

Crying Whorf

In 1924, Edward Sapir, the leading light of American linguistics, was entertaining no illusions about the attitude of outsiders toward his field: “The normal man of intelligence has something of a contempt for linguistic studies, convinced as he is that nothing can well be more useless. Such minor usefulness as he concedes to them is of a purely instrumental nature. French is worth studying because there are French books which are worth reading. Greek is worth studying—if it is—because a few plays and a few passages of verse, written in that curious and extinct vernacular, have still the power to disturb our hearts—if indeed they have. For the rest, there are excellent translations. . . . But when Achilles has bewailed the death of his beloved Patroclus and Clytaemnestra has done her worst, what are we to do with the Greek aorists that are left on our hands? There is a traditional mode of procedure which arranges them into patterns. It is called grammar. The man who is in charge of grammar and is called a grammarian is regarded by all plain men as a frigid and dehumanized pedant.”

In Sapir’s own eyes, however, nothing could be further from the truth. What he and his colleagues were doing did not remotely resemble

the pedantic sifting of subjunctives from aorists, moldy ablatives from rusty instrumentals. Linguists were making dramatic, even worldview-changing discoveries. A vast unexplored terrain was being opened up, the languages of the American Indians, and what was revealed there had the power to turn on its head millennia's wisdom about the natural ways of organizing thoughts and ideas. For the Indians expressed themselves in unimaginably strange ways and thus demonstrated that many aspects of familiar languages, which had previously been assumed to be simply natural and universal, were in fact merely accidental traits of European tongues. The close study of Navajo, Nootka, Paiute, and a panorama of other native languages catapulted Sapir and his colleagues to vertiginous heights, from where they could now gaze down on the languages of the Old World like people who see their home patch from the air for the first time and suddenly recognize it as just one little spot in a vast and varied landscape. The experience was exhilarating. Sapir described it as the liberation from "what fetters the mind and benumbs the spirit . . . the dogged acceptance of absolutes." And his student at Yale Benjamin Lee Whorf enthused: "We shall no longer be able to see a few recent dialects of the Indo-European family . . . as the apex of the evolution of the human mind. They, and our own thought processes with them, can no longer be envisioned as spanning the gamut of reason and knowledge but only as one constellation in a galactic expanse."

It was difficult not to get carried away by the view. Sapir and Whorf became convinced that the profound differences between languages must have consequences that go far beyond mere grammatical organization and must be related to profound divergence in modes of thought. And so in this heady atmosphere of discovery, a daring idea about the power of language shot to prominence: the claim that our mother tongue determines the way we think and perceive the world. The idea itself was not new—it had been lying around in a raw state for more than a century—but it was distilled in the 1930s into a powerful concoction that then intoxicated a whole generation. Sapir branded this idea the principle of "linguistic relativity," equating it with nothing less than Einstein's world-shaking theory. The observer's perceptions of the

world—so ran Sapir’s emendation of Einstein—depend not only on his inertial frame of reference but also on his mother tongue.

The following pages tell the story of linguistic relativity—a history of an idea in disgrace. For as loftily as it had once soared, so precipitously did the theory then crash, when it transpired that Sapir and especially his student Whorf had attributed far-fetched cognitive consequences to what were in fact mere differences in grammatical organization. Today, any mention of linguistic relativity will make most linguists shift uneasily in their chairs, and “Whorfianism” has largely become an intellectual tax haven for mystical philosophers, fantasists, and post-modern charlatans.

Why then should one bother telling the story of a disgraced idea? The reason is not (just) to be smug with hindsight and show how even very clever people can sometimes be silly. Although there is undeniable pleasure in such an exercise, the real reason for exposing the sins of the past is this: although Whorf’s wild claims were largely bogus, I will try to convince you later that the notion that language can influence thoughts should not be dismissed out of hand. But if I am to make a plausible case that some aspects of the underlying idea are worth salvaging and that language may after all function as a lens through which we perceive the world, then this salvaging mission must steer clear of previous errors. It is only by understanding where linguistic relativity went astray that we can turn a different way.

WILHELM VON HUMBOLDT

The idea of linguistic relativity did not emerge in the twentieth century entirely out of the blue. In fact, what happened at Yale—the over-reaction of those dazzled by a breathtaking linguistic landscape—was a close rerun of an episode from the early 1800s, during the high noon of German Romanticism.

The prevailing prejudice toward the study of non-European languages that Edward Sapir gently mocked in 1924 was nothing to poke fun at a century earlier. It was simply accepted wisdom—not just for the “ordinary man of intelligence” but also among philologists themselves—that

the only languages worthy of serious study were Latin and Greek. The Semitic languages Hebrew and Aramaic were occasionally thrown into the bargain because of their theological significance, and Sanskrit was grudgingly gaining acceptance into the club of classical worthies, but only because it was so *similar* to Greek and Latin. But even the modern languages of Europe were still widely viewed as merely degenerate forms of the classical languages. Needless to say, the languages of illiterate tribes, without great works of literature or any other redeeming features, were seen as devoid of any interest, primitive jargons just as worthless as the primitive peoples who spoke them.

It was not that scholars at the time were unconcerned about the question of what is common to all languages. In fact, from the seventeenth century onward, the writing of learned treatises on “universal grammar” was very much in vogue. But the universe of these universal grammars was rather limited. Around 1720, for instance, John Henley published in London a series of grammars called *The Compleat Linguist; or, An Universal Grammar of All the Considerable Tongues in Being*. All the considerable tongues in being amounted to nine: Latin, Greek, Italian, Spanish, French, Hebrew, Chaldee (Aramaic), Syriac (a later dialect of Aramaic), and Arabic. This exclusive universe offered a somewhat distorted perspective, for—as we know today—the variations among European languages pale in significance compared with the otherness of more exotic tongues. Just imagine what misleading ideas one would get on “universal religion” or on “universal food” if one limited one’s universe to the stretch between the Mediterranean and the North Sea. One would travel in the different European countries and be impressed by the great divergences between them: the architecture of the churches is entirely different, the bread and cheese do not taste at all the same. But if one never ventured to places farther afield, where there were no churches, cheese, or bread, one would never realize that these intra-European differences are ultimately minor variations in essentially the same religion and the same culinary culture.

In the second half of the eighteenth century, the view was beginning to widen slightly, as various attempts were made to compile “universal dictionaries”—lists of equivalent words in languages from different

continents. But although the scope and ambition of these catalogs gradually grew, they didn't go much beyond a linguistic cabinet of curiosities showcasing weird and wonderful words. In particular, the dictionaries revealed little of value about the *grammar* of exotic languages. Indeed, for most philologists at the time, the notion that the grammar of a barbarian language could be a worthwhile subject of study seemed perverse. Studying grammar meant the study of Greek and Latin, because "grammar" *was* the grammar of Greek and Latin. So when remote languages were described (not by philologists but by missionaries who needed them for practical purposes), the descriptions usually consisted of a list of Latin paradigms on one side and the allegedly corresponding forms in the native language on the other side. The nouns in an American Indian language, for example, would be shown in six forms, corresponding to the six cases of the Latin noun. Whether or not the language in question made any case distinctions was irrelevant—the noun would still be duly frogmarched into nominative, genitive, dative, accusative, vocative, and ablative. The French writer Simon-Philibert de La Salle de l'Étang demonstrates this frame of mind in his 1763 dictionary of Galibi, a now extinct language of the Caribbean, when he complains that "the Galibis have nothing in their language that makes distinctions of case, for which there should be six in the declension of each word." Such descriptions seem to us today like clumsy parodies, but they were conceived in complete earnestness. The notion that the grammar of an American Indian language might be organized on fundamentally different principles from those of Latin was simply beyond the intellectual horizon of the writers. The problem was much deeper than the failure to understand a particular feature of the grammar of a particular New World language. It was that many of the missionaries didn't even understand that there was something there to understand.

Enter Wilhelm von Humboldt (1767–1835), linguist, philosopher, diplomat, educational reformer, founder of the University of Berlin, and one of the stellar figures of the early nineteenth century. His education—the best of what the Berlin Enlightenment scene had to offer—imbued him with unbounded admiration for classical culture and for the classical



Wilhelm von Humboldt, 1767–1835

languages. And until he reached the age of thirty-three, there was little to show that he would one day break out of the mold or that his linguistic interests would ever extend beyond the revered Latin and Greek. His first publication, at the age of nineteen, was about Socrates and Plato; he then wrote about Homer and translated Aeschylus and Pindar. A happy lifetime of classical scholarship seemed to stretch in front of him.

His linguistic road to Damascus led through the Pyrenees. In 1799, he traveled to Spain and was greatly taken with the Basque people, their culture, and their landscape. But above all, it was their language that aroused his curiosity. Here was a language spoken on European soil but entirely unlike all other European tongues and clearly from a different stock. Back from the journey, Humboldt spent months reading through everything he could find about the Basques, but as there wasn't very much in the way of reliable information, he returned to the Pyrenees to do serious fieldwork and learn the language firsthand. As his knowledge deepened, he realized the extent to which the structure of this language—rather than merely its vocabulary—diverged from everything else he knew and from what he had previously taken as the only natural form of grammar. The revelation gradually dawned on him that not all languages were made in the image of Latin.

Once Humboldt's curiosity was aroused, he tried to find descriptions of even more remote tongues. There was almost nothing published at the

time, but the opportunity to discover more presented itself when he became the Prussian envoy to the Vatican in 1802. Rome was teeming with Jesuit missionaries who had been expelled from their missions in Spanish South America, and the Vatican library contained many manuscripts with descriptions of South and Central American languages that these missionaries had brought with them or written once back in Rome. Humboldt trawled through such grammars, and with his eyes now wide open after his experience with Basque, he could make out how distorted a picture they presented: structures that deviated from the European type had either passed unnoticed or been coerced to fit the European mold. "It is sad to see," he wrote, "what violence these missionaries exerted both on themselves and on the languages, in order to force them into the narrow rules of Latin grammar." In his determination to understand how the American languages actually worked, Humboldt completely rewrote many of these grammars, and gradually the real structure of the languages emerged from behind the facade of Latin paradigms.

Humboldt set linguists on a steep learning curve. Of course, the secondhand information that he was able to glean about American Indian languages was nothing like the deep firsthand knowledge that Sapir developed a century later. And considering what we know today about how the grammars of different languages are organized, Humboldt was barely scratching the surface. But the dim ray of light that shone from his materials felt dazzling nonetheless because of the utter darkness in which he and his contemporaries had languished.

For Humboldt, the elation of breaking new ground was mixed with frustration at the need to impress the value of his discoveries upon an uncomprehending world, which persisted in regarding the study of primitive tongues as an activity fit only for butterfly collectors. Humboldt went to great lengths to explain why the profound dissimilarities among grammars were in fact a window into far greater things. "The difference between languages," he argued, "is not only in sounds and signs but in worldview. Herein is found the reason and ultimate goal of all the study of language." But this was not all. Humboldt also claimed that grammatical differences not only reflect preexisting differences in thought but are responsible for shaping these differences in the first

place. The mother tongue “is not just the means for representing a truth already recognized but much more to discover the truth that had not been recognized previously.” Since “language is the forming organ of thought,” there must be an intimate relation between the laws of grammar and the laws of thinking. “Thinking,” he concluded, “is dependent not just on language in general but to a certain extent on each individual language.”

A seductive idea was thus tossed into the air, an idea that in the 1930s would be taken up (and up and up) at Yale. Humboldt himself never went as far as alleging that our mother tongue can entirely constrain our thoughts and intellectual horizons. He explicitly acknowledged something that in the hullabaloo around Whorf a century later tended to be overlooked, namely that, in principle, any thought can be expressed in any language. The real differences between languages, he argued, are not in what a language is *able* to express but rather in “what it encourages and stimulates its speakers to do from its own inner force.”

What exactly this “inner force” is, what ideas precisely it “stimulates” speakers to formulate, and how in practical terms it might do so always remained rather elusive in Humboldt’s writings. As we’ll see, his basic intuition may have been sound, but despite the detailed knowledge that he amassed about many exotic languages, his statements on the subject of the mother tongue’s influence on the mind always remained in the higher stratosphere of philosophical generalities and never really got down to the nitty-gritty of detail.

In fact, in his voluminous musings on this subject, Humboldt abided by the first two commandments for any great thinker: (1) Thou shalt be vague, (2) Thou shalt not eschew self-contradiction. But it may have been exactly this vagueness that struck a chord with his contemporaries. Following Humboldt’s lead, it now became fashionable among the great and the good to pay tribute to language’s influence on thought, and as long as one didn’t feel the urge to provide any particular examples, one could freely indulge in resonant but ultimately hollow imagery. The renowned Oxford professor of philology Max Müller declared in 1873 that “the words in which we think are channels of thought which we have not dug ourselves, but which we found ready made for us.” And his

nemesis across the Atlantic, the American linguist William Whitney, may have concurred with Müller in nothing else but agreed nevertheless that “every single language has its own peculiar framework of established distinctions, its shapes and forms of thought, into which, for the human being who learns that language as his mother-tongue, is cast the content and product of his mind, his store of impressions, . . . his experience and knowledge of the world.” The mathematician and philosopher William Kingdon Clifford added a few years later that “it is the thought of past humanity imbedded in our language which makes Nature to be what she is for us.”

Throughout the nineteenth century, however, such statements remained on the level of occasional rhetorical flourishes. It was only in the twentieth century that the slogans began to be distilled into specific claims about the alleged influence of particular grammatical phenomena on the mind. The Humboldtian ideas now underwent a rapid process of fermentation, and as the spirit of the new theory grew more powerful, the rhetoric became less sober.

LINGUISTIC RELATIVITY

What was it in the air that catalyzed this reaction? One reason must have been the great (and wholly justified) excitement about the enormous advances that linguists were making in understanding the outlandish nature of Amerindian languages. Linguists in America did not need to pore over manuscripts from the Vatican library to unearth the structure of the native languages of the continent, as there were still dozens of living native languages to be studied in situ. What is more, in the century that separated Sapir from Humboldt, the science of language had experienced a meteoric rise in sophistication, and the analytic tools at linguists' disposal became incomparably more powerful. When these advanced tools began to be applied in earnest to the treasure hoard of Native American languages, they revealed grammatical landscapes that Humboldt could not have dreamed of.

Edward Sapir, like Humboldt a century before him, started his linguistic career far from the open vistas of American languages. His

studies at Columbia concentrated on Germanic philology and consisted of things rather reminiscent of the pedantic collections of obscure verbal forms in ancient tongues that he derided in the passage I quoted earlier. Sapir credited his conversion from the dusty armchair of Germanic philology to the great outdoors of Indian languages to the influence of Franz Boas, the charismatic professor of anthropology at Columbia who was also the pioneer in the scientific study of the native languages of the continent. Years later, Sapir reminisced about a life-changing meeting at which Boas summoned counterexamples from this, that, or the other Indian tongue to every generalization about the structure of language that Sapir had previously believed in. Sapir began to feel that Germanic philology had taught him very little and that he still had “everything to learn about language.” Henceforth, he was to apply his legendary sharpness of mind to the study of Chinook, Navajo, Nootka, Yana, Tlingit, Sarcee, Kutchin, Ingalik, Hupa, Paiute, and other native languages, producing analyses of unmatched clarity and depth.

In addition to the exhilaration of discovering weird and exotic grammars, there was something else in the air that pushed Sapir toward the formulation of his linguistic relativity principle. This was the radical trend in the philosophy of the early twentieth century. At the time, philosophers such as Bertrand Russell and Ludwig Wittgenstein were



Edward Sapir, 1884–1939

busy decrying the pernicious influences of language on the metaphysics of the past. Russell wrote in 1924: "Language misleads us both by its vocabulary and by its syntax. We must be on our guard in both respects if our logic is not to lead to a false metaphysic."

Sapir translated the claims about language's influence on philosophical ideas into an argument about the influence of the mother tongue on everyday thoughts and perceptions. He started talking about the "tyrannical hold that linguistic form has upon our orientation in the world," and as opposed to anyone before him, he went on to inject such slogans with actual content. In 1931 he advanced the following example for how one specific linguistic difference should affect speakers' thoughts. When we observe a stone moving through space toward the earth, Sapir explained, we involuntarily divide this event into two separate concepts: a stone and the action of falling, and we declare that "the stone falls." We assume that this is the only way to describe such an event. But the inevitability of the division into "stone" and "fall" is just an illusion, because the Nootka language, which is spoken on Vancouver Island, does things in a very different way. There is no verb in Nootka that corresponds to our general verb "fall" and that can describe the action independently of a specific falling object. Instead, a special verb, "to stone," is used to refer to the motion of a stone in particular. To describe the event of a stone *falling*, this verb is combined with the element "down." So the state of affairs that we break up into "stone" and "fall" is described in Nootka as something like "[it] stones down."

Such concrete examples of "incommensurable analysis of experience in different languages," Sapir says, "make very real to us a kind of relativity that is generally hidden from us by our naïve acceptance of fixed habits of speech. . . . This is the relativity of concepts or, as it might be called, the relativity of the form of thought." This type of relativity, he adds, may be easier to grasp than Einstein's, but to understand it one needs the comparative data of linguistics.

Unfortunately for Sapir, it is exactly by forsaking the cozy vagueness of philosophical slogans and venturing into the freezing drafts of specific linguistic examples that he exposes the thin ice on which his theory stands. The Nootka expression "it stones down" is undoubtedly a

very different way of describing the event, and it certainly sounds strange, but does this strangeness mean that Nootka speakers necessarily have to *perceive* the event in a different way? Does the fusion of verb and noun in Nootka necessarily imply that Nootka speakers do not have separate images of the action and the object in their minds?

We can test this if we apply Sapir's argument to a slightly more familiar language. Take the English phrase "it rains." This construction is actually quite similar to the Nootka "it stones down," because the action (falling) and the object (water drops) are combined into one verbal concept. But not all languages do it in this way. In my mother tongue, the object and the action are kept apart, and one says something like "rain falls." So there is a profound difference in the way our languages express the event of raining, but does this mean that you and I have to *experience* rain in a different way? Do you feel you are prevented by the grammar of your mother tongue from understanding the distinction between the watery substance and the action of falling? Do you find it hard to relate the falling raindrops to other things that fall down? Or are the differences in the way our languages express the idea of "raining" no more than merely differences in grammatical organization?

At the time, no one thought of stumbling over such molehills. The excitement about the—largely factual—strangeness of expression in American Indian languages was somehow taken as sufficient to deduce the—largely fictional—differences in their speakers' perceptions and thoughts. In fact, the party was just beginning, for onto the stage now steps Sapir's most creative student, Benjamin Lee Whorf.

Whereas Sapir still kept a few toes on the ground and on the whole was reluctant to spell out the exact form of the alleged tyrannical hold of linguistic categories on the mind, his student Whorf suffered no such qualms. Whorf was to boldly go where no man had gone before, and in a series of ever wilder claims he expounded the power of our mother tongue to influence not just our thoughts and perceptions but even the physics of the cosmos. The grammar of each language, he wrote, "is not merely a reproducing instrument for voicing ideas, but rather is itself the shaper of ideas, the program and guide for the individual's mental

activity, for his analysis of impressions. . . . We dissect nature along lines laid down by our native languages.”

The general structure of Whorf’s arguments was to mention an outlandish grammatical feature and then, with a fateful “hence,” “so,” or “therefore,” to conclude that this feature must result in a very different way of thinking. From the frequent fusion of noun and verb in American Indian languages, for example, Whorf concluded that such languages impose a “monistic view of nature” rather than our “bipolar division of nature.” Here is how he justifies such claims: “Some languages have means of expression in which the separate terms are not so separate as in English but flow together into plastic synthetic creations. Hence such languages, which do not paint the separate-object picture of the universe to the same degree as English and its sister tongues, point toward possible new types of logic and possible new cosmical pictures.”

If you find yourself getting swept away by the prose, just remember the English phrase “it rains,” which combines the raindrops and the action of falling into one “plastic synthetic creation.” Is your “separate-object picture of the universe” affected? Do you and speakers of “rain falls” languages operate under a different type of logic and different cosmical pictures?

HOPI TIME

What surprises most is to find that various grand generalizations of the Western world, such as time, velocity and matter, are not essential to the construction of a consistent picture of the universe.

(Benjamin Lee Whorf, *Science and Linguistics*)

Even the stork in the heavens knows her times. And the turtledove, the swallow, and crane keep the time of their coming. But My people know not the ordinance of the Lord.

(Jeremiah 8:7)

By far the most electrifying of Whorf’s arguments concerned a different area of grammar and a different language: Hopi from northeastern

Arizona. Today the Hopi number about six thousand and are known especially for the "snake dance," in which the performers dance with live snakes between their teeth. The snakes are then released and spread the word among their peers that the Hopi are in harmony with the spiritual and natural world. But Whorf made Hopi famous for a different reason: the Hopi language, he said, had no concept of time. Whorf claimed to have made a "long and careful study" of the Hopi language, although he never actually got round to visiting them in Arizona and his research was exclusively based on his conversations with one Hopi informant who lived in New York City. At the start of his investigations, Whorf argued that Hopi time "has zero dimensions; i.e., it cannot be given a number greater than one. The Hopi do not say, 'I stayed five days,' but 'I left on the fifth day.' A word referring to this kind of time, like the word day, can have no plural." From this fact he concluded that "to us, for whom time is a motion on a space, unvarying repetition seems to scatter its force along a row of units of that space, and be wasted. To the Hopi, for whom time is not a motion but a 'getting later' of everything that has ever been done, unvarying repetition is not wasted but accumulated." Whorf thus found it "gratuitous to assume that a Hopi who knows only the Hopi language and the cultural ideas of his own society has the same notions . . . of time and space that we have." The Hopi, he said, would not understand our idiom "tomorrow is another day," because for them the return of the day is "felt as the return of the same person, a little older but with all the impresses of yesterday, not as 'another day,' i.e. like an entirely different person."

But this was only the beginning. As his investigations of Hopi deepened, Whorf decided that his previous analysis had not gone far enough and that the Hopi language in fact contains no reference to time at all. Hopi, he explained, contains "no words, grammatical forms, constructions or expressions that refer directly to what we call 'time,' or to past, present, or future." Thus a Hopi "has no general notion or intuition of TIME as a smooth flowing continuum in which everything in the universe proceeds at an equal rate."

This spectacular revelation outshone anything that anyone had previously been able to imagine, and it shot Whorf to the attention of the

world. The fame of his claims quickly spread far beyond linguistics, and within a few years Whorf's ideas were in every mouth. Needless to say, the stakes were raised with each retelling. A 1958 book called *Some Things Worth Knowing: A Generalist's Guide to Useful Knowledge* reported that the English language makes it impossible for "us laymen" to understand the scientific concept of time as a fourth dimension. But "a Hopi Indian, thinking in the Hopi language—which does not treat time as a flow—has less trouble with the fourth dimension than do we." A few years later, one anthropologist explained that for the Hopi "time seems to be that aspect of being which is the knife-edge of now as it is in the process of becoming both 'past' and 'future.' Viewed thus, we have no present either, but our linguistic habits make us feel as if we had."

There was only one hitch. In 1983, the linguist Ekkehart Malotki, who did extensive fieldwork on the Hopi language, wrote a book called *Hopi Time*. The first page of the book is largely blank, with only two short sentences printed in the middle, one below the other:

After long and careful study and analysis, the Hopi language is seen to contain no words, grammatical forms, constructions, or expressions that refer directly to what we call "time."

(Benjamin Lee Whorf, "An American Indian Model of the Universe," 1936)

*pu' antsa pay qavongvaqw pay su' its talavay kuyvansat, pàasatham pu'
pam piw maanat taatayna*

Then indeed, the following day, quite early in the morning at the hour when people pray to the sun, around that time then, he woke up the girl again

(Ekkehart Malotki, Hopi Field Notes, 1980)

Malotki's book goes on to describe, in 677 pages of small print, the numerous expressions for time in the Hopi language, as well as the tense and aspect system on its "timeless verbs." Incredible how much a language can change in forty years.



It is not difficult to comprehend why the principle of linguistic relativity, or the “Sapir-Whorf hypothesis,” as it has also come to be known, has sunk into such disrepute among respectable linguists. But there are others—philosophers, theologians, literary critics—who carry the torch regardless. One idea has proved particularly resilient to the onslaught of fact or reason: the argument that the tense system of a language determines the speakers’ understanding of time. Biblical Hebrew has offered particularly rich picking, as its allegedly tenseless verbal system could be relied on to explain anything from the Israelites’ conception of time to the nature of Judeo-Christian prophecy. In his 1975 cult book *After Babel*, George Steiner follows a long line of great thinkers in attempting to “relate grammatical possibilities and constraints to the development of such primary ontological concepts as time and eternity.” While always careful to avoid any formulation that could be nailed to a specific sense, Steiner nevertheless informs us that “much of the distinctive Western apprehension of time as a linear sequence and vectorial motion is set out in and organized by the Indo-European verb system.” But biblical Hebrew, according to Steiner, never developed such tense distinctions at all. Is this difference between the elaborate tense system of the Indo-European Greek and the tenselessness of Hebrew, he asks, responsible for the “contrasting evolution of Greek and Hebrew thought”? Or does it merely reflect preexisting thought patterns? “Is the convention that spoken facts are strictly contemporaneous with the presentness of the speaker—a convention which is crucial to Hebraic-Christian doctrines of revelation—a generator or a consequence of grammatical form?” Steiner concludes that the influence must go in both directions: the verbal system influences thought, which in turn influences the verbal system, all in “manifold reciprocity.”

Above all, Steiner argues, it is the future tense that has momentous consequences for the human soul and mind, as it shapes our concept of time and rationality, even the very essence of our humanity. “We can be defined as the mammal that uses the future of the verb ‘to be,’” he explains. The future tense is what gives us hope for the future, and

without it we are all condemned to end “in Hell, that is to say, in a grammar without futures.”

Before you rush to get rid of your psychiatrist and hire a grammarian instead, try this quick reality check. First, on a point of order, one should mention that no one fully understands the niceties of the biblical Hebrew verbal system. There are two main verbal forms in Hebrew, and the difference between them seems to depend on some elusive mix of both tense and what linguists call aspect—the distinction between completed actions (e.g., “I ate”) and ongoing actions (“I was eating”). But let’s even grant for the sake of argument that the Hebrew verb does not express the future tense, or any other tenses at all. Need this absence have any constraining effect on the speakers’ understanding of time, future, and eternity? Here is a verse from a delightful prophecy about impending doom, where a wrathful Jehovah promises his enemies imminent retribution:

לִי נִקְמָה וְשִׁלְמָה לְעֵת תְּמוּט רַגְלָם כִּי קָרוֹב יוֹם אִיְדָם וְהָשׁ עֲתֹדֹת לָמוֹ

Vengeance is mine, and recompense, at the time when their foot **shall slip**; for the day of their calamity is near, and the things to come **hasten** upon them.

(The Song of Moses, Deuteronomy 32:35)

There are two verbs in the Hebrew original, and as it happens, the first, “slip,” is in one of the two main verbal forms I have just mentioned, and the second, “hasten,” is in the other. In the English translation, these two verbs appear in two different tenses: “shall slip” and “hasten.” But while scholars can argue until vengeance comes home whether the difference between the Hebrew verbal forms expresses primarily aspect or tense, does any of this matter two hoots to the meaning of this verse? Would the meaning of the English translation change in any way if we changed the verb “slip” to the present tense: “at the time when their foot *slips*”? And can you detect any nebulousness about the concept of the future in the spine-chilling image of the things to come *hastening* upon the sinners?

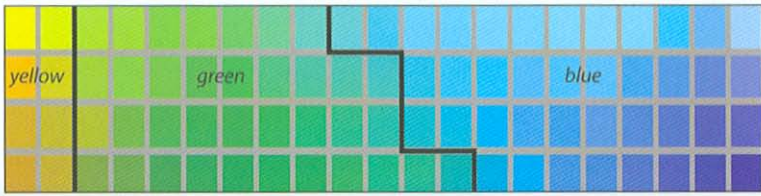
Or think about it another way: when you ask someone, in perfect



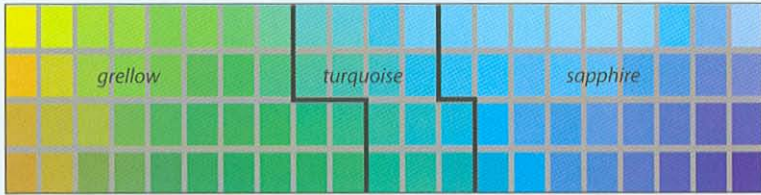
1. A rainbow (see page 17).



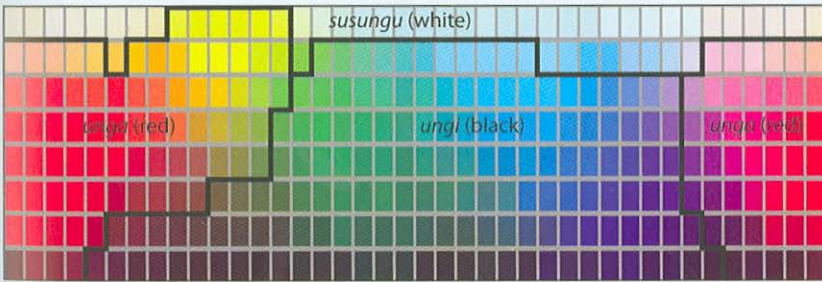
2. Kit of wools for the Holmgren color blindness test (see page 47).



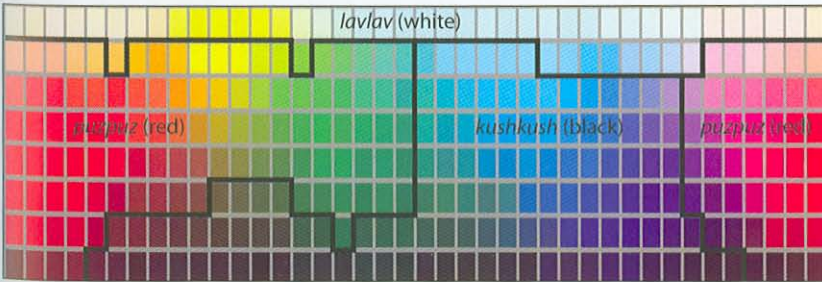
4a. The English colors “yellow,” “green,” and “blue.”



4b. An alternative division: “grellow,” “turquoise,” and “sapphire”
(see page 84).



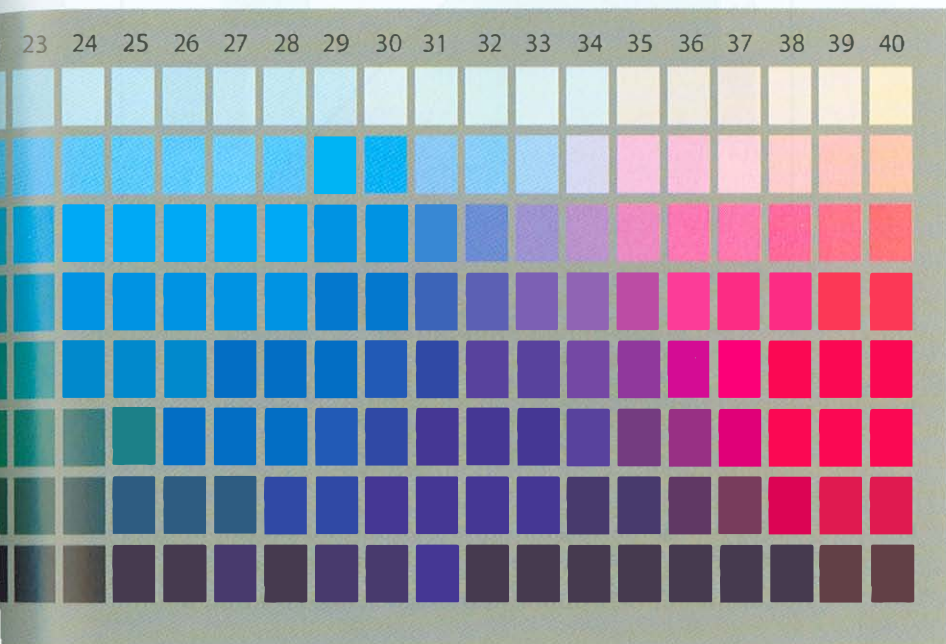
5a. The Bellonese three-color system.



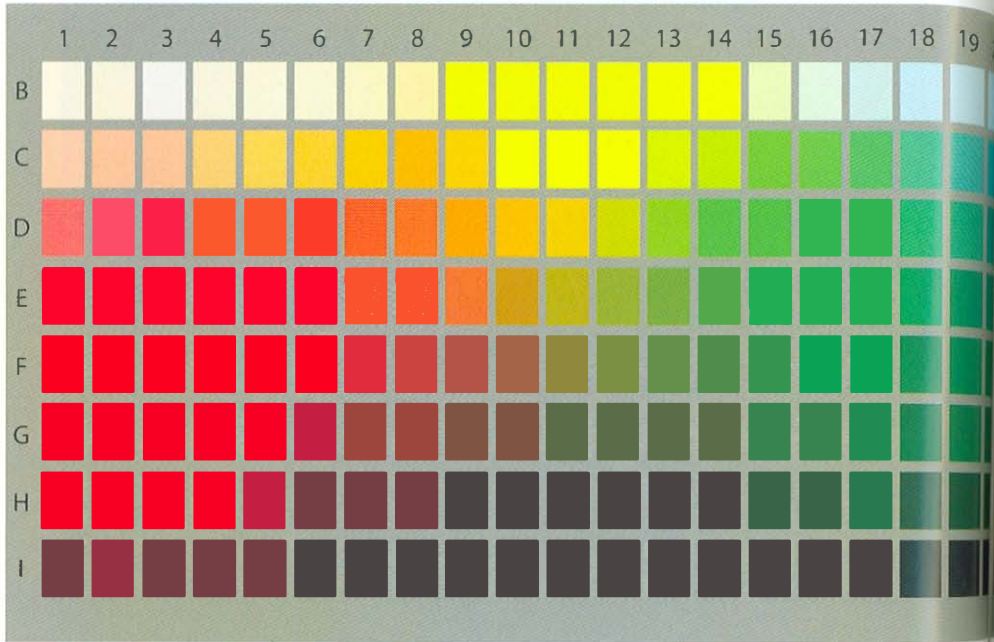
5b. The Ziftish three-color system (see page 84).



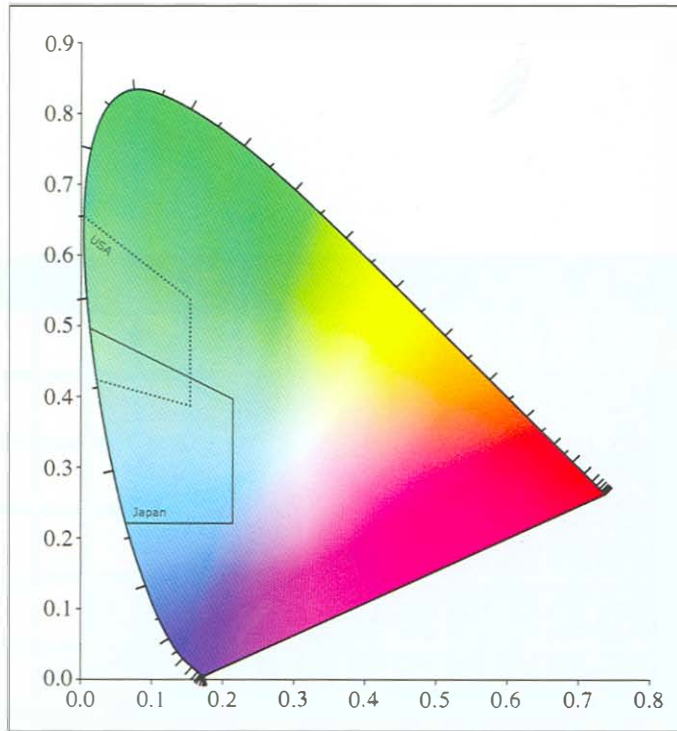
3. 'The difference between these two pictures demonstrates Magnus's revised theory (see page 63). The picture on the top is what Europeans see, and the picture on the bottom is what Magnus argued the ancients would have seen: the red hues are just as vivid, but the cooler colors green and blue are much less so.



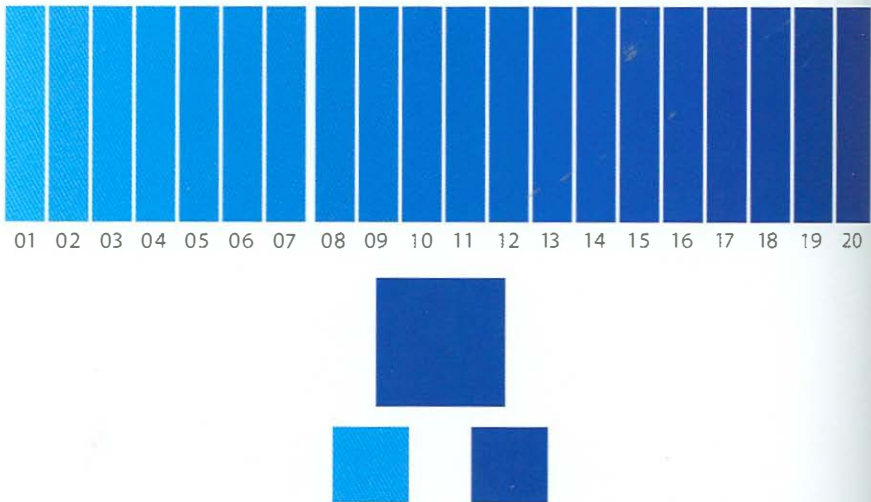
6. The set of 320 colored chips used by Berlin and Kay, in 40 equally spaced hues and 8 degrees of brightness. All chips are at maximum saturation. (See page 85.)



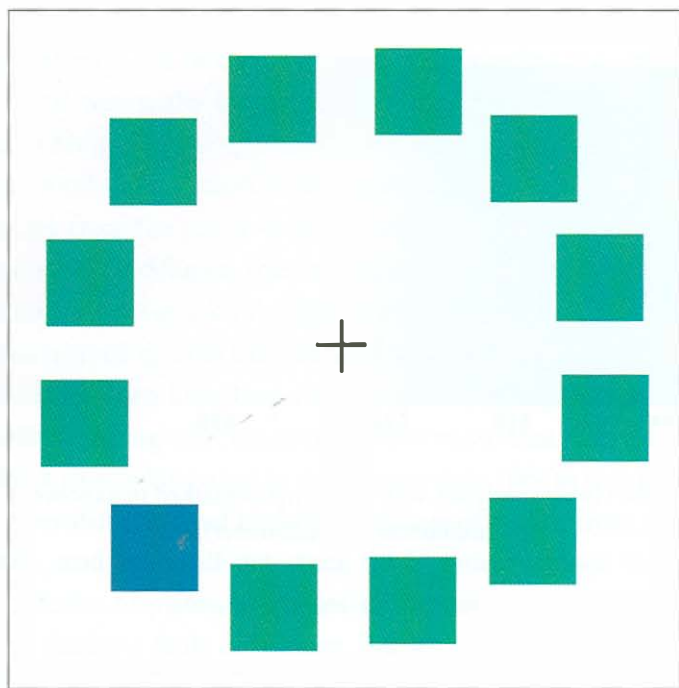
the China three-color system (see page 44)



7. Official specifications for the approved hues of green traffic lights in Japan and the United States, defined as regions of the standard CIE 1931 chromaticity diagram (see page 218).



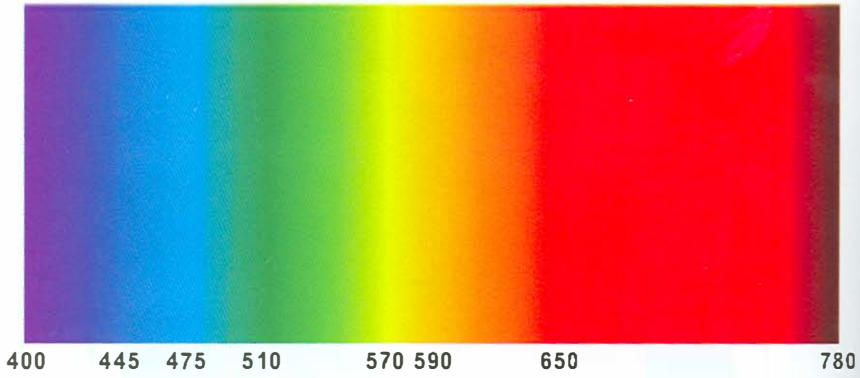
8. The "Russian blues" experiment (see page 222).



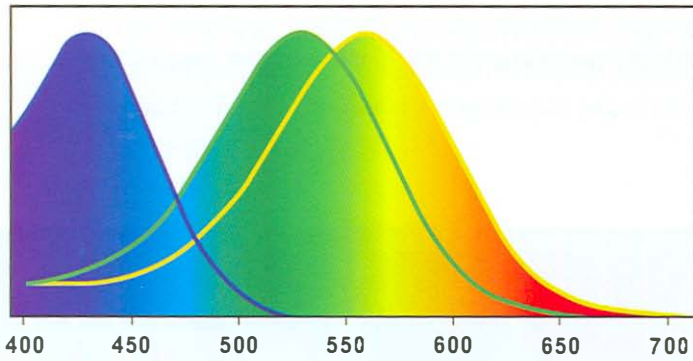
9. Circle of squares in green and blue shades (see page 228).



10. Easy-to-name and difficult-to-name colors in Chinese (see page 230).



11. The visible spectrum, with wavelengths marked in nanometers (millionths of a millimeter).



12. The normalized sensitivity of the short-wave, middle-wave, and long-wave cones as a function of wavelength (see page 243).

English prose and in the present tense, something like “are you coming tomorrow?” do you feel your grasp of the concept of futurity is slipping? Your idea of time changing in manifold reciprocity? The hope and resilience of your spirit and the fabric of your humanity beginning to fail? If Jeremiah were alive today, he might say (or do I mean “he might have said?”): Even the stork in the heavens knows her times. And the turtle-dove, the swallow, and crane keep the time of their coming. But My scholars know not the ordinance of the World.

You may feel you have heard enough about linguistic relativity by now, but let me treat you to one final bit of burlesque. In 1996, the American journal *Philosophy Today* featured an article entitled “Linguistic Relativity in French, English, and German Philosophy” in which the author, William Harvey, asserted that the grammar of French, English, and German can explain the differences between the three philosophical traditions. For example, “English philosophy being largely, according to our thesis, determined by English grammar, we should find it to be, like the language, a fusion of the French and the German.” The point is then proved by showing that English theology (Anglican) is a cross between (French) Catholicism and (German) Protestantism. There are further gems. German’s case system “is part of the explanation for German philosophy’s orientation toward system construction,” whereas “if English thought is in some ways more open to ambiguity and lack of system, it might be attributed in part to the relative variability and looseness of English syntax.”

It might. It might also be attributable to the irregular shape of hot cross buns. More appropriately, however, it should be attributed to the habit of English-language journals to allow the likes of Mr. Harvey free range. (Incidentally, I know that hot cross buns are not particularly irregular. But then again, neither is English syntax particularly “variable and loose.” It is more rigid in its word order, for instance, than German.)

THE PRISON-HOUSE OF LANGUAGE

By far the most famous claim that Nietzsche never made was: “We have to cease to think if we refuse to do so in the prison-house of language.”

What he actually said was: “We cease to think if we do not want to do it under linguistic constraints” (*Wir hören auf zu denken, wenn wir es nicht in dem sprachlichen Zwange thun wollen*). But the English mistranslation has turned into a catchphrase, and as it happens, this phrase neatly summarizes everything that is so wrong about linguistic relativity. For there is one toxic fallacy that runs like quicksilver through all the arguments we have encountered so far, and this is the assumption that the language we happen to speak is a prison-house that limits the concepts we are able to understand. Whether it is the claim that the lack of a tense system constrains speakers’ understanding of time, or the allegation that when a verb and an object are fused together speakers do not understand the distinction between action and thing—what unites all these contentions is a premise that is as crude as it is false, namely that “the limits of my language mean the limits of my world,” that the concepts expressed in a language are the same as the concepts its speakers are able to understand, and that the distinctions made in a grammar are the same as the distinctions the speakers are able to conceive.

It is barely comprehensible that such a ludicrous notion could have achieved such currency, given that so much contrary evidence screams in the face wherever one looks. Do ignorant folk who have never heard of “Schadenfreude” find it difficult to understand the concept of relishing someone else’s misfortune? Conversely, do Germans, whose language uses one and the same word for “when” and “if” (*wenn*), fail to understand the logical difference between what might happen under certain conditions and what will happen regardless? Did the ancient Babylonians, who used the same word (*arnum*) for both “crime” and “punishment,” not understand the difference? If so, why did they write thousands of legal documents, law codes, and court protocols to determine exactly what punishment should be given for what crime?

The list of examples could easily be extended. The Semitic languages require different verbal forms for the masculine and the feminine (“you eat” would have different forms depending on whether you are female or male), whereas English does not make gender distinctions on verbs. George Steiner concludes from this that “an entire anthropology of sexual equality is implicit in the fact that our verbs, in distinction from

those of Semitic tongues, do not indicate the gender of the agent.” Really? There are some languages that are so sexually enlightened that they make no gender distinctions even on pronouns, so that even “he” and “she” are fused into one unisex plastic synthetic creation. Which languages might these be? Turkish, Indonesian, and Uzbek, to name a few examples—not exactly languages of societies renowned for their anthropology of sexual equality.

Of course, no list of such blunders could be complete without George Orwell’s novel *1984*, where the political rulers have such faith in the power of language that they assume political dissent could be entirely eliminated if only all offending words could be expunged from the vocabulary. “In the end we shall make thoughtcrime literally impossible, because there will be no words in which to express it.” But why stop there? Why not abolish the word “greed” as a quick fix for the world’s economy, or do away with the word “pain” to save billions on aspirin, or confine the word “death” to the garbage can as an instant formula for universal immortality?



My ultimate aim, proclaimed earlier on, was to convince you that there might after all be something worth salvaging from the idea that our mother tongue can influence our thoughts and perceptions. This aim may now seem more like a suicide mission. But although the prospects for linguistic relativity do not look terribly promising right at the moment, the good news is that, having reached the intellectual nadir, things can only look up from here. In fact, the bankruptcy of Whorfianism has been beneficial for the progress of science, because by setting such an appalling example it has exposed the two cardinal errors that any responsible theory about the influence of language on thought must avoid. First, Whorf’s addiction to fantasies unfettered by facts has taught us that any alleged influence of a language on speakers’ minds must be demonstrated, not just assumed. One cannot just say “language X does things differently from language Y, and *hence* speakers of X must think differently from speakers of Y.” If there are reasons to suspect that speakers of X might think differently from speakers of Y, this has to be shown empir-

ically. In fact, even that is not quite enough, since when differences in thought patterns can be demonstrated, a convincing case still has to be made that it was really language that *caused* these differences, rather than other factors in the speakers' cultures and environments.

The second major lesson from the errors of Whorfianism is that we must escape from the prison-house of language. Or rather, what we must escape from is the delusion that language is a prison-house for thought—that it constrains its speakers' ability to reason logically and prevents them from understanding ideas that are used by speakers of other languages.

Of course, when I say that a language does not prevent its speakers from understanding any concepts, I do not mean that one can talk about any subject in any language in its current state. Try to translate a dishwasher operating manual into the language of a tribe from the Papuan highlands, and you will get stuck fairly quickly, since there are no words for forks, or plates, or glasses, or buttons, or soap, or rinsing programs, or flashing fault indicators. But it's not the deep nature of the language that prevents the Papuans from understanding such concepts; it's simply the fact that they are not acquainted with the relevant cultural artifacts. Given enough time, you could perfectly well explain all these things to them in their mother tongue.

Likewise, try to translate an introduction to metaphysics or to algebraic topology or, for that matter, many passages of the New Testament into our Papuan language, and you are unlikely to get very far, because you will not have words equivalent to most of the abstract concepts that are required. But again, you could create the vocabulary for such abstract concepts in any language, either by borrowing it or by extending the use of existing words to abstract senses. (European languages used both strategies.) These brave claims about the theoretical possibility of expressing complex ideas in any language are not merely wishful thinking; they have been proved countless times in practice. Admittedly, the experiment has not been conducted so often with dishwasher manuals or with metaphysics textbooks, but it has been conducted very often with the New Testament, which contains theological and philosophical arguments on extremely high levels of abstraction.

And if you are still tempted by the theory that the inventory of

ready-made concepts in our mother tongue determines the concepts we are able to understand, then just ask yourself how one would ever manage to learn any new concepts if that theory were true. Take this example. If you are not a professional linguist, the word “factivity” will probably not be part of your language. But does this mean that your mother tongue (ordinary English, that is) precludes you from understanding the distinction between “factive” and “non-factive” verbs? Let’s see. The verbs “realize” and “know,” for example, are called “factive,” because if you say something like “Alice realized that her friends had left,” you are implying that what Alice realized was a true fact. (So it would be very odd to say “Alice realized that her friends had left, but in fact they hadn’t.”) On the other hand, non-factive verbs such as “assume” do not imply a true fact: when you say “Alice assumed that her friends had left,” you can continue equally naturally with either “and indeed they had” or “but in fact they hadn’t.” So there we are. I have just explained a new and highly abstract concept to you, factivity, that was not part of your language before. Was your mother tongue a barrier?

Since there is no evidence that any language forbids its speakers from thinking anything, as Humboldt himself recognized two hundred years ago, the effects of the mother tongue cannot be sought in what different languages *allow* their speakers to think. But where then? Humboldt went on to say, in somewhat mystical terms, that languages nevertheless differ in what they “encourage and stimulate to do from their own inner force.” He seems to have had the right sort of intuition, but he was clearly struggling to pin it down and never managed to get beyond the metaphors. Can we turn his hazy imagery into something more transparent?

I believe we can. But to do so, we need to abandon the so-called Sapir-Whorf hypothesis, the assumption that languages limit their speakers’ ability to express or understand concepts, and turn instead to a fundamental insight that can be dubbed the Boas-Jakobson principle.

FROM SAPIR-WHORF TO BOAS-JAKOBSON

We have already encountered the anthropologist Franz Boas as the person who introduced Edward Sapir to the study of Native American



Franz Boas, 1858–1942



Roman Jakobson, 1896–1982

languages. In 1938, Boas made an acute observation about the role of grammar in language. He wrote that, in addition to determining the relationship between the words in a sentence, “grammar performs another important function. It determines those aspects of each experience that *must* be expressed.” And he went on to explain that such obligatory aspects vary greatly between languages. Boas’s observation was rather inconspicuously placed in a little section about “grammar” within a chapter entitled “Language” within an introduction to *General Anthropology*, and its significance does not seem to have been fully appreciated until two decades later, when the Russian-American linguist Roman Jakobson encapsulated Boas’s insight into a pithy maxim: “Languages differ essentially in what they *must* convey and not in what they *may* convey.” The crucial differences between languages, in other words, are not in what each language allows its speakers to express—for in theory any language could express anything—but in what information each language obliges its speakers to express.

Jakobson gives the following example. If I say in English, “I spent yesterday evening with a neighbor,” you may well wonder whether my companion was male or female, but I have the right to tell you politely that it’s none of your business. But if we are speaking French or German or Russian, I don’t have the privilege to equivocate, because I am obliged by the language to choose between *voisin* or *voisine*, *Nachbar* or *Nachbarin*, *sosed* or *sosedka*. So French, German, and Russian would compel

me to inform you about the sex of my companion whether or not I felt it was your business. This does not mean, of course, that English speakers are oblivious to the differences between evenings spent with male or female neighbors. Nor does it mean that English speakers cannot express the distinction should they want to. It only means that English speakers are not obliged to specify the sex each time the neighbor is mentioned, while speakers of some languages are.

On the other hand, English does oblige you to specify certain bits of information that can be left to the context in some other languages. If I want to tell you in English about a dinner with my neighbor, I may not have to tell you the neighbor's sex, but I do have to tell you something about the timing of the event: I have to decide whether we *dined*, *have been dining*, *are dining*, *will be dining*, and so on. Chinese, on the other hand, does not oblige its speakers to specify the exact time of the action each time they use a verb, because the same verbal form can be used for past or present or future actions. Again, this does not mean that Chinese speakers are unable to express the time of the action if they think it is particularly relevant. But as opposed to English speakers, they are not obliged to do so every time.

Neither Boas nor Jakobson was highlighting such grammatical differences in relation to the influence of language on the mind. Boas was concerned primarily with the role that grammar plays in language, and Jakobson was dealing with the challenges that such differences pose for translation. Nevertheless, it seems to me that the Boas-Jakobson principle is the key to unlocking the actual effects of a particular language on thought. If different languages influence their speakers' minds in varying ways, this is not because of what each language allows people to think but rather because of the kinds of information each language habitually obliges people to think *about*. When a language forces its speakers to pay attention to certain aspects of the world each time they open their mouths or prick up their ears, such habits of speech can eventually settle into habits of mind with consequences for memory, or perception, or associations, or even practical skills.

If this all still sounds a little too abstract, then the contrast between the Sapir-Whorf hypothesis and the Boas-Jakobson principle can be

brought into focus with another example. Chinese may seem to us rather lax in allowing its speakers to equivocate about the time of the action, but just try to imagine what a speaker of Matses from Peru might feel upon hearing about the incredibly crude and careless tense distinctions of English.

The Matses are a 2,500-strong tribe, and they live in the tropical rain forest along the Javari River, a tributary of the Amazon. Their language, which was recently described by the linguist David Fleck, compels them to make distinctions of mind-blowing subtlety whenever they report events. To start with, there are three degrees of pastness in Matses: you cannot just say that someone “passed by there”; you have to specify with different verbal endings whether this action took place in the recent past (roughly up to a month), distant past (roughly from a month to fifty years), or remote past (more than fifty years ago). In addition, the verb has a system of distinctions that linguists call “evidentiality,” and as it happens, the Matses system of evidentiality is the most elaborate that has ever been reported for any language. Whenever Matses speakers use a verb, they are obliged to specify—like the finickiest of lawyers—exactly how they came to know about the facts they are reporting. The Matses, in other words, have to be master epistemologists. There are separate verbal forms depending on whether you are reporting direct experience (you saw someone passing by with your own eyes), something inferred from evidence (you saw footprints on the sand), conjecture (people always pass by at that time of day), or hearsay (your neighbor told you he had seen someone passing by). If a statement is reported with the incorrect evidentiality form, it is considered a lie. So if, for instance, you ask a Matses man how many wives he has, unless he can actually see his wives at that very moment, he would answer in the past tense and would say something like *daəd ikoşh*: “two there were [directly experienced recently].” In effect, what he would be saying is, “There were two last time I checked.” After all, given that the wives are not present, he cannot be absolutely certain that one of them hasn’t died or run off with another man since he last saw them, even if this was only five minutes ago. So he cannot report it as a certain fact in the present tense.

But finding the right verbal form for directly experienced events is

child's play compared with the hairsplitting precision required when you report an event that has only been inferred. Here, Matses obliges you to specify not just how long ago you assume the event occurred but also how long ago you made the inference. Suppose you saw wild pigs' footprints on the ground somewhere outside the village, and you want to tell your friends that the animals passed by at that place. In English, saying "wild pigs passed by there" is exactly as much information as you have to specify. But in Matses, you have to reveal both how long ago you found out about the event (that is, how long ago you saw the footprints) and how long before that you think the event itself (pigs passing by) actually occurred. For example, if a short time ago you discovered tracks that were still fresh, you assume that the wild pigs passed by only shortly before you saw the tracks, so you would have to say:

kuen-ak-o-ṣh

passed by-HAPPENED SHORTLY BEFORE EXPERIENCED-EXPERIENCED RECENTLY-they

"they passed by" (I found out a short time ago, it had happened shortly before that)

If a short time ago you discovered tracks that were already old, you would have to say:

kuen-nēdak-o-ṣh

passed by-HAPPENED LONG BEFORE EXPERIENCED-EXPERIENCED RECENTLY-they

"they passed by" (I found out a short time ago, it had happened long before that)

If a long time ago you discovered tracks that were still fresh, you would have to say:

kuen-ak-onda-ṣh

passed by-HAPPENED SHORTLY BEFORE EXPERIENCED-EXPERIENCED LONG AGO-they

"they passed by" (I found out long ago, it had happened shortly before that)

And if a long time ago you discovered old tracks:

kuen-nēdak-onda-ṣh

passed by-HAPPENED LONG BEFORE EXPERIENCED-EXPERIENCED LONG AGO-they

"they passed by" (I found out long ago, it had happened long before that)

The Matses system is outlandish by any stretch of the imagination, and nothing quite as elaborate has yet been found elsewhere. Matses shows just how fundamentally languages can vary in the kinds of information they oblige their speakers to convey. But the weirdness of Matses also helps to clarify exactly where credible influences of language on thought may and may not be sought. One shudders to think what Whorf would have made of the Matses language if information about it had fallen into his hands, or, for that matter, what a Whorfian among the Matses would make of the unfathomable vagueness of English verbs. "I find it gratuitous to assume," such a Matses sage would say, "that an American who knows only the English language and the cultural ideas of his own society can have a proper grasp of epistemology. English speakers simply would not be able to understand the difference between directly experienced events and merely inferred facts, because their language imposes on them a monistic view of the universe that blends the event with how it was experienced into one plastic synthetic creation."

But this is gobbledygook, because we have no problems understanding the Matses distinctions, and if we are so minded we can easily express them in English: "I saw with my own eyes a short time ago that . . .," "I inferred a long time ago that . . .," "I guessed a very long time ago that . . .," and so on. When this kind of information is felt to be particularly relevant, for instance in the witness box, English speakers routinely use such expressions. The only real difference between English and Matses, therefore, is that Matses *forces* its speakers to supply all this information whenever they describe an event, whereas English does not.

Whether the requirement to specify evidentiality translates into habits of mind that affect more than language is something that no one has yet studied empirically. But all the credible claims from recent years

about the influence of a particular language on thought run on similar lines. No one (in his or her right mind) would argue nowadays that the structure of a language limits its speakers' understanding to those concepts and distinctions that happen to be already part of the linguistic system. Rather, serious researchers have looked for the consequences of the *habitual* use from an early age of certain ways of expression. For example, does the need to pay constant attention to certain aspects of experience train speakers to be especially sensitive to certain details or induce particular types of memory patterns and associations? These are exactly the questions we shall explore in the next chapters.

For some critics, such as Steven Pinker, the fact that our mother tongue constrains neither our capacity to reason logically nor our ability to understand complex ideas is an irredeemable anticlimax. In his recent book, *The Stuff of Thought*, Pinker argues that since no one has ever managed to show that speakers of one language find it impossible, or even extremely difficult, to reason in a particular way that comes naturally to the speakers of another language, then any remaining effects of language on thought are mundane, unsexy, boring, even trivial. Obviously, what's sexy is a matter of personal taste. But in what follows, I hope to show that while the actual effects of language on thought are very different from the wild and woolly claims of the past, they are far from boring, mundane, or trivial.

Where the Sun Doesn't Rise in the East

DRESSED FOR DINNER

The Guugu Yimithirr language has one famous claim to fame, and is consequently celebrated throughout the wide world of trivial pursuits. The story runs roughly like this. In July 1770, Captain Cook's *Endeavour* was grounded off the northeastern coast of Australia, near the mouth of a river soon to be named Endeavour, in a place that was later to become Cooktown. During the weeks when the ship was being repaired, Captain Cook and his crew made contact with the native population of the continent, both human and marsupial. With the former, relations were at first rather cordial. Cook writes in his diary on July 10, 1770: "In the A.M. four of the Natives came down to the Sandy point on the North side of the Harbour, having along with them a small wooden Canoe with Outriggers, in which they seem'd to be employed striking fish. They were wholly naked, their Skins the Colour of Wood soot. Their Hair was black, lank, and cropt short, and neither wooly nor Frizled. Some part of their Bodys had been painted with red, and one of them had his upper lip and breast painted with Streakes of white. Their

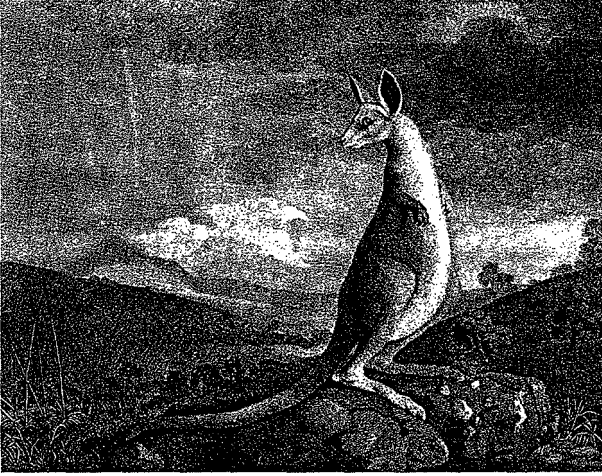
features were far from being disagreeable; their Voices were soft and Tunable.”

The other natives were treated with somewhat less respect. In the *Account of the Voyages*, which was based on the diaries of Cook and his officers, we read the following description for what unfolded later that week: “Mr. Gore, who went out this day with his gun, had the good fortune to kill one of the animals which had been so much the subject of our speculation. . . . The head, neck, and shoulders, are very small in proportion to the other parts of the body; the tail is nearly as long as the body, thick near the rump, and tapering towards the end: the fore-legs of this individual were only eight inches long, and the hind-legs two and twenty: its progress is by successive leaps or hops, of a great length, in an erect posture; the skin is covered with a short fur, of a dark mouse or grey colour, excepting the head and ears, which bear a slight resemblance to those of a hare. This animal is called by the natives *Kanguroo*. The next day, our Kanguroo was dressed for dinner, and proved most excellent meat.”

The *Endeavour* returned to England the following year with the skins of two kangaroos, and the animal painter George Stubbs was commissioned to do a likeness. Stubbs’s kangaroo immediately caught the public’s imagination, and the animal shot into celebrity. Eighteen years later, the excitement reached fever pitch when the first living specimen, “the wonderful Kanguroo from Botany Bay,” arrived in London and was displayed in the Haymarket. English thus gained its first word of Australian aboriginal origin, and as the fame of the animal spread to other countries, “kangaroo” became the most prominent feature of international vocabulary that was exported by a native language of Australia.

Or was it?

While the kangaroo’s enduring popularity in the Old World was not a matter for doubt, the authenticity of the word’s roots in Australia soon came under suspicion. For when later Australian explorers spotted the animal in other parts of the continent, the local Aborigines never came up with anything remotely similar to “kangaroo.” Natives the length and breadth of Australia didn’t even recognize the word, and some of them actually assumed they were being taught the English name for the animal when they heard it. Since many different native



George Stubbs's *The Kongouro from New Holland*, 1772

languages were spoken across the continent, the fact that the Aborigines in other parts of Australia did not recognize the word was not, in itself, so suspicious. But most damaging to the credibility of “kangaroo” was the report of another explorer, Captain Philip Parker King, who visited the mouth of the very same Endeavour River in 1820, fifty years after Cook had left. When Captain King asked the Aborigines he met there what the animal was called, he was given a completely different name from what Cook had recorded. King transcribed the name in his own diary as “minnar” or “meenuah.”

So who were those natives with voices soft and tunable who had given Cook the word “kanguroo” in 1770, and what was their language? Or had Cook simply been duped? By the mid-nineteenth century, skepticism about the authenticity of the word was rife. In 1850, John Crawfurd, a distinguished Orientalist and Stamford Raffles’s successor as the resident of Singapore, wrote in the *Journal of the Indian Archipelago and Eastern Asia* that “it is very remarkable that this word, supposed to be Australian, is not to be found as the name of this singular marsupial animal in any language of Australia. Cook and his companions, therefore, when they gave it this name, must have made some mistake, but of what nature cannot be conjectured.” Myths and legends of all kinds soon spread. The most famous version, beloved of comedians

unto this day, is that “kangaroo” was the phrase for “I don’t understand,” the answer allegedly given by the bemused natives to Cook’s question “What is this animal called?”

More responsible lexicographers elected to remain cautious, and the *Oxford English Dictionary* hedges with appropriate elegance in the following definition, which—at the time I’m writing—still appears in the online edition: “Kangaroo: stated to have been the name in a native Australian language. Cook and Banks believed it to be the name given to the animal by the natives at Endeavour River, Queensland.”

The mystery from Down Under was eventually resolved in 1971, when the anthropologist John Haviland began an intensive study of Guugu Yimithirr, a language spoken by an aboriginal community of about a thousand people who these days live some thirty miles north of Cooktown, but who previously occupied the territory near the Endeavour River. Haviland found that there is one particular type of large gray kangaroo whose name in Guugu Yimithirr is *gangurru*. The paternity of the name could thus no longer be in doubt. But if so, why wasn’t Captain King given the same name by the speakers of the same language when he visited in 1820? As it happens, the large gray *gangurru* that Cook’s party spotted is only rarely seen near the coast, so King probably pointed at a different type of kangaroo, which has a different name in Guugu Yimithirr. But we will never know which type of kangaroo it was that King saw, because the word he recorded, “minnar” or “meenuah,” was no doubt *minha*, the general term that means “meat” or “edible animal.”

So Captain Cook was not duped. His linguistic observations are now rehabilitated, and in consequence, Guugu Yimithirr, the language that bequeathed to international vocabulary its most famous aboriginal icon, has won a place in the hearts and minds of trivia addicts all over the world.

EGOCENTRIC AND GEOGRAPHIC COORDINATES

“Then would you read a Sustaining Book, such as would help and comfort a Wedged Bear in Great Tightness?” So for a

week Christopher Robin read that sort of book at the North end of Pooh, and Rabbit hung his washing on the South end.
("Pooh Goes Visiting and Pooh and Piglet Nearly Catch a Woozle")

There is an even better reason why Guugu Yimithirr deserves to be famous, but this reason is unknown even to the most avid trainspotters and is confined to the circles of professional linguists and anthropologists. The name of the language Guugu Yimithirr means something like "this kind of language" or "speaking this way" (*guugu* is "language," and *yimi-thirr* means "this way"), and this name is rather apt since Guugu Yimithirr has a manner of talking about spatial relations that is decidedly out of this way. Its method of describing the arrangements of objects in space sounds almost incredibly odd to us, and when these peculiarities in Guugu Yimithirr were uncovered they inspired a large-scale research project into the language of space. The findings from this research have led to a fundamental revision of what had been assumed to be universal properties of human language, and have also supplied the most striking example so far of how our mother tongue can affect the way we think.

Suppose you want to give someone driving directions for getting to your house. You might say something like: "Just after the traffic lights, take the first left and continue until you see the supermarket on your left, then turn right and drive to the end of the road, where you'll see a white house right in front of you. Our door is the one on the right." You could, in theory, also say the following: "Just to the east of the traffic lights, drive north and continue until you see a supermarket in the west. Then drive east, and at the end of the road you'll see a white house directly to the east. Ours is the southern door." These two sets of directions are equivalent in the sense that they describe the same route, but they rely on different systems of coordinates. The first system uses *egocentric* coordinates, whose two axes depend on our own body: a left-right axis and a front-back axis orthogonal to it. This coordinate system moves around with us wherever we turn. The axes always shift together with our field of vision, so that what is in the front becomes behind if we turn around, what was on our right is now on the left. The second

system of coordinates uses fixed geographic directions, which are based on the compass directions North, South, East, and West. These directions do not change with your movements—what is to your north remains exactly to your north no matter how often you twist and turn.

Of course, the egocentric and geographic systems do not exhaust the possibilities of talking about space and giving spatial directions. One could, for example, just point at a particular direction and say “go that way.” But for simplicity, let’s concentrate on the differences between the egocentric and the geographic systems. Each system of coordinates has advantages and disadvantages, and in practice we use both in our daily lives, depending on their appropriateness to the context. It would be most natural to use cardinal directions when giving instructions for hiking in the open countryside, for example, or more generally for talking about large-scale orientation. “Oregon is north of California” is more natural than “Oregon is to the right of California if you’re facing the sea.” Even inside some cities, especially those with clear geographic axes, people use fixed geographic concepts such as “uptown” or “downtown.” But on the whole, when giving driving or walking directions in town, it is far more usual to use the egocentric coordinates: “turn left, then take the third right,” and so on. The egocentric coordinates are even more dominant when we describe small-scale spaces, especially inside buildings. The geographic directions may not be entirely absent (real estate agents may wax lyrical about south-facing living rooms, for instance), but this usage is at best marginal. Just think how ridiculous it would be to say “When you get out of the elevator, walk south and then take the second door to the east.” When Pooh gets wedged in Rabbit’s front doorway and is forced to remain there for a whole week to reduce his girth, A. A. Milne refers to the “North end” and “the South end” of Pooh and thereby highlights the desperate fixity of his predicament. But think how absurd it would be for an aerobic trainer or a ballet teacher to say “now raise your north hand and move your south leg eastward.”

Why does the egocentric system feel so much easier and more natural to handle? Simply because we always know where “in front of” us is

and where “behind” and “left” and “right” are. We don’t need a map or a compass to work this out, we don’t need to look at the sun or the North Star, we just feel it, because the egocentric system of coordinates is based directly on our own body and our immediate visual field. The front-back axis cuts right between our two eyes: it is a long imaginary line that extends straight from our nose into the distance and which turns with our nose and eyes wherever and whenever they turn. And likewise, the left-right axis, which cuts through our shoulders, always obligingly adapts itself to our own orientation.

The system of geographic coordinates, on the other hand, is based on external concepts that do not adapt themselves to our own orientation and that need to be computed (or remembered) from the position of the sun or the stars or from features of the landscape. So on the whole, we revert to the geographic coordinates only when we really need to do so: if the egocentric system is not up for the task or if the geographic directions are specifically relevant (for instance, in evaluating the merits of south-facing rooms).

Indeed, philosophers and psychologists from Kant onwards have argued that all spatial thinking is essentially egocentric in nature and that our primary notions of space are derived from the planes that go through our bodies. One of the trump arguments for the primacy of the egocentric coordinates was of course human language. The universal reliance of languages on the egocentric coordinates, and the privileged position that all languages accord the egocentric coordinates over all other systems, was said to parade before us the universal features of the human mind.

But then came Guugu Yimithirr. And then came the astounding realization that those naked Aborigines who two centuries ago gave the kangaroo to the world had never heard of Immanuel Kant. Or at least they had never read his famous 1768 paper on the primacy of the egocentric conception of space to language and mind. Or at the very least, if they had read it, they never got round to applying Kant’s analysis to their language. As it turns out, their language does not make any use of egocentric coordinates at all!

CRYING NOSE TO THE SOUTH

In retrospect, it seems almost a miracle that when John Haviland started researching Guugu Yimithirr in the 1970s, he could still find anyone who spoke the language at all. For the Aborigines' brush with civilization was not entirely conducive to the conservation of their language.

After Captain Cook departed in 1770, the Guugu Yimithirr were at first spared intense contact with Europeans, and for a whole century were largely left to their own devices. But when the forces of progress eventually did arrive, they came with lightning speed. Gold was discovered in the area in 1873, not far from the spot where Cook's *Endeavour* had once moored, and a town named after Cook was founded—quite literally—overnight. One Friday in October 1873, a ship full of prospectors sailed into a silent, lonely, distant river mouth. And on the Saturday, as one of the travelers later described, “we were in the middle of a young diggings township—men hurrying to and fro, tents rising in all directions, the shouts of sailors and labourers landing more horses and cargo, combined with the rattling of the donkey-engine, cranes and chains.” Following in the footsteps of the diggers, farmers started taking up properties along the Endeavour River. The prospectors needed land for mining, and the farmers needed the land and the water holes for their cattle. In the new order, there was not much space left for the Guugu Yimithirr. The farmers resented their burning of grass and chasing the cattle away from the water holes, so the police were employed to remove the natives from the settlers' land. The Aborigines reacted with a certain degree of antagonism, and this in turn provoked the settlers to a policy of extermination. Less than a year after Cooktown was founded, the *Cooktown Herald* explained in an editorial that “when savages are pitted against civilisation, they must go to the wall; it is the fate of their race. Much as we may deplore the necessity for such a state of things, it is absolutely necessary, in order that the onward march of civilisation may not be arrested by the antagonism of the aboriginals.” The threats were not empty, for the ideology was carried out through a policy of

“dispersion,” which meant shooting aboriginal camps out of existence. Those natives who had not been “dispersed” either retreated in isolated bands into the bush or were drawn to the town, where they were reduced to drink and prostitution.

In 1886, thirteen years after Cooktown was founded, Bavarian missionaries established a Lutheran mission at Cape Bedford, to the north of the town, to try to salvage the wrecked souls of the lost pagans. Later, the mission moved to a place christened Hopevale, farther inland. The mission became a sanctuary for the remaining Aborigines from the entire region and beyond. Although people speaking many different aboriginal languages were brought to Hopevale, Guugu Yimithirr was dominant and became the language of the whole community. A Mr. Schwarz, the head of the mission, translated the Bible into Guugu Yimithirr, and although his command of the language was moderate, his faulty Guugu Yimithirr eventually became enshrined as a kind of “church language,” which people can’t easily understand but which enjoys an aura much like that of the English of the King James Bible.

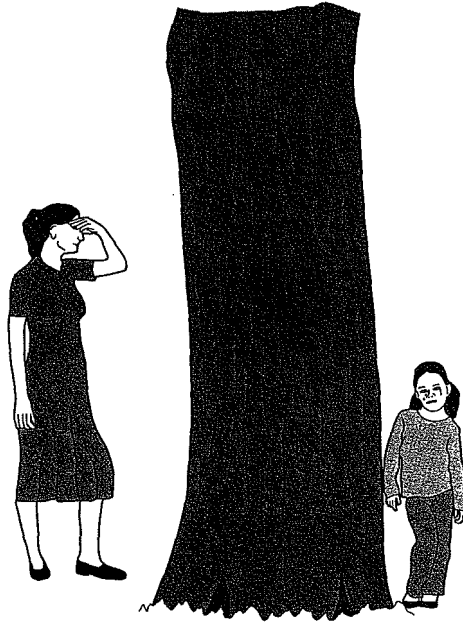
In the following decades, the mission underwent further trials and tribulations. During World War II, the whole community was forcefully relocated to the south, and the septuagenarian missionary Schwarz, who had arrived in Cooktown aged nineteen and had lived among the Guugu Yimithirr for half a century, was interred as an enemy alien. And yet, defying the odds, the Guugu Yimithirr language somehow refused to give up the ghost. Well into the 1980s, there were still some older men around who spoke an authentic version of the language.

Haviland discovered that Guugu Yimithirr, as spoken by the older generation, does not have words for “left” or “right” as directions at all. Even more strangely, it does not even use terms such as “in front of” or “behind” to describe the position of objects. Whenever we would use the egocentric system, the Guugu Yimithirr use the four cardinal directions: *gungga* (North), *jiba* (South), *guwa* (West), and *naga* (East). (In practice, their directions are slightly skewed from the compass North, by about 17 degrees, but this is of not much consequence to our present concerns.)

If Guugu Yimithirr speakers want someone to move over in a car to make room, they will say *naga-naga manaayi*, which means “move a bit to the east.” If they want to tell you to move a bit back from the table, they will say *guwa-gu manaayi*, “move a bit to the west.” It is even unusual to say only “move a bit that way” in Guugu Yimithirr. Rather, one has to add the correct direction “move a bit that way to the south.” Instead of saying that John is “in front of the tree,” they would say, “John is just north of the tree.” If they want to tell you to take the next left turn, they would say, “go south here.” To tell you where exactly they left something in your house, they would say, “I left it on the southern edge of the western table.” To tell you to turn off the camping stove, they would say, “turn the knob east.”

In the 1980s, another linguist, Stephen Levinson, also came to Hopevale, and he describes some of his outlandish experiences with Guugu Yimithirr direction giving. One day, while he was trying to film the poet Tulo telling a traditional myth, Tulo suddenly told him to stop and “look out for that big ant just north of your foot.” In another instance, a Guugu Yimithirr speaker called Roger explained where frozen fish could be found in a shop some thirty miles away. You will find them “far end this side,” Roger said, gesturing to his right with two flicks of the hand. Levinson assumed that the movement indicated that when one entered the shop the frozen fish were to be found on the right-hand side. But no, it turned out that the fish were actually on the left when you entered the shop. So why the gesture to the right? Roger was not gesturing to the right at all. He was pointing to the northeast, and expected his hearer to understand that when he went into the shop he should look for the fish in the northeast corner.

It gets curiouser. When older speakers of Guugu Yimithirr were shown a short silent film on a television screen and then asked to describe the movements of the protagonists, their responses depended on the orientation of the television when they were watching. If the television was facing north and a man on the screen appeared to be approaching, the older men would say that the man was “coming northward.” One younger man then remarked that you always know which way the TV was facing when the old people tell the story.



The same reliance on geographic directions is maintained even when speakers of Guugu Yimithirr are asked to describe a picture inside a book. Suppose the book is facing top side north. If a man is shown standing to the left of a woman, speakers of Guugu Yimithirr would say, “the man is to the west of the woman.” But if you rotate the book top side east, they will say, about exactly the same picture, “the man is to the north of the woman.” Here, for instance, is how one Guugu Yimithirr speaker described the above picture (guess which way he was facing): *bula gabiir gabiir*, “two girls,” *nyulu nubuun yindu buthiil naga*, “the one has nose to the east,” *nyulu yindu buthiil jibaarr*, “the other nose to the south,” *yugu gaarbaarr yuulili*, “a tree stands in between,” *buthiil jibaarr nyulu baajiljil*, “she’s crying nose to the south.”

If you are reading a book facing north, and a Guugu Yimithirr speaker wants to tell you to skip ahead, he will say, “go further east,” because the pages are flipped from east to west. If you are looking at it facing south, the Guugu Yimithirr will of course say, “go further west.” They even dream in cardinal directions. One person explained how he

entered heaven in a dream, going northward, while the Lord was coming toward him southward.

There are words for “left hand” and “right hand” in Guugu Yimithirr. But they are used only to refer to the inherent properties of each hand (for instance, to say “I can lift this with my right hand but not with my left hand”). Whenever the *position* of a hand in any particular moment is to be indicated, an expression such as “hand on the western side” is used.

In our language, the coordinates rotate with us whenever and wherever we turn. For the Guugu Yimithirr, the axes always remain constant. One way of visualizing this difference is to think of the two options on the displays of satellite navigation systems. Many of these gadgets let you choose between a “north up” and a “driving direction up” display. In the “driving direction up” mode, you always see yourself moving directly upwards on the screen, but the streets around you keep rotating as you turn. In the “north up” mode, the streets always stay in the same position, but you see the arrow representing you turning in different directions, so that if you are driving south, the arrow will be moving downwards. Our linguistic world is primarily in the “driving direction up” mode, but in Guugu Yimithirr one speaks exclusively in the “north up” mode.

A CRUMB ON YOUR SEAWARD CHEEK

The first reaction to these reports would be to dismiss them as an elaborate practical joke played by bored Aborigines on a few gullible linguists, not unlike the tall stories of sexual liberation that were told to the anthropologist Margaret Mead by adolescent Samoan girls in the 1920s. The Guugu Yimithirr may not have heard of Kant, but they somehow must have got their hands on *My Adventures on the Remote Island of Zift* and decided to invent something that would out-nonsense even the Ziftish concepts “bose” and “rird.” But how on earth did they manage to conjure up something so utterly unlikely and at odds with the rest of the world?

Well, it turns out that Guugu Yimithirr is not quite as unusual as

one might imagine. Once again, we have simply mistaken the familiar for the natural: the egocentric system could be paraded as a universal feature of human language only because no one had bothered to examine in depth those languages that happen to do things differently. In retrospect, it seems strange that such a striking feature of many languages could have gone unnoticed for such a long time, especially since clues had been littering the academic literature for a while. References to unusual ways of talking about space (such as “your west foot” or “could you pass me the tobacco there to the east”) appeared in reports about various languages around the world, but it was not clear from them that such unusual expressions went beyond the occasional oddity. It took the extreme case of Guugu Yimithirr to inspire a systematic examination of the spatial coordinates in a large range of languages, and only then did the radical divergence of some languages from what had previously been considered universal and natural start sinking in.

To begin with, in Australia itself the reliance on geographic coordinates is very common. From the Djaru language of Kimberley in Western Australia, to Warlbiri, spoken around Alice Springs, to Kayardild, once spoken on Bentinck Island in Queensland, it seems that most Aborigines speak (or at least used to speak) in a distinctly Guugu Yimithirr style. Nor is this peculiar way merely an antipodean aberration: languages that rely primarily on geographic coordinates turn out to be scattered around the world, from Polynesia to Mexico, from Bali and Nepal to Namibia and Madagascar.

Other than Guugu Yimithirr, the “geographic language” that has received the most attention so far is found on the other side of the globe, in the highlands of southeastern Mexico. In fact, we have already come across the Mayan language Tzeltal, in an entirely different context. (Tzeltal was one of the languages in Berlin and Kay’s 1969 study of color terms. The fact that its speakers chose either a clear green or a clear blue as the best example of their “grue” color was an inspiration for Berlin and Kay’s theory of universal foci.) Tzeltal speakers live on a side of a mountain range that rises roughly toward the south and slopes down toward the north. Unlike in Guugu Yimithirr, their geographic axes are based not on the compass directions North-South

and East-West but rather on this prominent feature of their local landscape. The directions in Tzeltal are “downhill,” “uphill,” and “across,” which can mean either way on the axis perpendicular to uphill-downhill. When a specific direction on the across axis is required, Tzeltal speakers combine “across” with a place-name and say “across in the direction of X.”

Geographic coordinate systems that are based on prominent landmarks are also found in other parts of the world. In the language of the Marquesas Islands of French Polynesia, for example, the main axis is defined by the opposition sea-inland. A Marquesan would thus say that a plate on the table is “inland of the glass” or that you have a crumb “on your seaward cheek.” There are also systems that combine both cardinal directions and geographic landmarks. In the language of the Indonesian island of Bali, one axis is based on the sun (East-West) and the other axis is based on geographic landmarks: it stretches “seaward” on one side and “mountainward” on the other, toward the holy volcano Gunung Agung, the dwelling place of the Hindu gods of Bali.

Earlier on I said that it would be the height of absurdity for a dance teacher to say things like “now raise your north hand and take three steps eastwards.” But the joke would be lost on some. The Canadian musicologist Colin McPhee spent several years on Bali in the 1930s, researching the musical traditions of the island. In his book *A House in Bali*, he recalls a young boy called Sampih who showed great talent and enthusiasm for dancing. As there was no suitable teacher in the boy’s village, McPhee persuaded Sampih’s mother to let him take the boy to a teacher in a different village, so that he could learn the rudiments of the art. Once McPhee had made all the arrangements, he traveled with Sampih to the teacher, left him there, and promised he would come back after five days to check how the boy was progressing. Given Sampih’s talent, McPhee was sure that after five days he would be interrupting an advanced lesson. But when he returned, he found Sampih dejected, almost ill, and the teacher exasperated. It was impossible to teach the boy to dance, said the teacher, since Sampih simply did not understand any of the instructions. Why? Because Sampih did not know where “mountainward,” “seaward,” “east,” and “west” were, so when he was told

to take “three steps mountainward” or to “bend east” he didn’t know what to do. Sampih would not have had the least trouble with these directions in his own village, but since he had never left his village before and since the landscape here was unfamiliar, he got disoriented and confused. No matter how often the teacher pointed at the mountainward direction, Sampih kept forgetting. It was all in vain.

Why didn’t the teacher try to use different instructions? He would probably have replied that saying “take three steps forward” or “bend backward” would be the height of absurdity.

PERFECT PITCH FOR DIRECTIONS

What I have reported so far are just facts. They may seem strange, and it is certainly strange that they were discovered only so recently, but the evidence collected by many researchers in different parts of the world no longer leaves room for doubt about their veracity. We venture onto riskier ground, however, when we move from the facts about language to their possible implications on the mind. Different cultures certainly make people *speak* about space in radically different ways. But does this necessarily mean that the speakers also *think* about space differently? By now red lights should be flashing and we should be on Whorf alert. It should be clear that if a language doesn’t have a word for a certain concept, that does not necessarily mean its speakers cannot understand this concept.

Indeed, Guugu Yimithirr speakers are perfectly able to understand the concepts of left and right when they speak English. Ironically, it seems that some of them even entertained Whorfian notions about the alleged inability of English speakers to understand cardinal directions. John Haviland reports how he was once working with an informant on translating traditional Guugu Yimithirr tales into English. One story concerned a lagoon that lies “west of the Cooktown airport”—a description that most English speakers would find perfectly natural and understand perfectly well. But his Guugu Yimithirr informant suddenly said: “But white fellows wouldn’t understand that. In English we’d better say, ‘to the right as you drive to the airport.’”

Instead of searching in vain for how the lack of egocentric coordinates

might constrain the Guugu Yimithirr's intellectual horizons, we should turn to the Boas-Jakobson principle and look for the difference in what languages *oblige* their speakers to convey rather than in what they *allow* them to convey. In this particular case, the relevant question is what habits of mind might develop in speakers of Guugu Yimithirr because of the necessity to specify geographic directions whenever spatial information is to be communicated.

When the question is framed in this way, the answer appears inescapable, but no less startling for all that. In order to speak Guugu Yimithirr, you need to know where the cardinal directions are at each and every moment of your waking life. You need to know exactly where the north, south, west, and east are, since otherwise you would not be able to impart the most basic information. It follows, therefore, that in order to be able to speak such a language, you need to have a compass in your mind, one that operates all the time, day and night, without lunch breaks or weekends.

And as it so happens, the Guugu Yimithirr have exactly this kind of an infallible compass. They maintain their orientation with respect to the fixed cardinal directions at all times. Regardless of visibility conditions, regardless of whether they are in thick forest or on an open plain, whether outside or indoors, whether stationary or moving, they have a spot-on sense of direction. Stephen Levinson relates how he took Guugu Yimithirr speakers on various trips to unfamiliar places, both walking and driving, and then tested their orientation. In their region, it is rarely possible to travel in a straight line, since the route often has to go around bogs, mangrove swamps, rivers, mountains, sand dunes, forests, and, if on foot, snake-infested grassland. But even so, and even when they were taken to dense forests with no visibility, even inside caves, they always, without any hesitation, could point accurately to the cardinal directions. They don't do any conscious computations: they don't look at the sun and pause for a moment of calculation before saying "the ant is north of your foot." They seem to have perfect pitch for directions. They simply feel where north, south, west, and east are, just as people with perfect pitch hear what each note is without having to calculate intervals.

Similar stories are told about Tzeltal speakers. Levinson relates how one speaker was blindfolded and spun around over twenty times in a darkened house. Still blindfolded and dizzy, he pointed without problem at the direction of "true downhill." A woman was taken into the market town for medical treatment. She had rarely if ever been in that town before, and certainly never in the house where she was staying. In the room, the woman spotted an unfamiliar contraption, a sink, and asked her husband: "Is the hot water in the uphill tap?"

The Guugu Yimithirr take this sense of direction entirely for granted and consider it a matter of course. They cannot explain how they know the cardinal directions, just as you cannot explain how you know where in front of you is and where left and right are. One thing that can be ascertained, however, is that the most obvious candidate, namely the position of the sun, is not the only factor they rely on. Several people reported that when they traveled by plane to very distant places such as Melbourne, more than a three-hour flight away, they experienced the strange sensation that the sun did not rise in the east. One person even insisted that he had been to a place where the sun really did not rise in the east. This means that the Guugu Yimithirr's orientation does fail them when they are displaced to an entirely different geographic region. But more importantly, it shows that in their own environment they rely on cues other than the position of the sun, and that these cues can even take precedence. When Levinson asked some informants if they could think of clues that would help *him* improve his sense of direction, they volunteered such hints as the differences in brightness of the sides of trunks of particular trees, the orientation of termite mounds, wind directions in particular seasons, the flights of bats and migrating birds, the alignment of sand dunes in the coastal area.



But we are only just beginning, because the sense of orientation that is required to speak a Guugu Yimithirr-style language has to extend further than the immediate present. What about relating past experiences, for instance? Suppose I ask you to describe a picture you saw in a museum a long time ago. You would probably describe what you see in

your mind's eye, say the milkmaid pouring the milk into a bowl on a table, the light coming from the window on the left and illuminating the wall behind her, and so on. Or suppose you are trying to remember a dramatic event from many years ago, when you capsized a sailing boat off the Great Barrier Reef. You jumped out to the right just before the boat rolled over to the left, and as you were swimming away you saw a shark in front of you, but . . . if you lived to tell the tale, you would probably describe it more or less as I just did now, by relaying everything from the vantage point of your orientation at the time: jumping "to the right" of the boat, the shark "in front of you." What you will probably not remember is whether the shark was exactly to the north of you swimming south or to the west swimming east. After all, when there is a shark right in front of you, one of the last things you worry about is the cardinal directions. Similarly, even if at the time you visited the museum you could have worked out the orientation of the room in which the picture was hanging, it is extremely unlikely that you will remember now if the window in the picture was to the north or the east of the girl. What you will see in your mind's eye is the picture as it appeared when you stood in front of it, that's all.

But if you speak a Guugu Yimithirr-style language, that sort of memory will simply not do. You cannot say "the window to the left of the girl" so you'll have to remember if the window was north of her or east or south or west. In the same way, you cannot say "the shark in front of me." If you want to describe the scene, you'd have to specify, even twenty years later, in which cardinal direction the shark was. So your memories of anything that you might ever want to report will have to be stored in your brain with cardinal directions as part of the picture.

Does this sound far-fetched? John Haviland filmed a Guugu Yimithirr speaker, Jack Bambi, telling his old friends the story of how in his youth he capsized in shark-infested waters but managed to swim safely ashore. Jack and another person were on a trip with a mission boat, delivering clothing and provisions to an outstation on the McIvor River. They were caught in a storm, and their boat capsized in a whirlpool. They both jumped into the water and managed to swim nearly three

miles to the shore, only to discover, on returning to the mission, that Mr. Schwarz was far more concerned at the loss of the boat than relieved at their miraculous escape. Except for its content, the remarkable thing about the story is that it was remembered throughout in cardinal directions: Jack Bambi jumped into the water on the western side of the boat, his companion to the east of the boat, they saw a giant shark swimming north, and so on.

Perhaps the cardinal directions were just made up for the occasion? Well, quite by chance, Stephen Levinson filmed the same person two years later, telling the same story. The cardinal directions matched exactly in the two tellings. Even more remarkable were the hand gestures that accompanied Jack's story. In the first film, shot in 1980, Jack is facing west. When he tells how the boat flipped over, he rolls his hands forward away from his body. In 1982, he is sitting facing north. Now, when he gets to the climactic point when the boat flips over, he makes a rolling movement from his right to his left. Only this way of representing the hand movements is all wrong. Jack was not rolling his hands from right to left at all. On both occasions, he was simply rolling his hands from east to west! He maintained the correct geographic direction of the boat's movement, without even giving it a moment's thought. And as it happens, at the time of year when the accident happened there are strong southeasterly winds in the area, so flipping from east to west seems very likely.

Levinson also relates how a group of Hopevale men once had to drive to Cairns, the nearest city, some 150 miles to the south, to discuss land-rights issues with other aboriginal groups. The meeting was in a room without windows, in a building reached either by a back alley or through a car park, so that the relation between the building and the city layout was somewhat obscured. About a month later, back in Hopevale, he asked a few of the participants about the orientation of the meeting room and the positions of the speakers at the meeting. He got accurate responses, and complete agreement, about the orientation in cardinal directions of the main speaker, the blackboard, and other objects in the room.

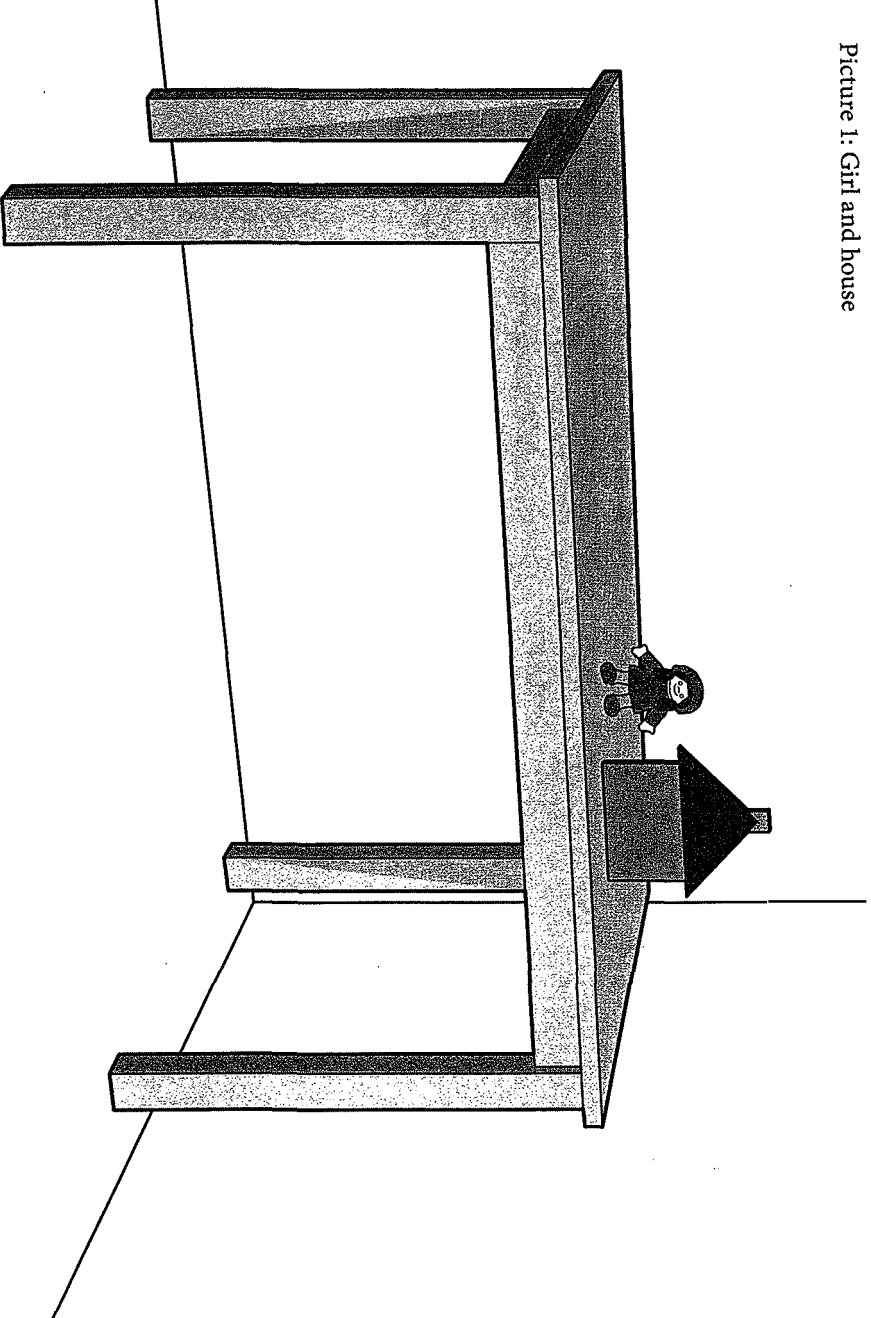
TURNING THE TABLES

What we have established so far is that speakers of Guugu Yimithirr have to be able to recall anything they have ever seen with the crisscross of the cardinal directions as part of the picture. It is almost a tautology to say, therefore, that they must commit to memory a whole extra layer of spatial information that we are blithely unaware of. After all, people who say “the fish in the northeast corner of the shop” obviously have to remember that the fish was in the northeast corner of the shop. Since most of us do not remember whether fish are in northeast corners of shops (even if we could work it out at the time), this means that Guugu Yimithirr speakers register and remember information about space that we do not.

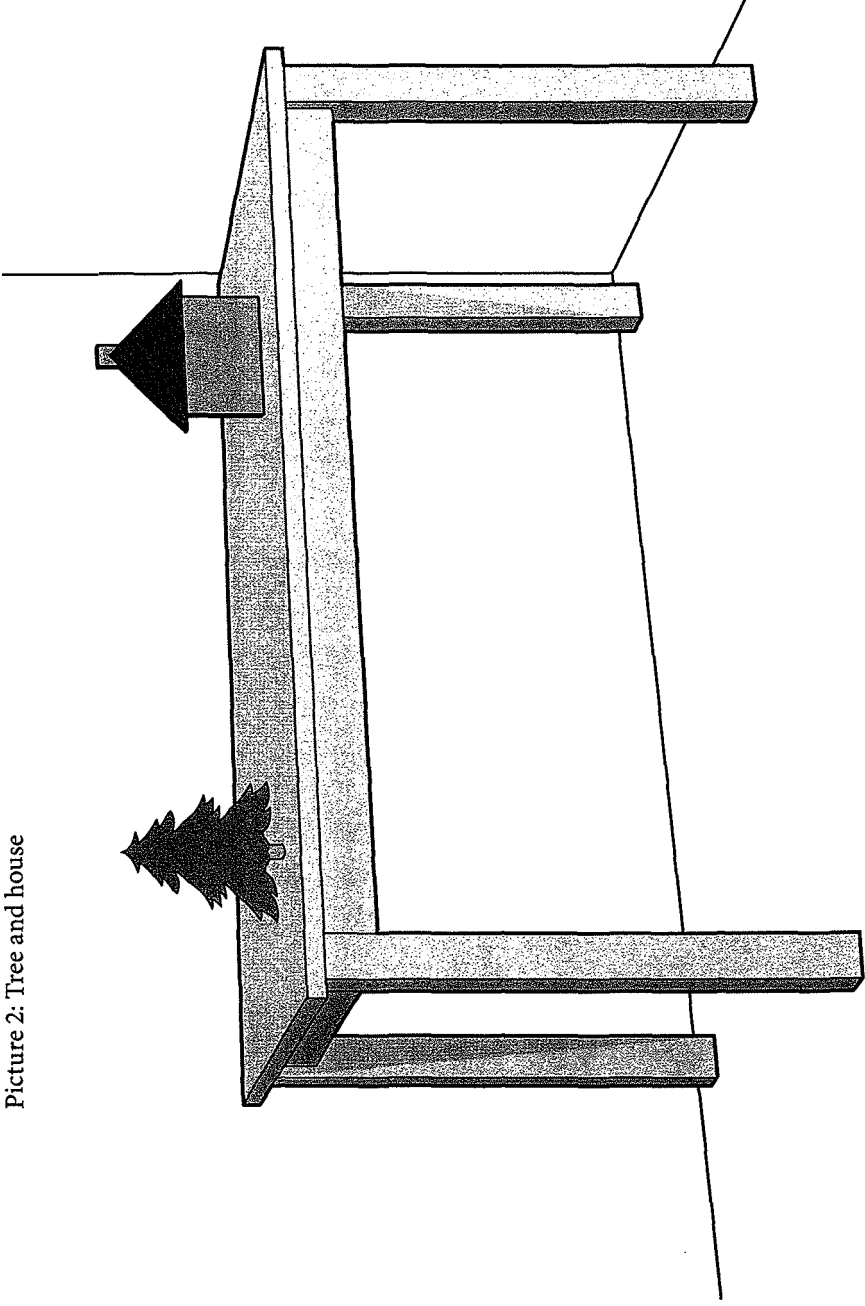
A more controversial question is whether this difference means that Guugu Yimithirr and English ever lead their speakers to remember different versions of the same reality. For example, could the crisscross of cardinal directions that Guugu Yimithirr imposes on the world make its speakers visualize and recall an arrangement of objects in space differently from us?

Before we can see how researchers tried to test such questions, let's first play a little memory game. I'm going to show you some pictures with a few toy objects arranged on a table. There are three objects in all, but you will see at most two at a time. What you have to do is try to remember their positions, in order to complete the picture later on. We start with picture 1, where you can see a house and a girl. Once you have memorized their positions, turn to the next page.

Picture 1: Girl and house



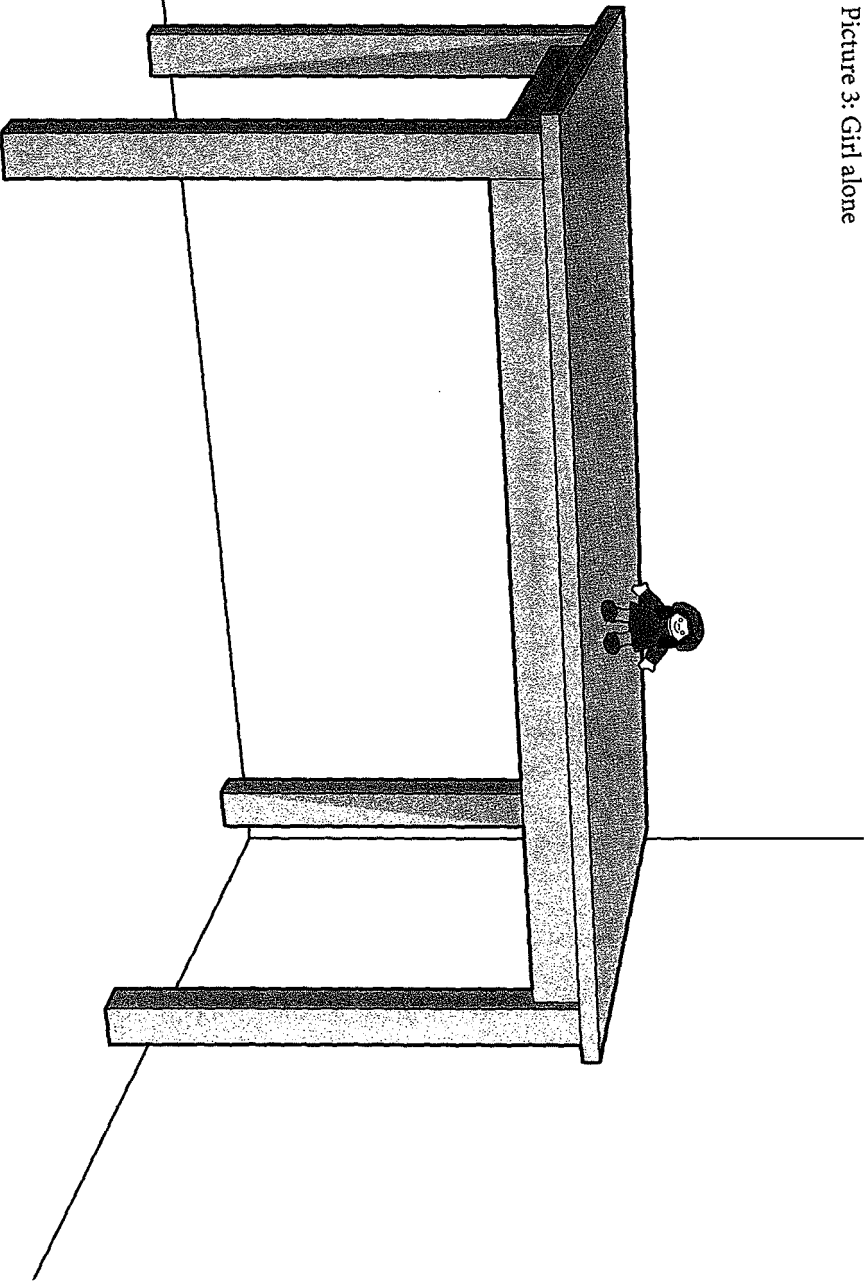
Picture 2: Tree and house



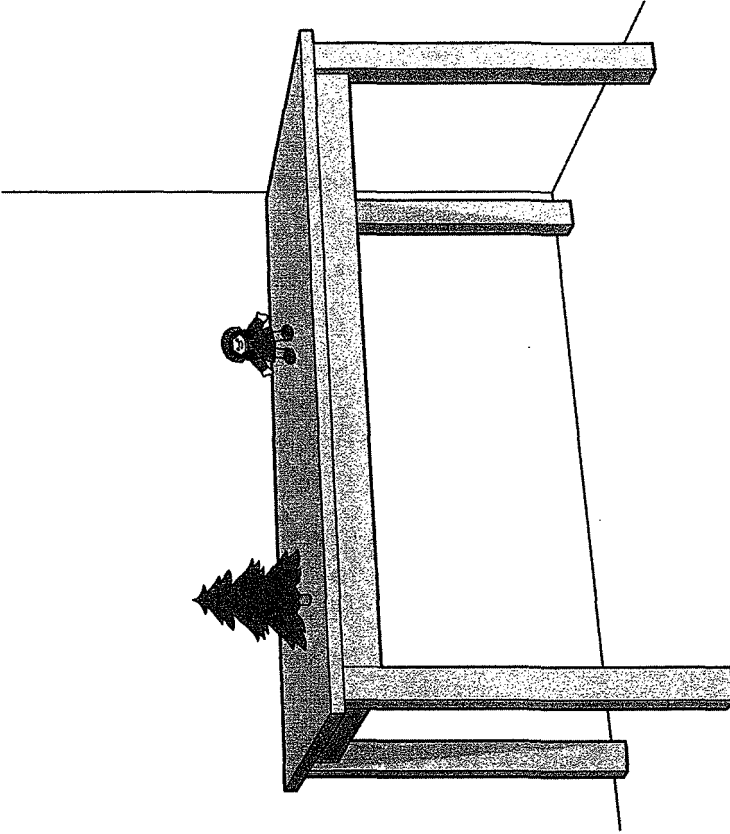
Now, in picture 2, you can see the house from the previous picture, and a new object, a tree. Try to remember the position of these two as well, and then turn to the next page.

Finally, in picture 3, you see just the girl on the table. Now imagine I gave you the toy tree and asked you to place this tree in a way that would complete the picture and would be consistent with the two layouts you saw before. Where would you put it? Make a small mark (mental or otherwise) on the table before you turn to the next page.

Picture 3: Girl alone

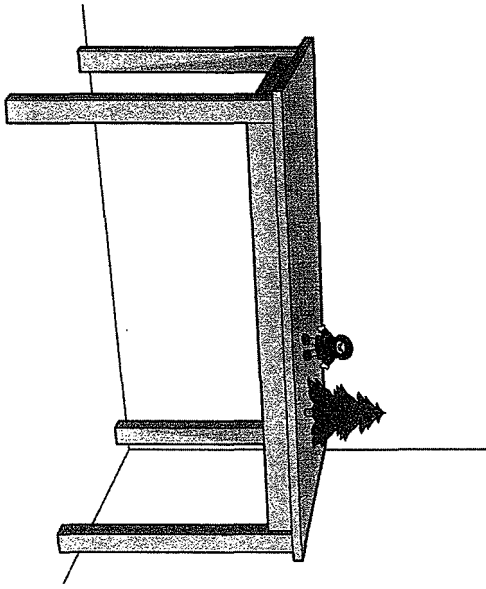


This is not a terribly difficult game, and it doesn't take prophetic powers to predict where you placed the tree. Your arrangement must have been more or less what is shown in picture 4, as you would have followed the obvious clues: earlier, the girl was standing immediately to the left of the house, whereas the tree was much farther to the left. So this must mean that the tree was farther to the left than the girl. If there is any difficulty here, it is only to understand what the point is in doing such obvious exercises.



Picture 4

The point is that for speakers of Guugu Yimithirr or Tzeltal, the solution you have suggested does not seem obvious at all. In fact, when they were given tasks of this nature, they completed the picture in a



Picture 5

very different way. They did not put the tree anywhere to the left of the girl, but rather on her other side, to the right, as in picture 5.

But why should they get such a simple task so badly wrong? There was nothing wrong about their solution, thank you very much. But there was something wrong about the way I just described it, because contrary to what I said, they did not put the tree “to the right of the girl.” They put it to the south of her. In fact, their solution makes perfect sense if one is thinking in geographic and not egocentric coordinates. To see why, let’s assume that you are reading this book facing north. (You can always turn to face the north, if you know where it is, just to avoid confusion.) If you look back at picture 1, you’ll see that the house was to the south of the girl. In picture 2, the tree was to the south of the house. Clearly, then, the tree must be south of the girl, since it is farther south from the house, which is farther south from the girl. So when completing the picture, it’s perfectly sensible to put the tree to the south of the girl, as in picture 5.

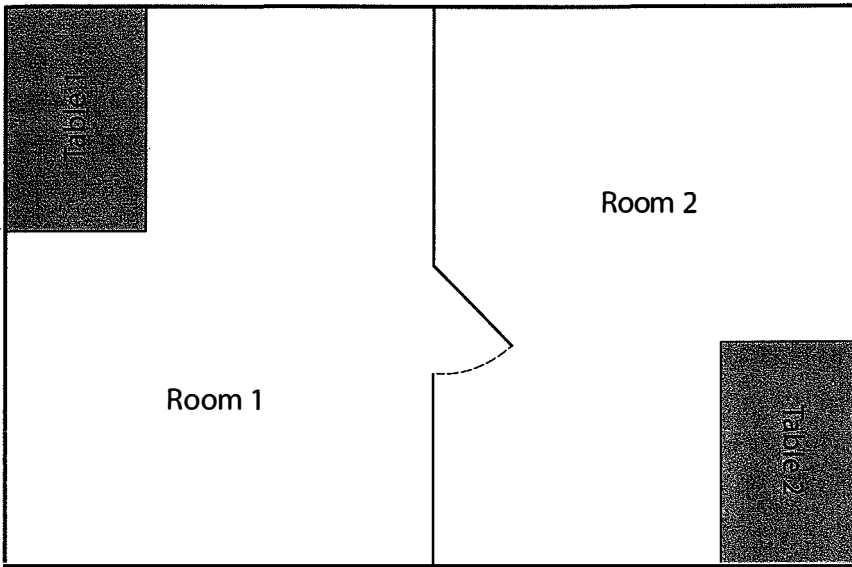
The reason the two solutions diverge is that in this game the table in picture 2 was rotated 180 degrees from the other pictures. We, who think in egocentric coordinates, automatically factor out this rotation and ignore it, so it has no bearing on the way we remember the arrangement

of the objects on the table. But those who think in geographic coordinates do not ignore the rotation, and so their memory of the same arrangement is different.

In the actual experiments conducted by Levinson and his colleagues from the Max Planck Institute in Nijmegen, the two tables were not on adjacent pages of a book but in adjacent rooms (as in the picture on the facing page). The participants were shown an arrangement on a table in one room, then moved to a facing room and shown the second arrangement on a second table, and then finally brought back to the first room to solve the puzzle and complete the picture on the first table. The rotation pattern was just as in the preceding pictures, only in real life and on real tables. Many varieties of such experiments have been conducted with speakers of different languages. And the results of these experiments show that the preferred coordinate system in the language correlates strongly with the solutions the participants tend to pick. Speakers of egocentric languages like English overwhelmingly chose the egocentric solution, whereas speakers of geographic languages like Guugu Yimithirr and Tzeltal chose the geographic solution.

On one level, the results of these experiments speak for themselves, but there has been some controversy in the last few years about how to interpret their significance. Whereas Levinson has claimed that the results demonstrate deep cognitive differences between speakers of languages with egocentric and geographic coordinates, some of his claims have been contested by other researchers. As usual in academic controversies, much of the debate boils down to bickering over ill-defined terms: is the effect of language strong enough to “restructure cognition” (whatever that might mean exactly)? But on the factual level, the main argument leveled against the experiments was that the choice of solution can easily be biased by the physical environment in which they are conducted.

For example, participants might be encouraged to choose an egocentric solution if the two rooms are arranged so that they look the same from the egocentric perspective—say with the table on the right in both rooms and a cupboard to the left of the table in both rooms. On the other hand, a geographic solution might be encouraged if the environment is



arranged to favor the geographic perspective—for instance, if the experiment is conducted in the open air, in view of a prominent geographic landmark. But while the point is well taken in general, in this particular experiment it serves only to strengthen the “strangeness” of the solution chosen by speakers of Guugu Yimithirr-style languages, because the two rooms in Levinson’s experiment were arranged to look exactly the same from the egocentric perspective. The table was on the right in both rooms (which meant it was in the north in one room and in the south in another), and all other furniture was arranged accordingly. And yet speakers of Guugu Yimithirr and Tzeltal overwhelmingly chose the geographic solution even under such “adverse” conditions.

Does all this mean that we and speakers of Guugu Yimithirr sometimes remember “the same reality” differently? The answer must be yes, at least to the extent that two realities that for us can look identical will appear different to them. We, who generally ignore rotations, will perceive two arrangements that differ only by rotation as the same reality, but they, who cannot ignore rotations, will perceive them as two different realities. One way of visualizing this is to imagine the following situation. Suppose you are traveling with a Guugu Yimithirr friend and are staying in a large chain-style hotel, with corridor upon corridor of

identical-looking doors. Your room is number 1264, and your friend is staying in the room just opposite yours, 1263. When you go to your friend's room, you see an exact copy of yours: the same little corridor with a bathroom on the left as you enter, the same mirrored wardrobe on the right, then the main room with the same bed on the left, the same indistinct-brown curtains drawn behind it, the same elongated desk next to the wall on the right, the same television set on the left corner of the desk and the same telephone and minibar on the right. In short, you have seen the same room twice. But when your Guugu Yimithirr friend comes into your room, he will see a room that is quite different from his, one where everything is reversed. Since the rooms face each other (rather like rooms 1 and 2 in the picture on page 185), and since they have been arranged to look the same from the egocentric perspective, they are actually north-side-south. In his room the bed was in the north, in yours it is in the south; the telephone that in his room was in the west is now in the east. So while you will see and remember the same room twice, the Guugu Yimithirr speaker will see and remember two different rooms.

CORRELATION OR CAUSATION?

One of the most tempting and most common of all logical fallacies is to jump from correlation to causation: to assume that just because two facts correlate, one of them was the cause of the other. To reduce this kind of logic ad absurdum, I could advance the brilliant new theory that language can affect your hair color. In particular, I claim that speaking Swedish makes your hair go blond and speaking Italian makes your hair go dark. My proof? People who speak Swedish tend to have blond hair. People who speak Italian tend to have dark hair. QED. Against this epitome of tight logical reasoning you may come up with a few petty objections along these lines: Yes, your facts about the correlation between language and hair color are perfectly correct. But couldn't it be something other than language that caused the Swedes to have blond hair and the Italians dark? What about genes, for instance, or climate?

Now, as far as language and spatial thinking go, the only thing we

have actually established is correlation between two facts: the first is that different languages rely on different coordinate systems; the second is that speakers of these languages perceive and remember space in different ways. Of course, my implication all along was that there is more than just correlation here and that the mother tongue is an important factor in *causing* the patterns of spatial memory and orientation. But how can we be sure that the correlation here is not as spurious as that between language and hair color? After all, it is not as if language itself can *directly* create a sense of orientation in anyone. We may not know exactly what clues the Guugu Yimithirr rely on for telling where north is, but we can be absolutely certain that their remarkable surety about directions could have been achieved only through observation of cues from the physical environment.

Nevertheless, the argument advanced here is that a language like Guugu Yimithirr *indirectly* brings about the sense of orientation and geographic memory, because the convention of communicating only in geographic coordinates compels the speakers to be aware of directions all the time, forcing them to pay constant attention to the relevant environmental clues and to develop an accurate memory of their own changing orientation. John Haviland estimates that as many as one word in ten (!) in a normal Guugu Yimithirr conversation is north, south, west, or east, often accompanied by very precise hand gestures. Put another way, everyday communication in Guugu Yimithirr provides the most intense drilling in geographic orientation from the earliest imaginable age. If you have to know your bearings to understand the simplest things people say around you, you will develop the habit of calculating and remembering the cardinal directions at every second of your life. And as this habit of mind will be inculcated almost from infancy, it will soon become second nature, effortless and unconscious.

The causal link between language and spatial thinking thus seems far more plausible than the case of language and hair color. Still, plausibility by no means constitutes proof. And as it happens, some psychologists and linguists, such as Peggy Li, Lila Gleitman, and Steven Pinker, have challenged the claim that it is primarily language that influences spatial memory and orientation. In *The Stuff of Thought*,

Pinker argues that people develop their spatial thinking for reasons unrelated to language, and that languages merely *reflect* the fact that their speakers think in a certain coordinate system anyway. He points out that it is small rural societies that rely primarily on geographic coordinates, whereas all large urban societies rely predominantly on egocentric coordinates. From this undeniable fact he concludes that the system of coordinates used in a language is determined directly by the physical environment: if you live in a city you will spend much of your time indoors, and even when you venture outside, turning right and then left and then left again after the traffic lights will be the easiest way of orienting yourself, so the environment will encourage you to think primarily in egocentric coordinates. Your language will then simply reflect the fact that you think in the egocentric system anyway. On the other hand, if you are a nomad in the Australian bush, there are no roads or second left turnings after the traffic lights to guide you, so egocentric directions will be far less useful and you will naturally come to think in geographic coordinates. The way you then end up speaking about space will just be a symptom of the way you think anyway.

What is more, says Pinker, the environment determines not just the choice between egocentric and geographic coordinates but even the particular type of geographic coordinates that will be used in a language. It is surely not a coincidence that the Tzeltal system relies on a prominent geographic landmark, whereas the Guugu Yimithirr system uses compass directions. The environment of Tzeltal speakers is dominated by a visible landmark, the uphill-downhill slope, and so it is only natural for them to depend on this axis rather than on the more elusive compass directions. But as the environment of the Guugu Yimithirr lacks such prominent landmarks, it is no wonder that their axes are based on compass directions. In short, Pinker claims that the environment has decreed for us what coordinates we think in, and it is spatial thinking that determines spatial language, not vice versa.

While Pinker's facts are hardly quibbleable with, his environmental determinism is unconvincing for several reasons. It makes sense, of course, that each culture would home in on a coordinate system suitable for its environment. Still, it is crucial to realize that different cul-

tures have a considerable degree of freedom. For example, there is nothing in the physical environment of the Guugu Yimithirr that precludes their using *both* geographic coordinates (for large-scale space) *and* egocentric coordinates (for small-scale). There is no conceivable reason why a traditional hunter-gatherer existence would prevent anyone from saying “there is an ant in front of your foot” instead of “to the north of your foot.” After all, as a description of small-scale spatial relations, “in front of your foot” is just as sensible and just as useful in the Australian bush as it is inside an office in London or Manhattan. This is not merely a theoretical argument—there are various languages of societies similar to Guugu Yimithirr that indeed use both egocentric and geographic coordinates. Even in Australia itself, there are aboriginal languages, such as Jaminjung in the Northern Territory, that do not rely only on geographic coordinates. So Guugu Yimithirr’s exclusive use of geographic coordinates was not directly imposed by the physical environment or by the hunter-gatherer way of life. It is a cultural convention. The categorical refusal of Guugu Yimithirr ants ever to crawl “in front of” Guugu Yimithirr feet is not a decree of nature but an expression of cultural choice.

What is more, there are odd pairs of languages around the world that are spoken in similar environments but have nevertheless chosen to rely on different coordinate systems. Tzeltal, as we have seen, uses geographic coordinates almost exclusively, but Yukatek, another Mayan language of a rural community from Mexico, predominantly employs egocentric coordinates. In the savannah of northern Namibia, the Hai||om bushmen speak about space like the Tzeltal and Guugu Yimithirr, whereas the language of the Kgalagadi tribe from neighboring Botswana, who live in a similar environment, relies heavily on egocentric coordinates. And when two anthropologists compared how Hai||om and Kgalagadi speakers responded to rotation experiments of the type we saw earlier, most Hai||om speakers offered geographic solutions (like the one that seemed counterintuitive to us), whereas the Kgalagadi tended to give egocentric solutions.

So the coordinate system of each language cannot have been completely determined by the environment, and this means that different

cultures must have exercised some choice. In fact, all the evidence suggests that we should turn to the maxim “freedom within constraints” as the best way to understand culture’s influence on the choice of coordinate systems. Nature—in this case the physical environment—certainly places constraints on the types of coordinate system that can be used sensibly in a given language. But there is considerable freedom within these constraints to select from different alternatives.

There is another critical error in Pinker’s environmental determinism, namely his glossing over the fact that the environment does not interact directly with a toddler or small child—it does so only through the mediation of upbringing. To clarify this point, we need to keep two different issues strictly apart. The first is the question of what the historical reasons were that caused a certain society to home in on a certain system of coordinates. The second issue, which is the one that is actually relevant for us here, is what happens to John Smith, an individual speaker of a Guugu Yimithirr-style language, when he grows up, and in particular what was mainly responsible for bringing about his perfect pitch for directions. Suppose we had evidence that John’s skill developed only in his late teens or early twenties, after he had been on countless hunting expeditions and has spent thousands of hours of trekking in the wild. The argument that language had much to do with creating this skill would have looked rather feeble, since it would have been far more plausible that this skill developed as a direct response to the environment, that the training and drilling came from his experiences of hunting and trekking and so on. But as it happens, we know that the geographic coordinate system is learned at a very early age. Studies of Tzeltal-speaking children show that they start using the geographic vocabulary by age two, that by age four they use geographic coordinates correctly to describe the arrangement of objects, and that they master the system by age seven. Alas, Guugu Yimithirr children no longer acquire the system at all, because the community is now dominated by English. But studies with Balinese children show similar results to Tzeltal: children in Bali use geographic coordinates by age three and a half and master the system by age eight.

At the age of two or three or even seven, John Smith has no idea

about the reasons why his society, centuries or millennia ago, chose this or the other coordinate system, and whether that choice was suitable for the environment or not. He simply has to learn the system of his elders as given. And since constant and unfailing awareness of directions is required to use the geographic system correctly, John Smith must have developed his perfect pitch for directions at a very young age, long before it could have been a direct response to the needs of survival in the physical environment, the exigencies of hunting, and so on.

All this goes to show that the system of coordinates you speak and think in is determined for you not directly by the environment but rather by the way you were brought up—or, in other words, through the mediation of culture. Of course, one may still object that there is more to the way one is brought up than just language. So we cannot simply take for granted that language in particular, rather than anything else in a Tzeltal or Guugu Yimithirr speaker's upbringing, was the primary reason for inducing geographic thinking. I have argued that the main cause here is simply the constant need to calculate directions in order to speak and understand others. But at least in theory, one cannot rule out the possibility that children develop their geographic thinking for an entirely different reason, say because of intense explicit tuition in orientation from an early age.

In fact, there is one example in our own egocentric system of coordinates, the left-right asymmetry, which teaches us to be cautious. For most Western adults, left and right seem second nature, but children have great difficulties in mastering the distinction and generally manage it only at a very late age. Most children cannot cope with these concepts even passively until well into school age and don't use left and right actively in their own language until around the age of eleven. This late age of acquisition, and especially the fact that children often master the distinction only through the brute force of schooling (including, of course, the need to acquire literacy and master the inherent sidedness of letters), makes it unlikely that the left-right distinction was acquired simply through the requirements of daily communication.

But while the left-right distinction in our own egocentric system

serves as a warning against jumping to conclusions about causation, the marked difference between the late acquisition of left-right and the early acquisition of geographic coordinates highlights exactly the reasons why, in the latter case, language is by far the most plausible cause. There is no evidence of formal tuition in geographic coordinates at an early age (although there is evidence from Bali of some geographically relevant religious practices, such as putting children to bed with the head pointing in a particular geographic direction). So the only imaginable mechanism that could provide such intense drilling in orientation at such a young age is the spoken language—the need to know the directions in order to be able to communicate about the simplest aspects of everyday life.

There is thus a compelling case that the relation between language and spatial thinking is not just correlation but causation, and that one's mother tongue affects how one thinks about space. In particular, a language like Guugu Yimithirr, which forces its speakers to use geographic coordinates at all times, must be a crucial factor in bringing about the perfect pitch for directions and the corresponding patterns of memory that seem so weird and unattainable to us.



Two centuries after Guugu Yimithirr bequeathed “kangaroo” to the world, its last remaining speakers gave the world a harsh lesson in philosophy and psychology. Guugu Yimithirr proved—tongue on teeth—that a language can do perfectly well without concepts that had long been considered as universal building blocks of spatial language and thought. This recognition illuminated concepts of our own language, which our common sense would have sworn were simply decreed for us by nature, but which only seem so because our common sense happened to grow up in a culture that employs these concepts. Guugu Yimithirr provided a glaring example—brighter even than the language of color—of cultural conventions that masquerade as nature.

What is more, the research that Guugu Yimithirr inspired has furnished the most striking example so far of how language can affect thought. It has shown how speech habits, imprinted from an early age, can create habits of mind that have far-reaching consequences beyond

speaking, as they affect orientation skills and even patterns of memory. Guugu Yimithirr managed all this just in time, before finally going west. The “unadulterated” language that John Haviland started recording from the oldest speakers in the 1970s has now gone the way of all tongues, together with the last members of that generation. While the sounds of Guugu Yimithirr are still heard in Hopevale, the language has undergone drastic simplification under the influence of English. Today’s older speakers still use cardinal directions fairly frequently, at least when they speak Guugu Yimithirr rather than English, but most people younger than fifty have no real grasp of the system.

How many other features of mainstream European languages are there, which we still take as natural and universal even today simply because no one has yet properly understood the languages that do things differently? We may never know. Or put another way, if the prospect of having to make further uncomfortable adaptations to our worldview seems daunting, the good news is that it is getting unlikelier by the minute that we will ever discover such features. Together with Guugu Yimithirr, hundreds of other “tropical languages” are going to the wall, dispersed by the onward march of civilization. The conventional predictions are that within two to three generations at least half the world’s six thousand or so languages will have disappeared, especially those remote tribal tongues that are really different from what seems natural to us. With every year that passes, the notion that all languages do things essentially like English or Spanish is becoming closer to reality. Soon enough, it may be factually correct to argue that the “standard average European” way is the only natural model for human language, because there are no languages that substantially diverge from it. But this will be a hollow truth.

Lest one fall under the impression, however, that it is only remote tribal languages that do things sufficiently strangely to induce noticeable differences in thinking, we shall now explore two areas where significant variation is to be found even among mainstream European languages, and where the influence of language on thought may thus be felt much closer to home.