

THE WOOD FOR THE TREES

And other things we cannot see

Meg Miller

I

The trees of a forest communicate, though to us it sounds like silence. We can hear the rustling of leaves and the creaking of trunks, the wind howling through a tree hollow. But that's not how trees talk to each other. Trees converse via underground networks so vast and interconnected that some have taken to calling them the "wood wide web."¹

The main material of the wood wide web is mycelium, the network of fungal threads from which mushrooms sprout. We see mushrooms everywhere in forests, emerging in billowing white heaps or scalloped folds; popping from the earth after a day of rain. But mushrooms are just the part of a fungus that's visible above ground—below the surface, miles of mycelium form fibrous webs that extend throughout the forest floor. The individual threads are delicate and fine; they branch infinitely and cluster together, appearing like plates of bright white fur. The networks they form are massive, complex, and alive.

Because the fungi live in darkness, they form symbiotic relationships with trees to survive. They trade nitrogen and phosphorus from the soil below for water and photosynthate from the sunlit world above, an exchange made through the trees' root systems. Trees that have the same type of fungi are connected by these subterranean networks, which connect to other networks, meaning that even different species are bound together by the wood wide web: cedar murmurs to maple; birch to hemlock to Douglas fir; Douglas fir to ponderosa pine.

1

The term was coined by Suzanne Simard in her paper "Net transfer of carbon between ectomycorrhizal tree species in the field," published in *Nature* in 1997.

The networks also allow for another type of trade, one in which nutrients and carbon travel from tree to tree, when needed. It allows for trees to send other trees chemical signals of distress or warning, if one is being cut down, for example, or attacked by parasitic insects. An older tree that's dying can bequeath its stored up carbon to the younger trees around it through this network, a transfer of knowledge that preserves the legacy of the old forest for and in a newer one. Suzanne Simard, the scientist who pioneered research on how trees converse, colloquially calls these older trees "mother trees," because they look out for the younger ones, and because—although they speak across species—they also recognize and nurture their own kin.

Simard first published her research on the networked communication of trees in 1997, but it is only recently that it has been widely accepted by the scientific community. At first, Simard was dismissed by many of her peers, who saw her research as counter to the idea that species must compete with each other in order to survive, per Darwinism. Simard's research tells a different evolutionary story than the one that solidified over the last century: her discovery confirms that while trees compete, they also collaborate. The well-being and survival of one tree is linked to the well-being and survival of others, just like all social creatures. The forest is an ecosystem woven together by subterranean fungal networks, through which trees communicate and coordinate the forest's survival, using what has been referred to as the "secret language of trees."

II

What makes a language secret? At its most basic, a secret language is one that can be understood by one group and not by another. But all languages are gibberish to those who have never learned them. Perhaps it is more about intention: secret languages are intentionally encoded to be meaningful to an in-group and illegible to outsiders. Or maybe, like the underground language of trees, a secret language must just be, in some way, hidden.

For six years, the artist Amy Suo Wu has built her practice around researching steganography, which she succinctly defines as “the art and science of hiding in plain sight.” Steganography can be coded language like jargon, slang, or in-speak, or it can take the form of words hidden inside pictures, or encoded into textiles. But unlike cryptography, steganography is not encrypted—it is only hidden to those who overlook it. “At the heart of steganography is the instrumentalization of the seemingly innocuous,” Wu writes. “The skin of a steganographic object blends in with its environment, deflecting the unknowing gaze of the onlooker.”²

My favorite example of steganography in Wu’s *A Cookbook of Invisible Writing* is a syllabic script called Nüshu (literally, “women’s language” in Chinese). Nüshu was developed in the ninth century by women in the rural Jiangyong county of China’s Hunan province; today, it’s still the world’s only script used exclusively by women. Made up of dots and three different types of strokes—horizontals, verticals, and arcs—the script is derived from square Chinese characters, but the results are simpler and vertically stretched, elegantly elongated. The strokes are curved diagonals that branch and cluster, and which can be so thin as to be described as threadlike.

Nüshu was passed down from mothers to daughters and spoken among sisters and friends. The women who created it didn’t have access to formal education in their feudal society; Nüshu was the only language they could read or write. Women wrote letters to each other in Nüshu, recorded their lives in clothbound booklets, created songs and ballads, all in their own private script. They embroidered the wispy calligraphy on silk clothes, handkerchiefs, and belts; inscribed song lyrics on fans; asked their friends to bury their papers with them after their deaths. “Women’s work” like sewing and embroidery provide the archive of most of the Nüshu artifacts that remain today.

Men in Jiangyong county couldn’t read Nüshu. But as Wu writes, it wasn’t because Nüshu was explicitly intended to exclude them. Rather, the men just never bothered to learn it. The women created, in the absence of one, a writing system that they could use to correspond with each other and record

²
“Dark Cousins: #1
An Introduction to
Steganography”
by Amy Suo Wu,
Source Type, 2021.

their own histories; to form a sense of belonging, autonomy, and social cohesion. In that way, Nūshu was coded, but it was never intentionally hidden. What made this language secret was that it was unvalued and overlooked.

In her book, Wu notes that while cryptography requires some sort of key or mathematical formula to decode, steganography (sometimes called cryptography's "dark cousin") relies on cultural apathy or misunderstanding to remain coded. It stands to reason then that teenagers, perpetually and notoriously misunderstood, are masters of open code. In a 2010 paper on teens and online privacy, media scholar danah boyd uses the term "social steganography" to describe social media posts written by teenagers so that they're understood by their friends but misinterpreted by their parents. Unable to control their own digital or physical privacy, the teens boyd talked to attempted instead to limit access to the meaning of their messages. They did this by, for example, encoding the meaning in song lyrics, inside jokes, or circumstantial references that only some followers would understand. Taking advantage of the fact that they were so often misunderstood or not taken seriously, viewed as frivolous or immature, the teens subverted their own surveillance, allowing for them to communicate privately in "networked publics."³

III

In Dalarna, Sweden, another teenage steganography runs parallel to the network of tree chatter happening underground, mimicking the collaboration of the birch and Douglas fir, but visible to us only if we care to look. Grand old Scotch pines can be found in the forests there, thick, gnarled, and covered in carvings. Shepherds from the seventeenth to the early twentieth centuries—almost all of whom were unmarried women, the majority of whom were teenage girls—left messages for each other on the tree trunks and in stone. The shepherds carved their initials, the dates, notes to each other, and assertions of existence. *Here we draw our names.*

Tasked with taking the family's livestock to graze in greener pastures, these girls were given a responsibility they didn't hold

3
"Social Steganography:
Privacy in Networked
Publics" by danah boyd,
2010.

in normal village life, and a lot more freedom. They worked collectively on the *fäbod*, or summer farm, to herd and milk the cattle, churn the butter, make the cheese. They slept together in wooden chalets, summer-camp style. There they also made their mark, with teenage freneticism; blanketing every inch of the wooden interiors, from the walls to the ceilings to the furniture, with their coded language. They wrote with melodrama (*we've lost three cows*) and hubris (*I draw my name with honor and no shame*); they swore (*we feel damn good*); they got homesick (*I long for home*). They wrote to themselves, to each other, and to future shepherds, with a language and a sentiment that would be understood by others like them.

Beginning in the late eighteenth century, the shepherds would let the cattle roam freely while they worked at the chalet, calling them home at the end of the day with the hypnotic, reverberating melodies of *kulning*. But in earlier days, the girls would take the cattle to pasture themselves, leaving the activity of the base camp to herd them alone for the entire stretch of daylight. It was probably painfully boring, out in the forest glade, watching the cows chew grass from under the shade of a pine. There's nothing so slow and sap-like as the passage of time for a teenager on duty, siloed from the drama, gossip, and far more interesting happenings of literally anywhere else. So they talked to each other through the trees. With an iron ax, they'd remove the bark and carve their initials onto the smooth wood, along with a short message for the next herder. They marked time—for themselves, as a way of quickening their solitude, and for us, by carving the seasons and years that they were there.

Some were written in the Dalecarlian runes, a local variety of the runic alphabet, used to write various Germanic languages before the Latin alphabet was adopted. As the last surviving runes, Dalecarlian runes looked similar to Latin letterforms, though more angular and with no horizontal strokes—better for carving into wood. Sometimes, the shepherds' messages were encrypted by "braided writing," a simple form of cryptography that will be familiar to anyone who has passed notes in class (HKLHSD 1786 = HLS KHD 1786). Sometimes they were

mirrored, or written in reverse. But mostly, the tree writings were an open code, a form of in-speak visible to all, but whose meaning is held only for those who see the social significance. The carvings were left behind for a specific audience: their authors knew that another girl would come after them, minding the cattle under the hot sun, desperate for something to read. She would look out for, see, and understand the social code.

Many more would overlook it. The fact that these carvings have not been better documented or written about more widely is evidence of that. Much of the old forest has by now been cut down for logging, but the carved trees that remain preserve their legacy and pass on their messages. Some of the trees are charred from forest fires; others have grown new bark, moss, or tree knobs around them. Still, the Dalecarlian shepherds chose the right vessels for their missives: pine trees can live up to 700 years with no human intervention, and stand another 300 years after their death.

Societies consciously recognize and actively preserve only what they value, but the unofficial toil of memory work is often "women's work." Embroidered into clothing, carved into trees, written into decades-old scientific papers, this work might linger on the edges, or be shrouded in innocuousness. It might hide in plain sight until someone is ready to look, which is the only key needed to break the code. Attention is a crucial precursor of understanding, and to give something your attention you must first see it. The shepherds must have known that too; they often began their messages with *SI*, meaning "look here."