

Seanán McGuire

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Hello, Hello; Can You Hear Me, Hello

Tasha's avatar smiled from the screen, a little too perfect to be true. That was a choice, just like everything else about it: When we'd installed my sister's new home system, we had instructed it to generate avatars that looked like they had escaped the uncanny valley by the skins of their teeth. It was creepy, but the alternative was even creepier. Tasha didn't talk. Her avatar did. Having them match each other perfectly would have been...wrong.

"So I'll see you next week?" she asked. Her voice was perfectly neutral, with a newscaster's smooth, practiced inflections. Angie had picked it from the database of publicly available voices; like the avatar, it had been generated in a lab. Unlike the avatar, it was flawless. No one who heard Tasha "talk" would realize that they were really hearing a collection of sounds programmed by a computer, translated from the silent motion of her hands.

That was the point. Setting up the system for her had removed all barriers to conversation, and when she was talking to clients who didn't know she was deaf, she didn't want them to realize anything was happening behind the scenes. Hence the avatar, rather than the slight delay that came with the face-time translation programs. It felt wrong to me, like we were trying to hide something essential about my sister, but it was her choice and her system; I was just the one who upgraded her software and made sure that nothing broke down. If anyone was equipped for the job, it was me, the professional computational linguist. It's a living.

“We’ll be there right on time,” I said, knowing that on her end, my avatar would be smiling and silent, moving her hands to form the appropriate words. I could speak ASL to the screen, but with the way her software was set up, speaking ASL while the translator settings were active could result in some vicious glitches. After the time the computer had decided my hand gestures were a form of complicated profanity, and translated the chugging of the air conditioner into words while spewing invective at my sister, I had learned to keep my hands still while the translator was on. “I’m bringing Angie and the kids, so be ready.”

Tasha laughed. “I’ll tell the birds to be on their best behavior.” A light flashed behind her avatar and her expression changed, becoming faintly regretful. “Speaking of the birds, that’s my cue. Talk tomorrow?”

“Talk tomorrow,” I said. “Love you lots.”

“I love you, too,” she said and ended the call, leaving me staring at my own reflection on the suddenly black screen. My face, so much like her computer-generated one, but slightly rougher, slightly less perfect. Humanity will do that to a girl.

Finally, I stood and went to tell my wife we had plans for the next weekend. She liked my sister, and Greg and Billie liked the birds. It would be good for us.

“Hello,” said the woman on the screen. She was black-haired and brown-eyed, with skin that fell somewhere between “tan” and “tawny.” She was staring directly at the camera, almost unnervingly still. “Hello, hello.”

“Hello!” said Billie happily, waving at the woman. Billie’s nails were painted bright blue, like beetle shells. She’d been on an entomology kick again lately, studying every insect she found as raptly as if she had just discovered the secrets of the universe. “How are you?”

“Hello,” said the woman. “Hello, hello, hello.”

“Billie, who are you talking to?” I stopped on my way to the laundry room, bundling the basket I’d been carrying against my hip. The woman didn’t look familiar, but she had the smooth, CGI skin of a translation avatar. There was no telling what her root language was. The natural user interface of the software would be trying to mine its neural networks for the places where she and Billie overlapped, looking for the points of commonality and generating a vocabulary that accounted for their hand gestures and body language, as well as for their vocalizations.

It was a highly advanced version of the old translation software that had been rolled out in the late 2010s; that had been verbal-only, and only capable of translating sign language into straight text, not into vocalizations that followed spoken sentence structures and could be played through speakers. ASL to speech had followed, and then speech to ASL, with increasingly realistic avatars learning to move their hands in the complex patterns necessary for communication. Now, the systems could be taught to become ad hoc translators, pulling on the full weight of their neural networks and deep learning capabilities as they built bridges across the world.

Of course, it also meant that we had moments like this one, two people shouting greetings across an undefined void of linguistic separation. “Billie?” I repeated.

“It’s Aunt Tasha’s system, Mom,” said my nine-year-old, turning to look at me over her shoulder. She rolled her eyes, making sure I understood just how foolish my concern really was. “I wouldn’t have *answered* if I didn’t recognize the caller.”

“But that’s not Aunt Tasha,” I said.

Billie gave me the sort of withering look that only people under eighteen can manage. She was going to be a terror in a few years. “I know that,” she said. “I think she’s visiting to see the birds. Lots of people visit to see the birds.”

“True,” I said, giving the woman on the screen another look. Tasha’s system was set up to generate a generic avatar for anyone who wasn’t a registered user. It would draw on elements of their appearance—hair color, eye color, skin tone—but it would otherwise assemble the face from public-source elements. “Hello,” I said. “Is my sister there?”

“Hello,” said the woman. “Hello, hello.”

“I don’t think the computer knows her language very well,” said Billie. “That’s all she’s said.”

Which could mean a glitch. Sometimes, when the software got confused enough, it would translate everything as “hello.” An attempt at connection, even when the tools weren’t there. “I think you may be right,” I said, moving to get closer to the computer. Billie, recognizing the shift from protective mother to computer scientist with a mystery to solve, shifted obligingly to the side. She would never have tolerated being smothered, but she was more than smart enough not to sit between me and a puzzle.

“Is Tasha there?” I asked again, as clearly as I could.

The woman looked at me and said nothing.

"I need to know what language you're speaking. I'm sorry the translator program isn't working for you, but if I know what family to teach it, I can probably get it up and running in pretty short order." Everything I said probably sounded like "hello, hello" to her, but at least I was trying. That was the whole point, wasn't it? Trying. "Can you say the name of your language? I am speaking casual conversational English." No matter how confused the program was, it would say "English" clearly. Hopefully that would be enough to get us started.

"Hello, hello," said the woman. She looked to her right, eyes widening slightly, as if she'd been startled. Then she leaned out of the frame and was gone. The image of Tasha's dining room continued for several seconds before the computer turned itself off, leaving Billie and I to look, bemused, at an empty screen.

Finally, hesitantly, Billie asked, "Was that one of Aunt Tasha's friends?"

"I don't know," I said. "I'll call her later and ask."

I forgot to call.

In my defense, there were other things to do, and none of them were the sort that could easily be put off until tomorrow. Greg, our two-year-old, discovered a secret snail breeding ground in the garden and transported them all inside, sticking them to the fridge like slime-generating magnets. Greg thought this was wonderful. The snails didn't seem to have an opinion. Angie thought this was her cue to disinfect the entire house, starting with the kitchen, and left me to watch both kids while I was trying to finish a project for work. It was really no wonder I lost track of them. It was more of a wonder that it took me over an hour to realize they were gone.

Angie wasn't shouting, so the kids hadn't wandered back into the kitchen to get in the way of her frenzied housework. I stood, moving carefully as I began my search. As any parent can tell you, it's better to keep your mouth shut and your eyes open when you go looking for kids who are being unreasonably quiet. They're probably doing something they don't want you to see, and if they hear you coming, they'll hide the evidence.

I heard them laughing before I reached the living room. I stopped making such an effort to mask my footsteps, and came around the corner of the doorway to find them with their eyes glued to the computer, laughing at the black-haired woman from before.

“Hello, hello,” she was saying. “I’m hungry, hello, can you hear me?”

Greg laughed. Billie leaned forward and said, “We can hear you. Hello, hello, we can hear you!” This set Greg laughing harder.

The woman on the screen looked from one child to the other, opened her mouth, and said, “Ha-ha. Ha-ha. Ha-ha. Hello, hello, can you hear me?”

“What’s this?” I asked.

Billie turned and beamed at me. “Auntie Tasha’s friend is back, and the program is learning more of her language! I’m doing like you told me to do if I ever need to talk to somebody the neural net doesn’t know, and using lots of repeating to try and teach it more.”

“The word you want is ‘echolalia,’” I said distractedly, leaning past her to focus on the screen. “You’re back. Hello. Is my sister there?”

“Hello, hello,” said the woman. “Can you hear me? I’m hungry.”

“Yes, I got that,” I said, trying to keep the frustration out of my voice. It wasn’t her fault that her language—whatever it was—was causing issues with the translation software. Tasha’s neural net hadn’t encountered as many spoken languages as ours had. It could manage some startlingly accurate gesture translations, some of which we had incorporated into the base software after they cropped up, but it couldn’t always pick up on spoken languages with the speed of a neural net belonging to a hearing person. Tasha also had a tendency to invite visiting academics and wildlife conservationists to stay in her spare room, since they were presumably used to the screeching of wild birds.

“If not for them,” she had said more than once, “you’re the only company I’d ever have.”

It was hard to argue with that. It was just a little frustrating that one of her guests kept calling my kids. “Can you please tell Tasha to call me? I want to speak with her.”

“Hello, hello,” said the woman.

“Good-bye,” I replied and canceled the call.

Both children looked at me like I had done something terribly wrong. “She just wanted someone to talk to,” said Billie mulishly.

“Let me know if she calls again, all right? I don’t know who she is, and I’m not comfortable with you talking to her until I’ve spoken to Tasha.”

“Okay, Mom,” said Billie.

Greg frowned but didn’t say anything. I leaned down and scooped him onto my shoulder. That got a squeal, followed by a trail of giggles. I straightened.

“Come on, you two. Let’s go see if we can’t help Mumma in the kitchen.”

They went willingly enough. I cast a glance back at the dark computer screen. This time, I would definitely remember to call my sister.

As always, reaching Tasha was easier said than done. She spent much of her time outside feeding and caring for her birds, and when she was in the house, she was almost always doing some task related to her work. There were flashing lights in every room to tell her when she had a call, but just like everyone else in the world, sometimes she ignored her phone in favor of doing something more interesting. I could have set my call as an emergency and turned all the lights red, but that seemed like a mean trick, since “I wanted to ask about one of your houseguests” wasn’t really an emergency. Just a puzzle. There was always a puzzle; had been since we were kids, when her reliance on ASL had provided us with a perfect “secret language” and provided me with a bilingual upbringing—something that had proven invaluable as I grew up and went into neurolinguistic computing.

When we were kids signing at each other, fingers moving almost faster than the human eye could follow, our hands had looked like birds in flight. I had followed the words. My sister had followed the birds. They needed her, and they never judged her for her differences. What humans saw as disability, Tasha’s birds saw as a human who was finally quiet enough not to be startling, one who wouldn’t complain when they started singing outside her window at three in the morning. It was the perfect marriage of flesh and function.

After two days of trying and failing to get her to pick up, I sent an email. *Just checking in, it said. Haven’t been able to rouse you. Do you have houseguests right now? Someone’s been calling the house from your terminal.*

Her reply came fast enough to tell me that she had already been at her computer. *A few grad students came to look @ my king vulture. He is very impressive. One of them could have misdialed? It’s not like I would have heard them. ;) We still on for Sunday?*

I sent a call request. Her avatar popped up thirty seconds later, filling the screen with her faintly dubious expression.

“Yes?” she said. “Email works, you know.”

“Email is too slow. I like to see your face.”

She rolled her eyes. “It’s all the same to me,” she said. “I know you’re not really signing. I prefer talking to you when I can see your hands.”

“I’m sorry,” I said. “Greg’s ASL is progressing really well. We should be able to go back to real-time chat in a year or so. Until then, we need to keep the vocals on, so he can get to know you, too. Look how well it worked out with Billie.”

Tasha’s expression softened. She’d been dubious when I’d explained that we’d be teaching Billie ASL but using the voice translation mode on our chat software; we wanted Billie to care about getting to know her aunt, and with a really small child, it had seemed like the best way. It had worked out well. Billie was fluent enough in ASL to carry on conversations with strangers, and she was already writing letters to our local high schools, asking them to offer sign language as an elective. Greg was following in her footsteps. I really was pretty sure we’d be able to turn off the voice translation in another year or so.

To be honest, I was going to be relieved when that happened. I was lazy enough to appreciate the ease of talking to my sister without needing to take my hands off the keyboard, but it was strange to *hear* her words, rather than watching them.

“I guess,” she said. “So what was up with the grad students? One of them called the house?”

“I think so,” I said. “She seemed a little confused. Just kept saying ‘hello’ over and over again. Were any of them visiting from out-of-country schools? Someplace far enough away that the neural net wouldn’t have a solid translation database to access?” Our systems weren’t creating translation databases out of nothing, of course—that would have been programming well above my pay grade, and possibly a Nobel Prize for Humanities—but they would find the common phonemes and use them to direct themselves to which shared databases they should be accessing. Where the complicated work happened was in the contextual cues. The hand gestures that punctuated speech with “I don’t know” and “yes” and “I love you.” The sideways glances that meant “I am uncomfortable with this topic.” Bit by bit, our translators put those into words, and understanding grew.

(And there were people who used their translators like Tasha did, who hid silent tongues or a reluctance to make eye contact behind computer-generated faces and calm, measured voices, who presented a completely default face to the world and took great comfort in knowing that the people

who would judge them for their differences would never need to know. I couldn't fault them for that. I was the one who asked my sister to let me give her a voice, like grafting a tongue onto Hans Christian Anderson's Little Mermaid, for the duration of my children's short infancy.)

"I don't know," she said, after a long pause. "Only two of them spoke ASL. The other three spoke through their professor, and I've known her for years. Why? Did she say something inappropriate to the kids?"

"No, just 'hello,' like I said. Still, it was strange, and she called back at least once. Black hair, medium brown skin. I didn't get a name."

"If I see someone like that, I'll talk to her about privacy and what is and is not appropriate when visiting someone else's home."

"Thanks." I shook my head. "I just don't like strangers talking to the kids."

"Me, neither."

We chatted for a while after that—just ordinary, sisterly things, how the kids were doing, how the birds were doing, what we were going to have for dinner on Sunday—and I felt much better when I hung up and went to bed.

When I woke up the next morning, Greg and Billie were already in the dining room, whispering to the computer. By the time I moved into position to see the monitor, it was blank, and neither of them would tell me who they'd been talking to—assuming they had been talking to anyone at all.

We arrived at Tasha's a little after noon. As was our agreement, we didn't knock; I just pressed my thumb to the keypad and unlocked the door, allowing our already-wiggling children to spill past us into the bright, plant-strewn atrium. Every penny Tasha got was poured back into either the house or the birds—and since the birds had the run of the house, every penny she put into the house was still going to the birds. Cages of rescued finches, budgies, and canaries twittered at us as we entered, giving greeting and expressing interest in a series of short, sharp chirps. Hanging plants and bright potted irises surrounded the cages, making it feel like we had just walked into the front hall of some exclusive conservatory.

That, right there, was why Tasha spent so much money on the upkeep and decor of her home. It was a licensed rescue property, but keeping it looking like something special—which it was—kept her neighbors from complaining.

Opening the door had triggered the flashing warning lights in the corners of the room. Tasha would be looking for us, and so we went looking for her, following the twitter of birds and the shrieking laughter of our children.

Our parties collided in the kitchen, where Billie was signing rapid-fire at her aunt while Greg tugged at her arm and offered interjections, his own amateurish signs breaking into the conversation only occasionally. A barn owl was perched atop the refrigerator. That was par for the course at Tasha's place, where sometimes an absence of birds was the strange thing. The door leading out to the screened-in patio was open, and a large pied crow sat on the back of the one visible chair, watching us warily. Most of that wariness was probably reserved for the owl. They would fight, if given the opportunity, and Tasha didn't like breaking up squabbles between birds she was rehabilitating. Birds that insisted on pecking at each other were likely to find themselves caged. The smarter birds—the corvids and the big parrots—learned to play nicely, lest they be locked away.

I waved. Tasha glanced over, beamed, and signed a quick 'hello' before she went back to conversing with my daughter. The world had narrowed for the two of them, becoming nothing more than the space of their hands and the words they drew on the air, transitory and perfect.

The computer was on the table, open as always. I passed the day bag to Angie, pressing a quick kiss to her cheek before I said, "I'm going to go check on the neural net. Let me know if you need me."

"Yes, leave me alone with your sister in the House of Birds," she said, deadpan. I laughed and walked away.

Part of the arrangement I had with Tasha involved free access to her computer. She got the latest translation software and endless free upgrades to her home neural net; I went rooting through the code whenever I was in the house. She didn't worry about me seeing her browser history or stumbling across an open email client; we'd been sharing our password-locked blogs since we were kids. What was the point of having a sister if you couldn't trade bad boy-band RPF once in a while?

Flipping through her call history brought up the usual assortment of calls to schools, pet supply warehouses, and local takeout establishments, all tagged under her user name. There were seven guest calls over the past week. Three of them were to the university, and pulling up their profiles showed that the people who had initiated the calls had loaded custom avatars, dressing their words in their own curated faces. The other four...

The other four were anonymous, and the avatar had been generated by the system, but not retained. All four had been made from this computer to the first number in its saved database. Mine.

I scribbled down the time stamps and went to join the conversation in the kitchen, waving a hand for Tasha's attention. She turned, expression questioning. I handed her the piece of paper and signed, "Did you have the same person in the house for all four of these calls?"

Tasha frowned. "No," she signed back. "I had some conservationists for this one, picking up an owl who'd been cleared for release," she tapped the middle entry on the list, "but all those other times, I was alone with the birds. What's going on?"

"Could it be a system glitch?" asked Angie, speaking and signing at the same time. She preferred it that way, since it gave her an excuse to go slowly. She said it was about including Greg in the conversation, and we let her have that; if it kept her from becoming too self-conscious to sign, it was a good thing.

"It could," I signed. Silence was an easy habit to fall back into in the company of my sister. "I'd have to take the whole system apart to be sure. Tasha, are you all right with my cloning it and unsnarling things once I get home?"

"As long as this glitch isn't going to break anything, I don't care," she signed.

I nodded. "It should be fine," I signed. "If it's a system error, that would explain why our caller keeps saying 'hello' and never getting any further. I'll be able to let you know in a couple of days."

Billie tugged on Tasha's sleeve. We all turned. Billie beamed. "Can we see the parrots now?" she signed. Tasha laughed, and for a while, everything was normal. Everything was the way it was supposed to be.

My snapshot of Tasha's system revealed no errors with the code, although I found some interesting logical chains in her translation software's neural network that I copied over and sent to R&D for further analysis. She had one of the most advanced learning systems outside of corporate, in part because she was my sister, and in part because she was a bilingual deaf person, speaking both American and British Sign Language with the people she communicated with. Giving her a system that could handle the additional nonverbal processing was allowing us to build out a better neural chain and

translation database than any amount of laboratory testing could produce, with the added bonus of equipping my sister to speak with conservationists all over the world. It's always nice when corporate and family needs align.

The calls were being intentionally initiated by someone who had access to Tasha's computer. There was no way this was a ghost in the machine or a connection routing error. Malware was still a possibility, given the generic avatar; someone could be spoofing the machine into opening the call, then overlaying the woman onto the backdrop of Tasha's dining room. I didn't know what purpose that would serve, unless this was the warm-up to some innovative denial-of-service attack. I kept digging.

"Hello? Hello?"

My head snapped up. The voice was coming from the main computer in the dining room. It was somehow less of a surprise when Billie answered a moment later: "Hello! How are you?"

"Hello, hello, I'm fine. I'm good. I'm hungry. How are you?"

I rose from my seat, using the table to steady myself before walking, carefully, quietly, toward the next room. There was Billie, seated in front of the terminal, where the strange woman's image was once again projected. Greg was nowhere to be seen. He was probably off somewhere busying himself with toddler projects, like stacking blocks or talking to spiders, leaving his sister to unwittingly assist in industrial espionage.

"Billie?"

Billie turned, all smiles, as the woman on the screen shifted her focus to me, cocking her head slightly to the side to give herself a better view. "Hi, Mom!" my daughter chirped, her fingers moving in the appropriate signs at the same time. "I figured it out!"

"Figured what out, sweetie?"

"Why we couldn't understand each other!" She gestured grandly to the screen where the black-haired woman waited. "Mumma showed me."

I frowned, taking a step closer. "Showed you what?"

"Hello, hello; can you hear me? Hello," said the woman.

"Hello," I said, automatically.

Billie was undaunted. "When we went to see Aunt Tasha, Mumma used her speaking words and her finger words at the same time, so Greg could

know what we were saying. She was bridging.” Her fingers moved in time with her lips. ASL doesn’t have the same grammatical structure as spoken English; my daughter was running two linguistic processing paths at the same time. I wanted to take the time to be proud of her for that. I was too busy trying to understand.

“You mean she was building a linguistic bridge?” I asked.

Billie nodded vigorously. “Yeah. Bridging. So I thought maybe we couldn’t understand each other because the neural net didn’t have enough to work with, and I turned off the avatar setting on this side.”

My heart clenched. The avatar projections for Billie and Greg were intended to keep their real faces hidden from anyone who wasn’t family. It was a small precaution, but anything that would keep their images off the public Internet until they turned eighteen was a good idea as far as I was concerned. “Billie, we’ve talked about the avatars. They’re there to keep you safe.”

“But she needed to see my hands,” said Billie, with serene childhood logic. “Once she could, we started communicating better. See? I just needed to give the translator more data!”

“Hello,” said the woman.

“Hello,” I said, moving closer to the screen. After a beat, I followed the word with the appropriate sign. “What’s your name? Why do you keep calling my house?”

“I’m hungry,” said the woman. “I’m hungry.”

“You’re not answering my question.”

The woman opened her mouth like she was laughing, but no sound came out. She closed it again with a snap and said, “I’m hungry. I don’t know you. Where is the other one?”

“Here I am!” said Billie, pushing her way back to the front. “Sorry about Mom. She doesn’t understand that we’re doing science here.”

“Science, yes,” said the woman obligingly. “Hello, hello. I’m hungry.”

“I get hungry, too,” said Billie. “Maybe some cereal?”

I took a step back, letting the two of them talk. I didn’t like the idea of leaving my little girl with a live connection to God-knows-who. I also didn’t like the thought that this call was coming from my sister’s house. If she was

out back with the birds, she would never hear an intruder, and I couldn't call to warn her while her line was in use.

Angie was in the kitchen. "Billie's on the line with our mystery woman," I said quickly, before she could ask me what was wrong. "I'm going to drive to Tasha's and see if I can't catch this lady in the act."

Angie's eyes widened. "So you just *left* Billie on the line?"

"You can supervise her," I said. "Just try to keep her from disconnecting. I can make this stop, but I need to go."

"Then go," said Angie. I'd be hearing about this later. I knew that, just like I knew I was making the right call. Taking Billie away from the computer wouldn't stop this woman from breaking into my sister's house and calling us, and one police report could see Tasha branded a security risk by the company, which couldn't afford to leave software patches that were still under NDA in insecure locations.

Tasha lived fifteen minutes from us under normal circumstances. I made the drive in seven.

Her front door was locked, but the porch light was on, signaling that she was home and awake. I let myself in without ringing the bell. She could yell at me later. Finding out what was going on was more important than respecting her privacy, at least for right now. I felt a little bad about that. I also knew that she would have done exactly the same thing if our positions had been reversed.

I slunk through the house, listening for the sound of Billie's voice. Tasha kept the speakers on for the sake of the people who visited her and used her computer to make calls. She was better at accommodation than I was. The thought made my ears redden. My sister, who had spent most of her life fighting to be accommodated, made the effort for others when I was willing to focus on just her. I would be better, I promised silently. For her sake, and for the sake of my children, I would be better.

I didn't hear Billie. Instead, I heard the throaty croaking of a crow from somewhere up ahead. It continued as I walked down the hall and stepped into the kitchen doorway. And stopped.

The pied crow that Tasha had been rehabilitating was perched on the back of the chair across from the computer, talons digging deep into the wood as it cocked its head and watched Billie's image on the screen. Billie's mouth moved; a squawk emerged. The crow croaked back, repeating the same

sounds over and over, until the avatar was matching them perfectly. Only then did it move on to the next set of sounds.

I took a step back and sagged against the hallway wall, heart pounding, head spinning with the undeniable reality of what I had just seen. A language the neural net didn't know, one that depended on motion and gesture as much as it did on sound. A language the system would have been exposed to enough before a curious bird started pecking at the keys that the program could at least *try* to make sense of it.

Sense enough to say "hello."

An air of anticipation hung over the lab. The pied crow—whose name, according to Tasha, was Pitch, and who had been raised in captivity, bouncing from wildlife center to wildlife center before winding up living in my sister's private aviary—gripped her perch stubbornly with her talons and averted her eyes from the screen, refusing to react to the avatar that was trying to catch her attention. She'd been ignoring the screen for over an hour, shutting out four researchers and a bored linguist who was convinced that I was in the middle of some sort of creative breakdown.

"All right, Paulson, this was a funny prank, but you've used up over a dozen computing hours," said Mike, pushing away from his own monitor. He was one of the researchers, and had been remarkably tolerant so far. "Time to pack it in."

"Wait a second," I said. "Just...just wait, all right? There's one thing we haven't tried yet."

Mike looked at me and frowned. I looked pleadingly back. Finally, he sighed.

"Admittedly, you've encouraged the neural net to make some great improvements. You can have one more try. But that's it! After that, we need this lab back."

"One more is all I need."

I'd been hoping to avoid this. It would've been easier if I could have replicated the original results without resorting to re-creation of all factors. Not easier for the bird: easier for my nerves. Angie was already mad at me, and Tasha was unsettled, and I was feeling about as off-balance as I ever did.

Opening the door and sticking my head out into the hall, I looked to my left, where my wife and children were settled in ergonomic desk chairs. Angie was focused on her tablet, composing an email to her work with quick swipes of her fingers, like she was trying to wipe them clean of some unseen, clinging film. Billie was sitting next to her, attention fixed on a handheld game device. Greg sat on the floor between them. He had several of his toy trains and was rolling them around an imaginary track, making happy humming noises.

He was the first one to notice me. He looked up and beamed, calling, "Mama!"

"Hi, buddy," I said. Angie and Billie were looking up as well. I offered my wife a sheepish smile. "Hi, hon. We're almost done in here. I just need to borrow Billie for a few minutes, if that's okay?"

It wasn't okay: I could see that in her eyes. We were going to fight about this later, and I was going to lose. Billie, however, bounced right to her feet, grinning from ear to ear as she dropped her game on the chair where she'd been sitting. "Do I get to work science with you?"

"I want science!" Greg protested, his own smile collapsing into the black hole of toddler unhappiness.

"Oh, no, bud." I crouched down, putting myself on as much of a level with him as I could. "We'll do some science when we get home, okay? Water science. With the hose. I just need Billie right now, and I need you to stay here with Mumma and keep her company. She'll get lonely if you both come with me."

Greg gave me a dubious look before twisting to look suspiciously up at Angie. She nodded quickly.

"She's right," she said. "I would be so lonely out here all by myself. Please stay and keep me company."

"Okay," said Greg, after weighing his options. He reached contentedly for his train. "Water science later."

Aware that I had just committed myself to being squirted with the hose in our backyard for at least an hour, I took Billie's hand and ushered her quickly away before anything else could go wrong.

The terminal she'd be using to make her call was waiting for us when we walked back into the room. I ushered her over to the chair, ignoring the puzzled looks from my colleagues. "Remember the lady who kept calling the house?" I asked. "Would you like to talk to her again?"

“I thought I wasn’t supposed to talk to strangers,” said Billie, eyeing me warily as she waited for the catch. She was old enough to know that when a parent offered to break the rules, there was always a catch.

“I’m right here this time,” I said. “That means she’s not a stranger, she’s...a social experiment.”

Billie nodded, still dubious. “If it’s really okay...”

“It’s really, truly okay.” Marrying a physicist meant that my kids had always been destined to grow up steeped in science. It was an inescapable part of our lives. I hadn’t been expecting them to necessarily be so fond of it, but that worked out, too. I was happier raising a bevy of little scientists than I would have been with the alternative.

Billie nodded once more and turned to face the monitor. I flashed a low “okay” sign at Mike and the screen sprang to life, showing the blandly pretty CGI avatar that Tasha’s system generated for Pitch. We’d have to look into the code to see when it had made the decision to start rendering animals with human faces, and whether that was part of a patch that had been widely distributed. I could see the logic behind it—the generic avatar generator was given instructions based on things like “eyes” and “attempting to use the system,” rather than the broader and more complex-to-program “human.” I could also see lawsuits when people inevitably began running images of their pets through the generator and using them to catfish their friends.

On the other side of the two-way mirror, Pitch perked up at the sight of Billie’s face on her screen. She opened her beak. Microphones inside the room would pick up the sounds she made, but I didn’t need to hear her to know that she was croaking and trilling, just like corvids always did. What was interesting was the way she was also fluffing out her feathers and moving the tip of her left wing downward.

“Hello, hello,” said her avatar to Billie. “Hello, hello, can you hear me? Hello.”

“Hello,” said Billie. “My mom says I can talk to you again. Hello.”

“I’m hungry. Where am I? Hello.”

“I’m at Mom’s work. She does science here. I don’t know where you are. Mom probably knows. She called you.” Billie twisted to look at me. “Mom? Where is she?”

I pointed to the two-way mirror. “She’s right through there.”

Billie followed the angle of my finger to Pitch, who was scratching the side of her head with one talon. Her face fell for a moment, expression turning betrayed, before realization wiped away her confusion and her eyes went wide. She turned back to the screen.

“Are you a bird?” she asked.

The woman looked confused. “Hello, hello, I’m hungry, where am I?”

“A *bird*,” said Billie, and flapped her arms like wings.

The effect on Pitch was immediate. She sat up straighter on her perch and flapped her wings, not hard enough to take off, but hard enough to mimic the gesture.

“A bird!” announced the avatar. “A bird a bird a bird yes a bird. Are you a bird? Hello? A bird? Hello, can you hear me, hello?”

“Holy shit,” whispered Mike. “She’s really talking to the bird. The translation algorithm really figured out how to let her talk to the bird. And the bird is really talking back. Holy *shit*.”

“Not in front of my child, please,” I said, tone prim and strangled. The xenolinguists were going to be all over this. We’d have people clawing at the gates to try to get a place on the team once this came out. The science behind it was clean and easy to follow—we had built a deep neural net capable of learning, told it that gestures were language and that the human mouth was capable of making millions of distinct sounds, taught it to recognize grammar and incorporate both audio and visual signals into same, and then we had turned it loose, putting it out into the world, with no instructions but to learn.

“We need to put, like, a thousand animals in front of this thing and see how many of them can actually get it to work.” Mike grabbed my arm. “Do you know what this means? This changes everything.”

Conservationists would kill to get their subjects in front of a monitor and try to open communication channels. Gorillas would be easy—we already had ASL in common—and elephants, dolphins, parrots, none of them could be very far behind. We had opened the gates to a whole new world, and all because I wanted to talk to my sister.

But all that was in the future, stretching out ahead of us in a wide and tangled ribbon tied to the tail of tomorrow. Right here and right now was my daughter, laughing as she spoke to her new friend, the two of them feeling their way, one word at a time, into a common language, and hence into a greater understanding of the world.

Tasha would be so delighted.

In the moment, so was I.