

Cultural evolution, biological evolution and origins

Kirby, Cornish and Smith used laboratory transmission chains to show how initially unstructured signal systems can become more regular and learnable. Christiansen and Chater develop the broader claim that languages are shaped by repeated learning and processing. Laboratory participants and artificial meanings are not equivalent to historical speech communities, so the manuscript treats the experiments as mechanism demonstrations rather than compressed language histories.

Fitch and Tomasello provide contrasting but overlapping accounts of biological and social prerequisites. The absence of direct linguistic fossils makes any exact origin date, single mutation or fixed sequence speculative. Archaeology, anatomy, genetics and comparative cognition constrain the possibilities without recovering the first language.

Suzuki, Wheatcroft and Griesser reported order-sensitive call combinations in Japanese great tits. Berthet, Surbeck and Townsend reported extensive compositionality in bonobo vocal sequences in 2025 under their analytical definitions. Cartmill and colleagues warn against comparisons designed around human strengths and animal weaknesses. The manuscript therefore rejects a single-feature boundary while distinguishing these findings from evidence for the full scale and open productivity of human language. That interpretation is disputed. Subsequent peer-reviewed criticism argued that the reported combinations do not satisfy stricter tests for compositional meaning. The exchange is a useful warning: patterned combinations in animal calls can reveal ingredients of communication without yet establishing the productive, open-ended compositional system found in human language.

Bibliography

General language, structure and use

Adger, David. *Language Unlimited: The Science Behind Our Most Creative Power*. Oxford: Oxford University Press, 2019.

Austin, J. L. *How to Do Things with Words*. Oxford: Clarendon Press, 1962.

Bybee, Joan. *Language, Usage and Cognition*. Cambridge: Cambridge University Press, 2010.

Clark, Herbert H. *Using Language*. Cambridge: Cambridge University Press, 1996.

Crystal, David. *How Language Works*. London: Penguin, 2007.

Evans, Nicholas, and Stephen C. Levinson. "The Myth of Language Universals: Language Diversity and Its Importance for Cognitive Science." *Behavioral and Brain Sciences* 32, no. 5 (2009): 429-448.
doi:10.1017/S0140525X0999094X.

Grice, H. P. "Logic and Conversation." In *Syntax and Semantics, Volume 3: Speech Acts*, edited by Peter Cole and Jerry L. Morgan, 41-58. New York: Academic Press, 1975.

Hockett, Charles F. "The Origin of Speech." *Scientific American* 203, no. 3 (1960): 88-97.

Piantadosi, Steven T., Harry Tily, and Edward Gibson. "The Communicative Function of Ambiguity in Language." *Cognition* 122, no. 3 (2012): 280-291.
doi:10.1016/j.cognition.2011.10.004.

Sacks, Harvey, Emanuel A. Schegloff, and Gail Jefferson. "A Simplest Systematics for the Organization of Turn-Taking for Conversation." *Language* 50, no. 4 (1974): 696-735.

Schegloff, Emanuel A., Gail Jefferson, and Harvey Sacks. "The Preference for Self-Correction in the Organization of Repair in Conversation." *Language*

53, no. 2 (1977): 361-382.

Stivers, Tanya, et al. "Universals and Cultural Variation in Turn-Taking in Conversation." *Proceedings of the National Academy of Sciences* 106, no. 26 (2009): 10587-10592. doi:10.1073/pnas.0903616106.

Sign, writing and modality

Coulmas, Florian. *Writing Systems: An Introduction to Their Linguistic Analysis*. Cambridge: Cambridge University Press, 2003.

MacSweeney, Mairéad, Cheryl M. Capek, Ruth Campbell, and Bencie Woll. "The Signing Brain: The Neurobiology of Sign Language." *Trends in Cognitive Sciences* 12, no. 11 (2008): 432-440. doi:10.1016/j.tics.2008.07.010.

Olson, David R. *The World on Paper: The Conceptual and Cognitive Implications of Writing and Reading*. Cambridge: Cambridge University Press, 1994.

Sandler, Wendy, and Diane Lillo-Martin. *Sign Language and Linguistic Universals*. Cambridge: Cambridge University Press, 2006.

Acquisition and transmission

Clark, Eve V. *First Language Acquisition*. 3rd ed. Cambridge: Cambridge University Press, 2016.

De Houwer, Annick. *Bilingual First Language Acquisition*. Bristol: Multilingual Matters, 2009.

Grosjean, François. *Bilingual: Life and Reality*. Cambridge, MA: Harvard University Press, 2010.

Kirby, Simon, Hannah Cornish, and Kenny Smith. "Cumulative Cultural Evolution in the Laboratory: An Experimental Approach to the Origins of Structure in Human Language." *Proceedings of the National Academy of Sciences* 105, no. 31 (2008): 10681-10686. doi:10.1073/pnas.0707835105.

Kuhl, Patricia K., Feng-Ming Tsao, and Huei-Mei Liu. "Foreign-Language

Experience in Infancy: Effects of Short-Term Exposure and Social Interaction on Phonetic Learning." *Proceedings of the National Academy of Sciences* 100, no. 15 (2003): 9096-9101. doi:10.1073/pnas.1532872100.

Mayberry, Rachel I., and Robert Kluender. "Rethinking the Critical Period for Language: New Insights into an Old Question from American Sign Language." *Bilingualism: Language and Cognition* 21, no. 5 (2018): 886-905. doi:10.1017/S1366728917000724.

Saffran, Jenny R., Richard N. Aslin, and Elissa L. Newport. "Statistical Learning by 8-Month-Old Infants." *Science* 274, no. 5294 (1996): 1926-1928. doi:10.1126/science.274.5294.1926.

Sandler, Wendy, Irit Meir, Carol Padden, and Mark Aronoff. "The Emergence of Grammar: Systematic Structure in a New Language." *Proceedings of the National Academy of Sciences* 102, no. 7 (2005): 2661-2665. doi:10.1073/pnas.0405448102.

Senghas, Ann, Sotaro Kita, and Aslı Özyürek. "Children Creating Core Properties of Language: Evidence from an Emerging Sign Language in Nicaragua." *Science* 305, no. 5691 (2004): 1779-1782. doi:10.1126/science.1100199.

Tomasello, Michael. *Constructing a Language: A Usage-Based Theory of Language Acquisition*. Cambridge, MA: Harvard University Press, 2003.

Variation, contact and language maintenance

Croft, William. *Explaining Language Change: An Evolutionary Approach*. Harlow: Longman, 2000.

DeGraff, Michel. "Linguists' Most Dangerous Myth: The Fallacy of Creole Exceptionalism." *Language in Society* 34, no. 4 (2005): 533-591. doi:10.1017/S0047404505050207.

Grenoble, Lenore A., and Lindsay J. Whaley. *Saving Languages: An Introduction to Language Revitalization*. Cambridge: Cambridge University Press, 2006.

Labov, William. *Principles of Linguistic Change, Volume 1: Internal Factors*. Oxford: Blackwell, 1994.

Lippi-Green, Rosina. *English with an Accent: Language, Ideology, and Discrimination in the United States*. 2nd ed. London: Routledge, 2012.

Nettle, Daniel, and Suzanne Romaine. *Vanishing Voices: The Extinction of the World's Languages*. Oxford: Oxford University Press, 2000.

Thomason, Sarah Grey, and Terrence Kaufman. *Language Contact, Creolization, and Genetic Linguistics*. Berkeley: University of California Press, 1988.

Language, cognition, brain and genes

Fedorenko, Evelina, Anna A. Ivanova, and Tamar I. Regev. "The Language Network as a Natural Kind within the Broader Landscape of the Human Brain." *Nature Reviews Neuroscience* 25 (2024): 289-312. doi:10.1038/s41583-024-00802-4.

Fedorenko, Evelina, Steven T. Piantadosi, and Edward A. F. Gibson. "Language Is Primarily a Tool for Communication Rather than Thought." *Nature* 630 (2024): 575-586. doi:10.1038/s41586-024-07522-w.

Fisher, Simon E., and Constance Scharff. "FOXP2 as a Molecular Window into Speech and Language." *Trends in Genetics* 25, no. 4 (2009): 166-177. doi:10.1016/j.tig.2009.03.002.

Gajardo-Vidal, Andrea, et al. "Damage to Broca's Area Does Not Contribute to Long-Term Speech Production Outcome after Stroke." *Brain* 144, no. 3 (2021): 817-832. doi:10.1093/brain/awaa460.

Lai, Cecilia S. L., Simon E. Fisher, Jane A. Hurst, Faraneh Vargha-Khadem, and Anthony P. Monaco. "A Forkhead-Domain Gene Is Mutated in a Severe Speech and Language Disorder." *Nature* 413 (2001): 519-523. doi:10.1038/35097076.

Malik-Moraleda, Saima, et al. "An Investigation across 45 Languages and 12 Language Families Reveals a Universal Language Network." *Nature*

Neuroscience 25 (2022): 1014-1019. doi:10.1038/s41593-022-01114-5.

Wolff, Phillip, and Kevin J. Holmes. "Linguistic Relativity." *Wiley Interdisciplinary Reviews: Cognitive Science* 2, no. 3 (2011): 253-265. doi:10.1002/wcs.104.

Evolution and animal communication

Berthet, Mélissa, Martin Surbeck, and Simon W. Townsend. "Extensive Compositionality in the Vocal System of Bonobos." *Science* 388, no. 6742 (2025): 104-108. doi:10.1126/science.adv1170.

Cartmill, Erica A., et al. "Overcoming Bias in the Comparison of Human Language and Animal Communication." *Proceedings of the National Academy of Sciences* 120, no. 47 (2023): e2218799120. doi:10.1073/pnas.2218799120.

Christiansen, Morten H., and Nick Chater. *Creating Language: Integrating Evolution, Acquisition, and Processing*. Cambridge, MA: MIT Press, 2016.

Christiansen, Morten H., and Nick Chater. "Language as Shaped by the Brain." *Behavioral and Brain Sciences* 31, no. 5 (2008): 489-558. doi:10.1017/S0140525X08004998.

Fitch, W. Tecumseh. *The Evolution of Language*. Cambridge: Cambridge University Press, 2010.

Fitch, W. Tecumseh. "Animal Cognition and the Evolution of Human Language: Why We Cannot Focus Solely on Communication." *Philosophical Transactions of the Royal Society B* 375, no. 1789 (2020): 20190046. doi:10.1098/rstb.2019.0046.

Hauser, Marc D., Noam Chomsky, and W. Tecumseh Fitch. "The Faculty of Language: What Is It, Who Has It, and How Did It Evolve?" *Science* 298, no. 5598 (2002): 1569-1579. doi:10.1126/science.298.5598.1569.

Suzuki, Toshitaka N., David Wheatcroft, and Michael Griesser. "Experimental Evidence for Compositional Syntax in Bird Calls." *Nature Communications* 7 (2016): 10986. doi:10.1038/ncomms10986.

Tomasello, Michael. *Origins of Human Communication*. Cambridge, MA: MIT Press, 2008.