IN THE LAND OF

INVENTED LANGUAGES

ESPERANTO ROCK STARS, KLINGON POETS, LOGLAN LOVERS, AND THE MAD DREAMERS WHO TRIED TO BUILD A PERFECT LANGUAGE

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In the Land of INVENTED

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NINE HUNDRED LANGUAGES, NINE HUNDRED YEARS

Language,—human language,—after all, is but little better than the croak and cackle of fowls and other utterances of brute nature,—sometimes not so adequate.

—*Nathaniel Hawthorne*

Language, the most valuable single possession of the human race.

—*Charles Hockett*

ONE

Scaring the Mundanes

Klingon speakers, those who have devoted themselves to the study of a language invented for the *Star Trek* franchise, inhabit the lowest possible rung on the geek ladder. Dungeons & Dragons players, ham radio operators, robot engineers, computer programmers, comic book collectors—they all look down on Klingon speakers. Even the most ardent *Star Trek* fanatics, the Trekkies, who dress up in costume every day, who can recite scripts of entire episodes, who collect *Star Trek* paraphernalia with mad devotion, consider Klingon speakers beneath them. When a discussion of Klingon appeared on Slashdot.org—the Web site billed as "News for Nerds"—the topic inspired comments like "I'm sorry but it's people like this that give science fiction a bad name." Another said that Klingon speakers "provide excellent reasons for

forced sterilization. Then again being able to speak Klingon pretty much does this without surgery."

Mark Shoulson, who has a wife and two children, doesn't enjoy being talked about this way. "It's okay to laugh about it, because it's funny. It's legitimate to laugh. Klingon has entertainment as part of its face value. But I do get annoyed at some of the ruder stuff." Mark was my unofficial guide to the world of Klingon. When I met him, we lived in the same New Jersey town. I discovered this browsing the Internet, where I also found that he was assistant director of the Klingon Language Institute (KLI) and editor of the Klingon translation of *Hamlet*. I wrote him, and he e-mailed me back the same day, saying he was so excited by the prospect of another Klingon speaker so close by that he didn't even finish reading my message before he responded.

I wasn't yet a Klingon speaker, and I wasn't really planning on becoming one. I was a linguist who had developed a side interest in the subject of artificial languages, and I wanted to talk to Mark for research purposes. People really spoke Klingon—so claimed the Klingon Language Institute materials anyway—and I wasn't sure what that meant. When people "spoke" Klingon, was it playacting? Spitting out little words and phrases and putting on a show? A charades-like guessing game where someone sort of cobbled together a message and someone else sort of understood it? Or was it actual language use?

If it was the latter, then this was something I needed to see for myself, because that would make Klingon something so remarkable as to be almost unheard of—a consciously invented language that had been brought to life.

Although we like to call language mankind's greatest invention, it wasn't invented at all. The languages we speak were not created according to any plan or design. Who invented French? Who

invented Portuguese? No one. They just happened. They arose. Someone said something a certain way, someone else picked up on it, and someone else embellished. A tendency turned into a habit, and somewhere along the way a system came to be. This is how pidgins, slangs, and dialects are born; this is the way English, Russian, and Japanese were born. This is the way all natural languages are born—organically, spontaneously.

The variety of shape, pattern, and color found in the languages of the world is a testament to the wonder of nature, to the breathtaking array of possibilities that can emerge, tangled and wild, from the fertile human endowments of brain and larynx, intelligence and social skills. The job of the linguist, like that of the biologist or the botanist, is not to tell us how nature should behave, or what its creations should look like, but to describe those creations in all their messy glory and try to figure out what they can teach us about life, the world, and, especially in the case of linguistics, the workings of the human mind.

In libraries organized according to the Library of Congress call number system, linguists can usually be found in the stacks classified in the first half of the Ps, anywhere from subclass P, which covers general linguistics, to subclass PN, where "literature" starts. When I was in graduate school, I used to wander this territory, in a procrastinatory haze, noting how the languages covered by the intervening categories became more and more "exotic" the farther I got from PA (Greek and Latin). I would first pass through aisles and aisles of Romance languages, then Germanic, Scandinavian, English, Slavic. There at the end of the Slavic section, at PG9501, things would start to get interesting, with Albanian, followed by the offerings of PH—the Finno-Ugrics (Veps, Estonian, Udmurt, Hungarian), the mysterious Basque. By the time I got to PL, I would be far from Europe, drifting through

Asia and Africa, lingering over *A Grammar of the Hoava Language, Western Solomons* or *The Southern Bauchi Group of Chadic Languages: A Survey Report.*

The final subclass, PM, was a tour through the New World, starting with the Eskimo languages of Greenland and Alaska and proceeding southward through Tlingit, Kickapoo, and Navajo to the Mayan and Aztecan languages of Mexico and Central America, down across the Amazon, through the Andes and the plains of Brazil, until I reached the islands off the southernmost tip of South America with *Yámana-English: A Dictionary of the Speech of Tierra del Fuego.* From there, there was nowhere to go but to the borders of language itself—the contact, or "mixed," languages, the pidgins and creoles of the PM7800s: *Spanish Contact Vernaculars in the Philippine Islands*; *Le créole de Breaux Bridge, Louisiane: Étude morphosyntaxique, textes, vocabulaire.*

At the very end of this lush orchid garden of languages there was one more section, where linguists don't generally care to visit—a few lonely shelves of faded plastic flowers, the artificial languages. *The Klingon Dictionary* was here, among other books on languages I had never heard of: Babm, aUI, Nal Bino, Leno Gi-Nasu, Tutonish, Ehmay Ghee Chah. These were not lighthearted language games, like pig Latin, or the spontaneous results of in-group communication, like Cockney rhyming slang or surfer jargon. They were invented on purpose, cut from whole cloth, set down on paper, start to finish, by one person. They had chapters and chapters of grammar and extensive dictionaries. They were testaments not to the wonder of nature but to the human impulse to master nature. They were deliberate, painstakingly crafted attempts to tame language by making it more orderly, more rational, less burdened with inconsistencies and irregularities. There were

hundreds of them. And they were all failures, dead in the water, spoken by no one.

Well, of course they were. If you plant a plastic flower, will it grow? So I was skeptical about the claims that Klingon—*Klingon?*—had really defied the odds and sprouted roots. In the name of research, I registered for the annual Klingon conference, or *qep'a'*, to occur in Phoenix at the end of the summer. I wanted to be prepared, and so I arranged to meet with Mark.

For our first meeting Mark showed up in a T-shirt with the International Phonetic Alphabet printed on it, and I soon discovered that all his T-shirts were a form of self-expression. In fact, everything he owns somehow advertises his interests to the world. On his minivan he has a KLI license plate holder and an LNX sticker (proclaiming himself a user of the Linux operating system). On the vest he wears most days, he displays his three Klingon certification pins; membership pins for the Dozenal Society ("they advocate switching to a base 12 system from the base 10 system we use for numbering"), Mensa ("it's a way for insecure people to feel better about themselves"), and the Triple Nine Society ("a more extreme kind of Mensa"); and a button he made that says "If you can read this you are standing too close" in Braille.

I usually met with Mark at a kosher pizza place. He's an Orthodox Jew who follows all the rules, but jokes that he would be an atheist "if I weren't such a scaredy-cat." He is slender and jittery, one knee constantly bouncing as he talks in a speedy patter. His eyes convey both friendliness and sadness, as if he hopes you will like him but wouldn't be surprised if you punched him. He never finished his Ph.D. in computer science, and he has had trouble holding down a job, to which he credits his attention deficit disorder ("It's not an excuse; it's an explanation"). He cares for

his children while his wife, a physician, works, and he teaches computer programming part-time at a yeshiva in Newark. While many bright people like Mark tend to blame the world for not rewarding them more heartily for their smarts, he accepts his own responsibility in the matter. He knows a lot, but not much of it is career making. He is, as he might put it, a polymath of esoterica. His other interests include knot making, typography, mathematical knitting, and calendrical systems. We flew to Phoenix together, and when the plane took off, he pulled a book out of his duffel bag titled *Science from Your Airplane Window.*

Mark is an extreme case of the Klingon-speaker type—a computer guy with an interest in languages and a slightly hurt pride in his status as an outsider. He doesn't fear being called a geek, even by the geekiest, because what is happening with Klingon is just too damn interesting. "So-called normal society," Mark says, "spends all these resources figuring out new and exciting ways to drape cloth on our bodies. What's so bad about having fun with this little language?" While his life has been marked by some unpleasant run-ins with so-called normal society, he has no desire to appease it. The part of the *qep'a'* he was most looking forward to was going out to restaurants with the participants (some in costume), speaking Klingon, and "scaring the mundanes."

I wasn't looking forward to that as much. Not as brave as Mark, and probably more of a mundane myself, I felt conflicted about whether to call the conference hotel to request the special conference rate. In order to do this, I would have to, as the registration materials stated, identify myself as a conference attendee. I rehearsed in my head: "Hi, I'm with the Klingon conference . . ." I tried to get up the nerve to call, but in the end I reserved my room online from a comfortable cushion of anonymity.

And then I got to work on my verb charts and lists of affixes. I needed to study in order to pass the first language certification exam. The Klingon Language Institute, what you might call the academy of the Klingon language, runs the *qep'a'* and also administers the Klingon Language Certification Program. Passing the first certification exam earns you a bronze pin and the title of *taghwI'* (beginner). The second test confers a silver pin and the title *ghojwI'* (intermediate), and the third test earns a gold pin and the title *po'wI'* (advanced).

I didn't know about the tests until Mark told me. I had been casually studying the Klingon dictionary, intending to familiarize myself with the grammar from a clinical distance. But the idea of a test stirred something in me. A feeling every school-loving egghead who ever got a secret thrill from a spelling quiz knows. I was going to take that test and pass it. To get ready, I began the KLI's online postal course. I completed the first lesson and e-mailed it in. It came back with the words that sealed my fate: "Perfect—first time I've seen someone get every question right. Keep it up!" I felt the drug of overachievement rush through my veins. I didn't want to pass that test anymore. I wanted to ace it.

TWO

A History of Failure

I did take the test, and (I'm rather proud to say) I did ace it. That achievement, however, is not the beginning of the story I wish to tell with this book, but the end of it. The true significance of what I saw and participated in at the conference, the lessons the Klingon phenomenon can teach us about how language does and doesn't work (trust me on this), can be fully appreciated only in the context of the long, strange history of language invention, a history that encompasses more than nine hundred languages created over the last nine hundred years, a history of human ambition, ingenuity, and struggle that, in a way, culminates with Klingon. You can get a brief overview of this history in appendix A, where I have provided a list of five hundred of these languages.

The earliest documented invented language is the Lingua Ignota of Hildegard von Bingen, a twelfth-century German nun.

Scholars have long puzzled over the purpose of this language, presented in a manuscript as a list of about a thousand words, with Latin and German translations. Because Hildegard was known to experience visions, which she recorded in theological texts, it has been assumed that her Lingua Ignota was some type of glossolalia, or "speaking in tongues." But the product of glossolalia tends to be a string of repetitious nonsense, without system or organization, and without any sign of deliberate planning. Though Hildegard's language may have been motivated by some kind of divine inspiration, the fact that it was written down, with the words carefully organized into meaningful categories and with some structural relationships between words indicated by endings, makes it look more like the intentional work of an inventor with a plan than the channelings of a spiritual medium.

The purpose of Hildegard's language may be lost to history, but through the chancy luck of document preservation the language survives. How many others were not so lucky? The nine hundred languages, over nine hundred years, we do have evidence for suggest that the urge to invent languages is as old and persistent as language itself.

It is at least as old and persistent as the urge to complain about language. The primary motivation for inventing a new language has been to improve upon natural language, to eliminate its design flaws, or rather the flaws it has developed for lack of conscious design. Looked at from an engineering perspective, language *is* kind of a disaster. We have words that mean more than one thing, meanings that have more than one word for them, and some things we'd like to say that, no matter how hard we struggle, seem impossible to put into words. We have irregular verbs, idioms, and exceptions to every grammatical rule—all of which make languages unnecessarily hard to learn. We misunderstand

each other all the time; our messages are ambiguous despite our best efforts to be clear. Most of us are content to live with these problems, but over the centuries a bold idea has bloomed again and again in the minds of those who think these problems can be solved: Why not build a better language?

The history of invented languages is, for the most part, a history of failure. Many of the languages involved years of work and sacrifice. They were fueled by vain dreams of fame and recognition, or by humble hopes that the world could be made a better place through language, or, most often, by a combination of the two.

Language inventors, it hardly needs to be said, have usually been eccentric types. Often a plan for an improved language was not the only, or the most unusual, idea an inventor pursued. Paulin Gagne, the creator of Monopanglosse (1858), was well-known in Paris for, among other things, proposing that the French help out the famine-struck Algerians by donating their own bodies for food (or just an arm or leg, if one preferred not to die for the cause). Joseph Schipfer, who presented his Communicationssprache in 1839, when he was nearly eighty years old, also worked to promote his idea for preventing people from being accidentally buried alive (a common concern in the nineteenth century). Schipfer had been a relatively prosperous landowner in the German town of Niederwalluf who served on a state government council for a time. He moved among nobles and acted as an adviser to the prince of Salm-Salm. But by 1830 his fortunes had changed and he had somehow lost his estate. He continued to work, as he said, "for the general welfare of mankind," by petitioning government officials to consider his proposals for the prevention of premature burial, the establishment of mortuaries in small villages, the improvement of fire brigades, and the promotion of his language, Communicationssprache. He asked only that the duchy take on

the cost of printing his Communicationssprache grammar and that any profits received from sales of the booklet go to aid the distressed people in France who had recently been afflicted by a major flooding of the Rhône.

His requests were not granted, and in a subsequent letter he asked instead for a loan with which he might pay off the printing costs he had already incurred. He promised to repay the loan once he received an expected pension from Prague. Or, should his request be denied, he had a couple of oil paintings to sell, if anyone was interested.

The lot of the language inventor was almost always a hard one, and those who set out with the most confidence invariably ended up full of bitterness. Ben Prist, the Australian creator of Vela (1995), simply could not understand why his language was being ignored, and blamed some kind of anti-Australian conspiracy. "Why aren't we allowed to have the easiest language possible?" he complains. "A child can go to a library and pick-up a book on pornography. Why can't a grown-up person pick-up a book on the easiest language possible? Is this democracy? Is this human? Where are our human rights?" He has no doubt that his work is an unrecognized masterpiece for which he has become a persecuted martyr. "What is going to be prohibited next: best soup, best cakes, best clothes, best cars, or what?"

It was this overblown ridiculousness that first attracted me to the artificial-language section of the library. It was entertaining to read the unreasonable boasts, like "Mondea! The New World Language! Unequalled! Unsurpassable! New system easy to learn in one minute!" and "In a few years, we will all use Ehmay Ghee Chah . . . the greatest boon of the twenty-first century."

But it was curiosity about the authors of these projects that kept me there. Why did people invest so much effort in this pursuit?

What made them think they could succeed? Who were these inventors? They usually provided very little information about themselves in their books, but I gleaned what I could from the way they presented their languages. Early in my wanderings through the invented-languages section of the library, I became particularly absorbed in the backstory alluded to by Fuishiki Okamoto, who in 1962, when he was seventy-seven years old, published a description of Babm, a "man-made language" for the "future World Society" and also "a theoretical system of the supreme good, which is assured by my philosophical Learning of Knowledge (not yet translated into English)." Since it is designed to be used easily by everyone from "the natives in the Himalayas" to "the inlanders of African ravines," Babm is "planned most simply but perfectly." Really? Here's an example:

V pajio ci htaj, lrid cga coig pegayx pe bamb ak cop pbagt.

It means:

> "I am reading this book, which is very interestingly written in Babm by a predominant scholar."

More is revealed by the translation of his sentence than by the sentence itself. It shows something of his human yearnings. That he hopes to be found interesting. That he hopes to be considered a predominant scholar, and that perhaps he hopes that other predominant scholars will one day use his language. He does seem quite sure that "many experts in Babm are expected to appear one after another, who will present abundant and excellent examples of literary works."

He is, of course, gravely mistaken.

But why? Why does this enterprise seem doomed to fail? After all, what do people do when they identify a problem with an existing tool? They try to invent a better one. Is it so crazy to apply this impulse to language? Hundreds of years ago dreamy souls were ridiculed for drawing up plans for vehicles that could travel underwater or fly to the moon. They have since been vindicated. But it's also been hundreds of years since less dreamy, sometimes quite respected souls started drawing up plans for a better language. They and their successors are still ridiculed—if anyone has heard of them at all.

Maybe they deserve it. There is no shortage of arrogance or foolishness in the history of language invention. But after reading into the story of Mr. Okamoto and his beloved Babm, I didn't feel much like ridiculing him. Of his own life he says little beyond that he was "born an extremely weak baby in the most miserable of circumstances," but he unwittingly reveals more in the sentences he uses to illustrate the rules of his language:

V kog cald mtk, lrek deg cjobco ca mnom.
"I hope for an important matter, which is the consummation of the whole of humankind."

V kij kdopakd aj modk.
"I choose a healthful meal rather than a delicious one."

Sasn muq in ve hejp.
"No money is in my pocket."

Vli cqeo.
"I have nothing of myself."

Ox udek pbot.
"He does not carry out his original mission."

Y uhqck V.

"I request you not to reproach me."

Dedh cjis beg kobp.

"Time causes youth to be old."

It seemed as if he had suffered enough. And he had worked so hard. "In spite of the fact that my physical body has so much weakened so that even walking annoys me," he writes, "I am every day engaging in theoretical writings and compositions of Babm without even one holiday all the year round, from the early dawn of morning till the dark of evening." He made me feel guilty. I had been born a strong baby in good circumstances, and yet here I was, lazing the day away, producing nothing but new procrastination strategies, and here was Mr. Okamoto, his body aching, his meals non-delicious, working all day every day to produce this book. He deserved a little respect for that, I thought.

Didn't they all? Didn't their hard work deserve at least a look? As I started piecing together the history of invented languages, I discovered amazing feats of work ethic that made me wish I could muster that kind of productive dedication. Of course, my respect was tried by the nutty claims made about these languages: It can be learned in twenty minutes! It can express anything you wish to say with a vocabulary of only fifty items! It is logically perfect! It will make you think more clearly! It will reveal the Truth! (And variations on these themes.) I didn't have to believe these claims, but I thought it was only fair to at least test them for myself.

And so I entered the land of invented languages. I read the books and made a sincere attempt to learn the languages. I studied example texts line by line to figure out how the rules worked. I scoured vocabulary lists and composed translations. I dug up in-

formation on the lives of the inventors and got drawn in by their hopes and struggles. My journey also took me beyond the land of books, to gatherings of Esperantists, Lojbanists, and Klingonists, where I witnessed (and participated in) the unexpected phenomenon of invented languages brought to life.

What follows is not just a collection of stories about individual languages. The way people think about language is influenced by the times they live in, and it is possible to show how changing times led, in a general way, to changes in the types of languages that inventors came up with. There are trends, or eras, in language invention that reflect the preoccupations of the surrounding culture, and so, in a way, the history of invented languages is a story about the way we think about language.

It is also a story about natural language. In answering the question of why invented languages fail (and indeed, why they sometimes succeed), we will touch on topics like the relationship of concepts to words, the revival of Hebrew, Chinese writing, sign language, the role of logic in language, and the effect of language on thought. We will see what happens when you attempt to take the flaws out of language, and those "flaws" will be revealed as more important than we realize.

This is a story of why language refuses to be cured and why it succeeds, not in spite of, but because of, the very qualities that the language inventors have tried to engineer away.

JOHN WILKINS AND THE LANGUAGE OF TRUTH

Hαι coba 88 ια ril dad,
ha bαbι ιo sδγmtα,
ha salba ιo velcα,
ha tαlbι ιo vemgδ,
mδ ril dadγ me ril dad,
ιo velpι lαl αι ril ι poto hαι sαba vαtγ,
na ιo sδeldγδs lαl αι hαι bαlgas
me αι ια sδeldγδs lαl eι 88 ια vαlgas rδ αι
na mι ιo velco αι, rαl bedodlδ
nil ιo cδαlbo aι lal vαgasιe
nor αl salba, na αl tado, na αl tadalα ια ha
pιδbγδ
mδ ιo

—*The Lord's Prayer in John Wilkins's Philosophical Language*

1600 *Developments in mathematical notation on the rise*

1629 *Descartes considers a "universal language"*

1647 *Lodwick publishes* A Common Writing

1651 *Urquhart publishes* Ekskubalauron *(Gold out of Dung)*

1657 *Dalgarno moves to Oxford*

1660 *Royal Society founded*

1661 *Dalgarno publishes* Ars signorum

1665 *The plague reaches London*

1666 *The Great Fire of London*

1668 *Wilkins publishes* An Essay Towards a Real Character and a Philosophical Language

1672 *Wilkins dies*

1852 Roget's Thesaurus *published*

The Six-Hundred-Page Rewrite

Sixteen sixty-six was a hard year for John Wilkins. It was a hard year for everyone in London. The previous summer the Plague had swept through the city, killing thousands. Wilkins, like most who could afford to, had fled to the countryside. The emptying of London brought the activities of the Royal Society—the scientific academy that Wilkins had recently helped to found—to an abrupt halt. This was a minor inconvenience, of course, compared with the Black Death, but still an inconvenience, and Wilkins did what he could during that time to continue advancing the cause of science. He and a couple of fellow Society members used the various instruments they had hauled up from the city with them to carry on with their experiments. By the summer of 1666 the epidemic appeared to have run its course, and the streets of

London began to fill with people again. Then a baker neglected to extinguish his oven fire one night and the city went up in flames.

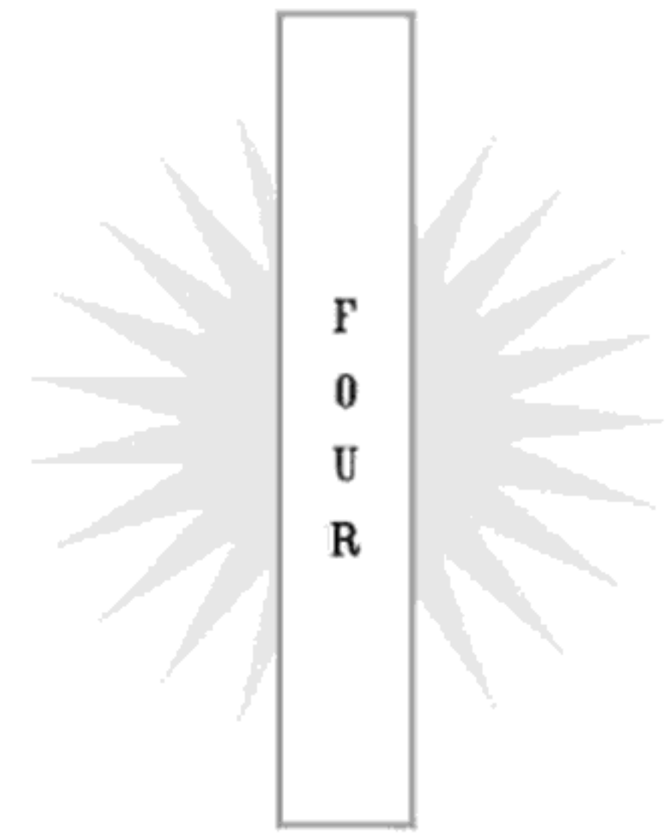
The Great Fire of London burned for four days and destroyed most of the city. Wilkins lost his house. And because the church where he was vicar was also destroyed, he lost his job. A few years before, when he had been pushed out of his position as master of Trinity College for political reasons, he had bounced back relatively quickly with the help of influential friends. But the disruption to his life was more severe this time, and his friends were concerned about his low spirits.

This time he had lost something much more difficult to replace than living quarters or income. The fire had also claimed his "darling"—his universal language. He had been working on it for a decade, through the vagaries of national political upheaval and the pain of chronic kidney stones. His manuscript—hundreds of pages, finally complete, already at the printer's shop—was now reduced to ashes.

Wilkins was at the very center of scientific life in his day, but his particular gifts were not of the type that go down in history. He was a mentor, an organizer, a promoter, a peacemaker, and a soother of egos. He befriended and encouraged the innovators who would gain more lasting fame. Robert Hooke (of Hooke's law, the relationship of force to stretch in springs) said of him, "There is scarce any one Invention, which this Nation has produc'd in our Age, but it has some way or other been set forward by his assistance." He collaborated with Robert Boyle (of Boyle's law, the relation of pressure to volume) and John Ray (father of natural history in Britain). He noticed the extraordinary talent of the young Christopher Wren (mathematician, astronomer, architect of St. Paul's Cathedral) and took a special interest in promoting his career.

Wilkins's own work was not groundbreaking (it was suggested that he got along so well with everyone because he didn't arouse jealousy), but it did display a unique kind of creative verve. He drew up plans for land-water vehicles and flying machines. He designed an early odometer and a rainbow-producing fountain. He built a hollowed-out statue for playing practical jokes on people; he would speak through the statue's mouth by means of a long pipe that allowed him to stand at a distance and observe the bewildered reactions of his targets. He constructed an elaborate glass beehive, outfitted like a palace with tiny decorations. Whimsical but also practical, it permitted the scientific observation of bee behavior. He presented a report on the differences between queens and drones at a meeting of the Royal Society.

Wilkins took a secondary role in the greater achievements of others both as an inspirer (his suggestions led to pioneering research on skin grafting and blood transfusion) and as a publicizer. He was perhaps the first popular science writer. Exasperated by dense, overly theoretical presentation styles, he made the promotion of plain language a lifelong cause. He wrote one book to explain Copernican astronomy to a general audience and another to explain mechanical geometry to people who might want to benefit from its practical applications. All applications of scientific theory were interesting to him; many of his own experiments veered toward the domestic (more efficient methods of embroidery, quicker ways to roast meat). He took great joy from science, and he knew how to make it accessible. Boyle may have been the true innovator when it came to the principles of air pressure, but it was Wilkins who thought to demonstrate the power of those principles in an experiment where, by blowing into a series of connected pipes, he levitated "a fat boy of sixteen or seventeen years" a clear two inches off the ground. The Society members



A Calculus of Thought

Wilkins's project was the most fully developed of all the many linguistic schemes hatched in his day. Language invention was something of a seventeenth-century intellectual fad. Latin was losing ground as the international lingua franca, and as the pace of advancement in philosophy, science, and mathematics picked up, scholars fretted about the best way to propagate their findings. Talk of universal language was in the air. It was not the first time. The search for a cure for Babel was as old as the story of Babel, but the cure proposed before this point usually involved the discovery of the original language of Adam as crafted by God. Now, in the throes of the scientific revolution, people started to think that perhaps a solution could be crafted by man.

It seems that any self-respecting gentleman of the day could

be expected to have some sort of universal language up his sleeve. Of all the works published on the idea during this time, the one with my favorite title is by Edward Somerset, the second Marquis of Worcester: *A Century of the Names and Scantlings of Such Inventions as at Present I Can Call to Mind to Have Tried and Perfected, Which (My Former Notes Being Lost) I Have, at the Instance of a Powerful Friend, Endeavoured Now in the Year 1655, to Set These Down in Such a Way as May Sufficiently Instruct Me to Put Any of Them in Practice.*

There among his inventions ingenious (the steam engine), overly optimistic (an unsinkable ship), and fanciful ("a floating garden of pleasure, with trees, flowers, banqueting-houses, and fountains, stews for all kinds of fishes, a reserve for snow to keep wine in, delicate bathing places, and the like") is a mention of "an universal character methodical and easie to be written, yet intelligible in any language." He doesn't, however, say much more about it.

Another gentleman inventor, who never missed a chance to say more about anything, was the eccentric Scotsman Sir Thomas Urquhart of Cromarty. He made a name for himself as the English translator of Rabelais, and not, as he had hoped, as the inventor of "a new idiome of far greater perfection than any hitherto spoken." In a characteristic display of his excessive lack of humility, he likened his universal language to "a most exquisite jewel, more precious than diamonds inchased in gold, the like whereof was never seen in any age."

He described his language as a sort of arithmetic of letters by which every single thing in the universe could be given a unique name that, through a simple computation, showed you its exact and true definition. What's more, every word meant something

read both backward and forward—or in any permutation of the letters. He published two works on this language: *Ekskubalauron*, or "Gold out of Dung," in 1652; and *Logopandecteision; or, An Introduction to the Universal Language* in 1653. (He was an avid coiner of exotic Greco-Latin-based terms, often taken to—to use a phrase of his—*quomodocunquizing*, or "any-old-way-ing," extremes.) Both of these works include an indictment of natural languages for their gross imperfections and a trumpeting of praise for the solution that he had devised. But he never gets around to the details. The remainder of the first work is taken up with an invective against greedy Presbyterians and a history of Scotland. The largest part of the second work consists of a chapter-by-chapter complaint against the "impious dealing of creditors," "covetous preachers," and "pitiless judges" who were compounding his money troubles.

He claimed to have completed a full description of his language, but the manuscript pages had been destroyed when they were appropriated for "posterior uses" by the opposing army after he was taken prisoner at the battle of Worcester. Seven pages from the preface, however, were rescued from under a pile of dead men in the muddy street (thus, "gold out of dung").

Urquhart was such a shockingly self-aggrandizing hack that some scholars have concluded that he must have been joking. He had earlier published a genealogy of his family, placing himself 153rd in line from Adam, and a book on mathematics, which an "admirer" (who happens to use words like *doxologetick* and *philomathets*) said explained the subject in so clear and poetic a manner that it conferred the ability to solve any trigonometry problem, no matter how difficult, "as if it were a knowledge meerly infused from above, and revealed by the peculiar inspiration of some favourable Angel."

The book in question begins:

Every circle is divided into three hundred and sixty parts, called degrees, whereof each one is sexagesimated, subsexagesimated, resubsexagesimated, and biresubsexagesimated.

Ah, the voices of angels. Though Urquhart did have a sense of humor (in fact, he died from laughing too hard at the news that Charles II had been restored to the throne), he was no satirist. If you take the time to beat your way through his suffocating prose, you will find quite earnest (and humorless) proposals.

It is easy to mistake his universal language proposal for satire because it appeared at a time when such proposals were the latest thing. Seventeenth-century philosophers and scientists were complaining that language obscured thinking, that *words* got in the way of understanding *things*. They believed that concepts were clear and universal, but language was ambiguous and unsystematic. A new kind of rational language was needed, one where words perfectly expressed concepts. These ideas *were* later satirized by Swift in *Gulliver's Travels*, when Gulliver visits the "grand academy of Lagado" and learns of its "scheme for entirely abolishing all words whatsoever." Since "words are only names for things," people simply carry around all the things they might need to refer to and produce them from their pockets as necessary.

Gulliver observes especially learned men "almost sinking under the weight of their packs, like pedlars among us; who, when they met in the streets, would lay down their loads, open their sacks, and hold conversation for an hour together: then put up their implements, help each other to resume their burthens, and take their leave."

This scenario illustrates a major problem with the rational lan-

guage idea. How many "things" do you need in order to communicate? The number of concepts is huge, if not infinite. If you want each word in your language to perfectly express one concept, you need so many words that it will be impossible for anyone to learn them all.

But maybe there was a way around this problem. After all, by learning a few basic numbers and a system for putting them together, we can count to infinity. Couldn't the same be done for language? Couldn't we derive everything through a sort of mathematics of concepts?

This was a tremendously exciting idea at the time. In the seventeenth century, mathematical notation was changing everything. Before then, through thousands of years of mathematical developments, there was no plus sign, no minus sign, no symbol for multiplication or square root, no variables, no equations. The concepts behind these notational devices were understood and used, but they were explained in text form. Here, for example, is an expression of the Pythagorean theorem from a Babylonian clay tablet (about fifteen hundred years before Pythagoras):

> 4 is the length and 5 the diagonal. What is the breadth? Its size is not known. 4 times 4 is 16. 5 times 5 is 25. You take 16 from 25 and there remains 9. What times what shall I take in order to get 9? 3 times 3 is 9. 3 is the breadth.

And expressed a little more abstractly by Euclid a couple millennia later:

> In right-angled triangles the square on the side subtending the right angle is equal to the squares on the sides containing the right angle.

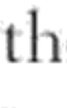
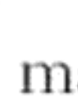
tendent a Secant." He thought a similar approach could be used to make precise, definition-containing words for everything in the universe. All you needed was the right alphabet, and he claims to have devised one so perfect that not only can it generate distinct words for all possible meanings, but the words for stars will show you their exact position in the sky in degrees and minutes, the words for colors will show their exact mixture of light, shadow, and darkness, the names of individual soldiers will show their exact duty and rank. What's more, in comparison with all other languages, it produces the best prayers, the most elegant compliments, the pithiest proverbs, and the most "emphatical" interjections. And besides all that, it is the easiest to learn. He stops short of claiming that it whitens your teeth and cures impotence, but he might as well have. His claims can't be disproved, because he doesn't provide any examples.

The second strategy was to turn words into numbers. This was the approach of Cave Beck, an Ipswich schoolmaster who published his invention (*The Universal Character: By Which All the Nations in the World May Understand One Anothers Conceptions*) in 1657. He assigned numbers to concepts: 1 was "to abandon," 2 "to abash," 3 "to abate," 742 "to embroider," q2126 "gogle-eyed," r2654 "a loosenesse in the belly," p2846 "hired mourners at funerals." (Letters appearing before the numbers were used to indicate part of speech and grammatical concerns such as tense and gender.) He provided a pronunciation key for the numbers so that the language could be spoken out as words (for example, 7 is pronounced "sen"). Though the book opens with a series of poems (by his friends) praising Beck and his invention, his confidence is far less blustery than Urquhart's; he presents his system as merely a practical tool for translating between languages. However, with an ambitious gleam in his eye, he adds that if it

should happen to become a universal language that could unlock "Glorious Truths," he will "judge this pains of mine happily bestowed." He provides only one example of the language in action, the fifth commandment. Honor thy father and thy mother, "leb 2314 p2477 & pf2477," to be pronounced, "Leb toreónfo, pee tofosénsen et pif tofosénsen."

There is an assumption in these approaches that all you have to do to build a perfect language is find the right set of symbols—whether letters, numbers, or line drawings. The focus on symbols was influenced by other, related popular pursuits of the time such as cryptography, shorthand, and kabbalism (seeking divine messages in patterns of letters in ancient texts). Another influence was the widespread interest in hieroglyphics and Chinese writing, which were believed to represent concepts more directly than alphabetic writing systems. But if your goal is to craft a language capable of mathematically exposing the truths of the universe, the form of the symbols you use is relatively unimportant. What is more important is that systematic relations obtain *between* the symbols. The number 1 stands for the concept of oneness, and 100 stands for the concept of onehundredness, but, more important, there is a relationship between oneness and onehundredness that is captured by the relationship between the symbols 1 and 100. And it is the same relationship that obtains between 2 and 200. In Beck's system there is no such relationship between 1 (abandon) and 100 (agarick—a type of mushroom), and if you do find a way to read a relationship into them, it won't be the same as the one between 2 (abate) and 200 (an anthem). The numbers are just labels for words. They might as well *be* words. Both Beck and Urquhart had a vague sense that symbols were capable of systematically capturing relationships between concepts, but they never did the hard work of applying this idea to language.

They could have learned a thing or two from the humble Francis Lodwick, a Dutchman living far from home in London whose 1647 book, *A Common Writing*, was signed simply "a Well-willer to Learning." In his preface he apologizes for the "harshnesse of [his] stile" and entreats "a more abler wit and Pen, to a compleate attyring and perfecting of the Subject." His modesty was partly due to a feeling of inferiority, life-station-wise. He was a merchant with no formal education, which, in the opinion of the author of a later scheme, made him "unequal to the undertaking." But his modesty was also of the hard-earned type—the modesty that all thoughtful and honest scholars must come to (whatever their life station) when their work reveals a vast, churning ocean of difficulty just beyond the charming rivulet they had glimpsed from afar.

The important insight of Lodwick's system wasn't in the symbols he chose (characters that look like capital letters, with various hooks, dots, and squiggles attached) but in the way his symbols expressed relationships between concepts. For example, as shown in figure 4.1, the symbol for "word,"  , is the symbol for "to speak," , combined with a mark denoting "act of . . .": . A word is essentially defined as an act of speaking. The symbol for God,  , is the symbol for "to be," , combined with "act of . . . ,"  , and "proper name,"  . God is the proper name of the act of being (something like "The Embodiment of Existence"). The symbol for man,  , is the symbol for "to understand,"  , combined with "one who . . . ,"  , and "proper name," . Man is "The Understander." Lodwick's major insight was to derive more complex concepts by adding together more basic ones.

Lodwick had hit upon the third method for creating a mathematics of discourse. It was concerned not with mere letters or numbers or symbols but with the relationships between the con-

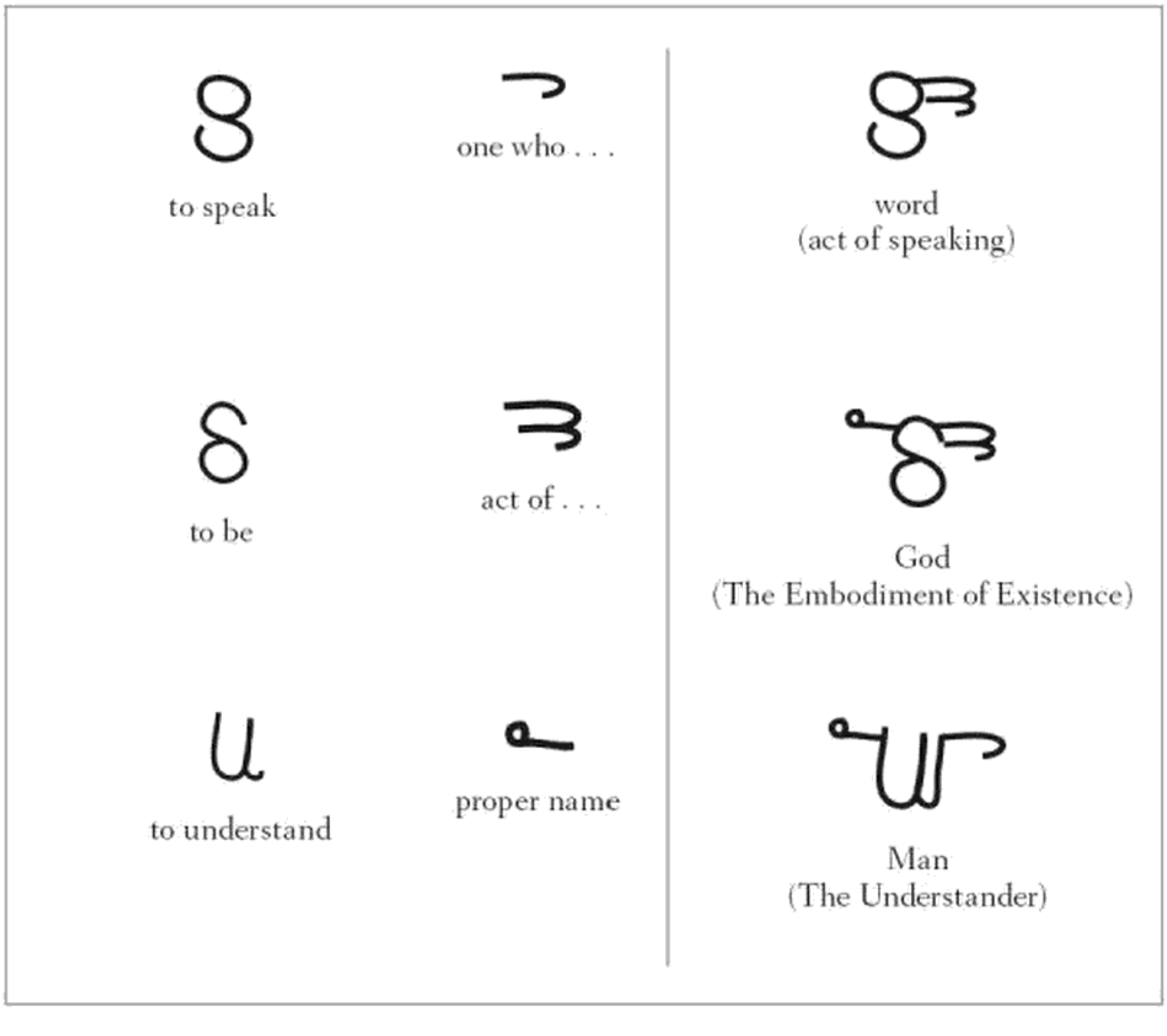


Figure 4.1: Lodwick's symbols

cepts they represented. From a limited set of basic concepts, you could derive everything else through combination. Leibniz would later describe this as a "calculus of thought." The first rule of this calculus was that numbers for concepts "should be produced by multiplying together the symbolic numbers of the terms which compose the concept." So, "since man is a rational animal, if the number of animal, *a*, is 2, and of rational, *r*, is 3, then the number of man, *h*, will be the same as *ar*: in this example, 2 × 3, or 6." The calculations work in reverse as well. If you saw that ape was 10, you could deduce that it was an animal (because it could be divided by 2) but not a rational one (as it can't be divided by 3).

Descartes had also considered this idea a decade or two be-

fore Lodwick. He mused that if you could "explain correctly what are the simple ideas in the human imagination out of which all human thoughts are compounded . . . I would dare to hope for a universal language very easy to learn, to speak and to write." But he never tried his hand at creating such a language, because he thought it would first require a complete understanding of the true nature of everything. While he did think it was "possible to invent such a language and to discover the science on which it depends," he also thought this was unlikely to occur "outside of a fantasyland."

Lodwick had hit upon a solution to the problem of how to make a mathematics of language, but the solution introduced a much bigger problem: How do we know what the basic units of meaning are? How do we define everything in terms of those units?

Well, you can start by figuring out the order of the universe. This was not a ridiculous proposition for the seventeenth-century man of science. It was a difficult proposition, and one that anyone could see would most likely never be adequately fulfilled. But that was no reason not to try. This was the age of reason, and so the rational animal got to work.

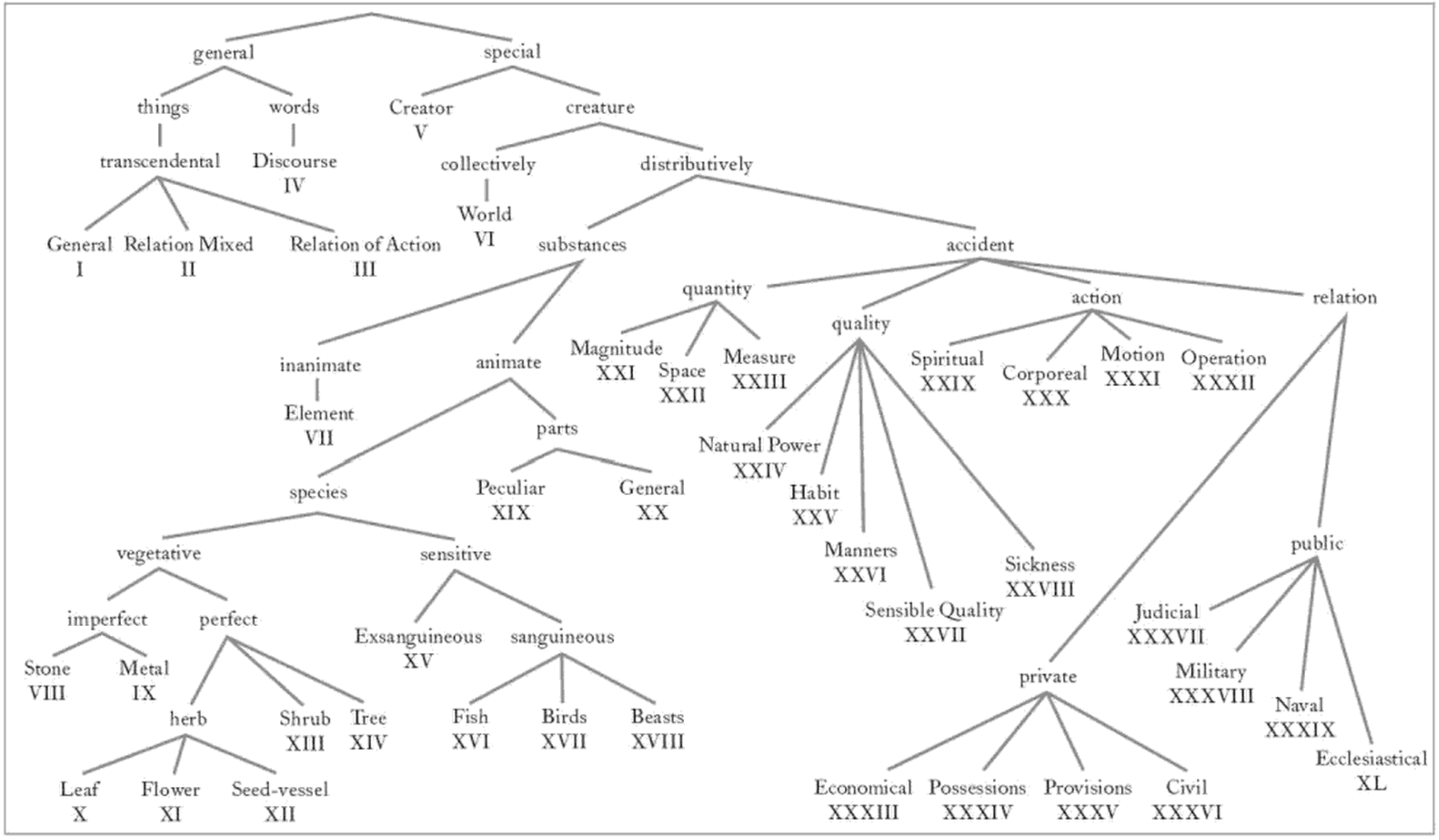


Figure 5.1: Wilkins's tree of the universe

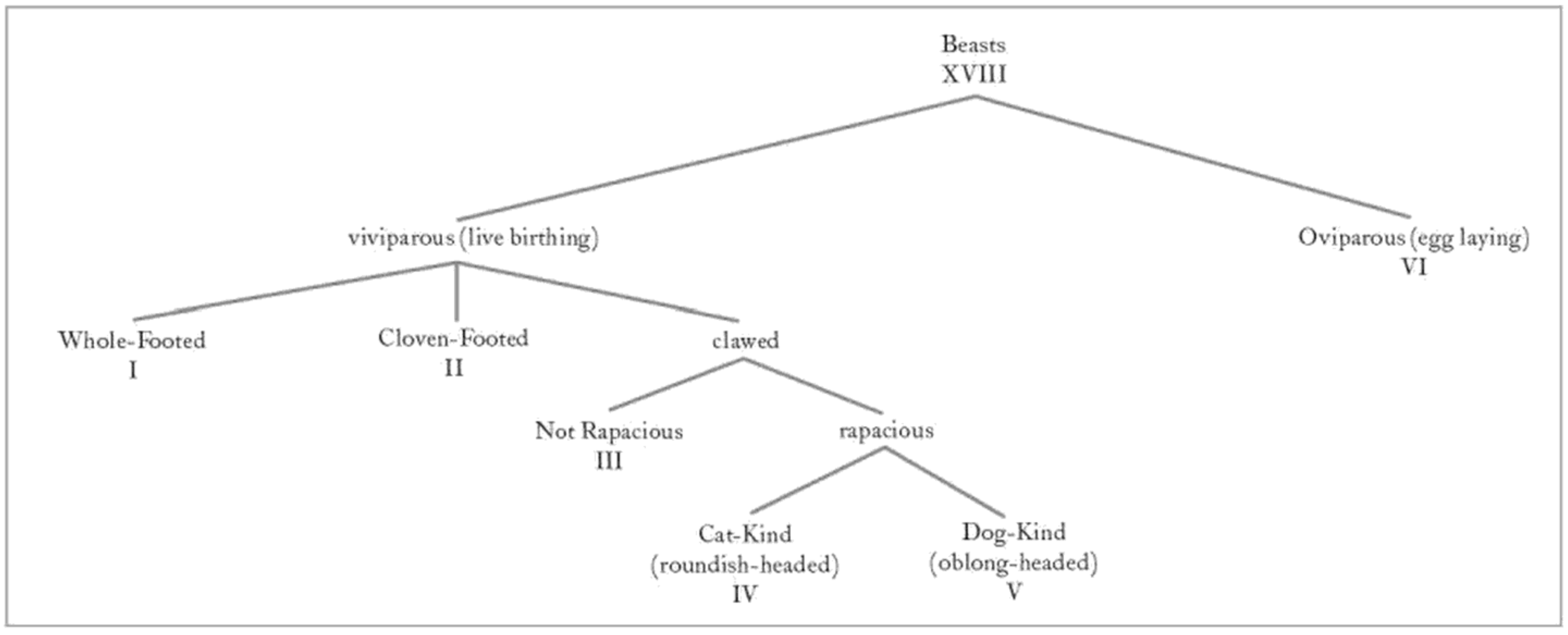


Figure 5.2: Subcategories of beasts

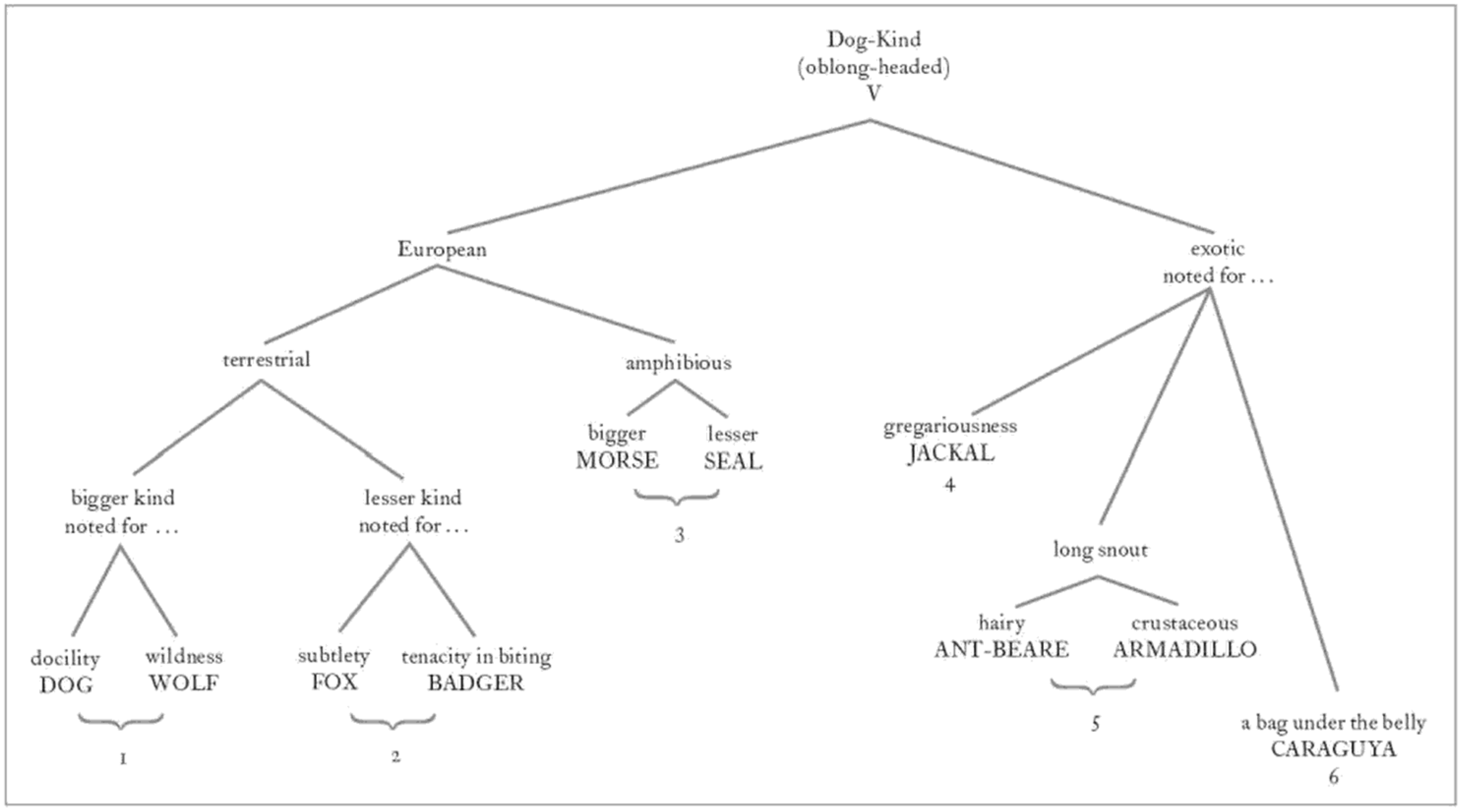


Figure 5.3: Subcategories of oblong-headed beasts