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Androides mas reales

The Mobile World Congress in Barcelona was a faithful test of the great advances made in the field of robotics, driven by 5G Robotics has made a qualitative leap with the push of the 5G network. Within the framework of the Barcelona MWC, several examples of these developments were observed. Sophia, the 'celebrity' robot developed by Hanson Robotics Limited has been famous since its inception in 2015. She has starred in magazine covers such as Cosmopolitan or Elle and is an image of the new advertising campaign of the Galician water brand Cabreiroá. It even counts among its milestones being the first robot with citizenship of a country, Saudi Arabia, since October 2017. On the other hand, Taiwan Excellence's android Kobbi, presented at the fair, is able to recognize the face and voice of the family members in which it integrates. He has also exhibited his business utility as a customer service agent. Kebbi, a similarly named android developed by Nuwa Robotics, is able to understand body language and teach languages, as well as receive orders and execute them. The news doesn't end there. Robelf, of Robotelf Technologies, was presented in Catalonia as the perfect guardian for the home, as it can protect the house with surveillance guards and sensors of voice, vision and position. Also, via facial recognition, it can detect the presence of strangers inside the house and send mobile alerts to its owners. It is also a robot with social skills, able to talk, tell stories and jokes, make phone calls and report the latest news, all this turning your head towards your interlocutor. To interact with it, simply tap your screen or call it by name and control it via mobile app. Passing Nicolas and Rachel, androids of the Chinese company CloudMinds, stand out for a game of articulations that is the work of artificial intelligence (thanks to two virtual brains in the cloud connected through 5G networks). In rigor, this allows them to easily manipulate small objects, serve drinks and dance, as they have shown at the fair. Each XR1 robot (its technical name) uses the vision of its camera to observe around it, move its joints and perform actions that require skill such as threading a needle. A human can help perfect his technique by taking control of the machine and allowing him to improve his technique with practice. Finally, Barcelona will be the first health center in the state that will incorporate 5G technology into an operating room to conduct remote operations in real time, as seen in the Mobile World Congress. 5G technology allows surgeons to connect to intervention from anywhere on the planet and the intervention to be transmitted on video without communication delays. The tool can be implemented from next year, when a widespread deployment of the 5G network has already begun around the world.
The absolute protagonist was able to stay smiling for hours without flinching. You can see it in the Reuters image above. His name is Yangyang and his mission at this meeting was to smile and greet conference attendees where she was presented in society. It is the fourth generation of androids they have created in Shanghai Shengng Industry (SSI) in collaboration with Japanese Hiroshi Ishiguro, who has once again demonstrated his leadership in this type of robot of great resemblance to humans. Not for nothing has he been in the country for 20 years now. The android Yangyang faithfully recreates the appearance of one of the researchers working in the Chinese center. And she herself has been in charge of presenting her to the astonishment of the attendees. As you can see in the video, the appearance between robot and human is quite amazing, but not so much how it works. With the help of an artificial rubber skin that simulates the text of the natural, Yangyang is able to interact with those present by smiling, commenting on details and moving parts of his body, albeit in a some crude way. He can even give hugs. But the real future Ishiguro seeks for these androids is that they can complement us. In a next phase, for which he has secured funding of \$16 million curiously in China, this scientist will try to go further and give the robot emotions like desire. In statements at the event itself, Ishiguro understands the future of humans and robots as complementary, being able to have a double life no longer only domestic but in the professional sphere, especially in the fields of teaching, medical/domestic assistance and even as a complement for actors and singers. After all, we could attend a concert that would last as long as the robot's batteries lasted. Via Motherboard See how companies big and small have used Android to do more business. There were so many frameworks for developers that it was an easy pick for us. Travis Folk, Head of Design Systems, Walmart For the business CIO, the value of Android Enterprise is to give them much more agility and opportunities in their mobility infrastructure management. Antoine Houllgatte, Digital Workplace Project Deployment Manager, SNCF The Android platform is probably one of the most exciting things we've added to our products in a long, long time, because the possibilities are endless. Chris Giles, VP, Global Product Management, Pitney Bowes Anything that we could build into this functionality to make it easy for techs to use was important, and the very flexible framework that Android gave us allowed us to get this down to one click. Nate Beckman, Field Systems Business Analyst, Safelite AutoGlass The implementation was really smooth. We surprised a lot of people by rolling out 9,000 devices in six months. Andrew Bull, IT Business Solution Manager, Marks & Spencer platform creates a lot of opportunities around productivity tools. On that, we also have the opportunity to deploy applications. Daniel Johnson, CTO, Guardian Life Insurance Android is definitely a flexible tool to go beyond what our guests require, and beyond what we would like our technology and devices to become. Christopher Chan, Senior Manager, R&D, The Hongkong and Shanghai Hotels, Limited We're actually managing all of our devices across the cloud, remotely, rather than managing it individually. Eddie Ybáñez, co-founder of MiCab, Chronopost chose Android Enterprise to benefit from this solution in terms of data security, mobile device monitoring and app management through Google Play. Chams Fathallah, Director of Transportation IT Systems, Chronopost This article is a collaboration between WIRED and Epic Magazine. Photographs of Cait Oppermann Love in time of robots Hiroshi Ishiguro builds androids. Beautiful, realistic, unreachable convincing human replicas. Academically, you're using them to understand the mechanics of person-to-person interaction. But his real quest is to untangle the ineffable nature of the connection itself. by Alex Mar 10.17.17 It's summer 2002, mid-morning at a university research lab on the edge of Osaka, Japan. Two girls, both dressed in pale yellow, with puffy cheeks for boys, black hair up to the shoulder and bangs, stand in front of each other under fluorescent lights. More precisely: One is a girl, 5 years old; the other is your copy, your Android replica. They are the same size, one modeled on the other, and meet for the first time. The girl stares into her counterpart's eyes; its expression is severe and rigid. He seems to look back at you. A man is video-recording the couple—he's the father of one, creator of the other—and from outside the camera he asks, Would you like to say something? Go back to the android. Talk to her, she says. Hello, the girl repeats the word, silently, to her robot, me. Nod with the ass. His father gives him another line: Let's play. The android shakes his head. His father laughs behind the camera. But the girl doesn't move. She just looks at her double, looking at her face one focusing and perhaps worrying. Each member of this couple continues to make the gestures just there that serve, through reflexes or trickery, as signs of life: Each blinks at regular intervals; each tilts their heads from side to side. One is the processing, in the raw and sensory form of a human child; the other is performing a series of simple movements possible by the servo motors installed inside the silicone housing which is your skin. Is it hard to play with her? the father asks. His daughter looks at him, and then he goes back to the android. His mouth begins to and close slightly, like a dying fish. He laughs. Is he eating anything? The girl's not responding. She is patient and obedient and listens. But something inside is telling him to resist. Do you feel strange? asks his father. Even he must admit that the robot is not entirely believable. Eventually, after a few long minutes, the girl's breathing gets heavier, and she announces: I'm so tired. Then it bursts into tears. That night, in a suburban house, his father uploads the images to his laptop for posterity. His name is Hiroshi Ishiguro, and he believes this is the first record of a modern android. In the 15 years since then, Ishiguro has produced some 30 androids, most of them female. They have included replicas of a newscast, an actress and a fashion model. These androids have made numerous public appearances, in cafes and department stores, singing in shopping malls, performing in a play. Most of the time, however, Ishiguro's oflle of pretty women is used for her academic experiments, many of which are held in two locations in Japan: the Advanced Telecommunications Research Institute International in Nara and the Intelligent Robotics Laboratory on the Osaka University campus. The laboratory, known as IRL, is embedded within a maze of austere and gray university buildings. In one of these industrial boxes, around 30 students and assistant teachers work on a series of near-silent computer capsules and observation rooms. Teams of young people shuffle the long lineoleum-lined corridors in hoodies, rhythm of research rooms in their socks, or float on laptops in rows, heads down, subsist mainly on Red Bull, cookies and Pocky Sticks. (Women don't seem like a natural fit here. As if to underline this fact, a bathroom sign says: Watch out for the strange men in the ladies' room Presiding over this scruffy scene is Ishiguro-sensei. It is immediately recognizable, looking just like it does in the promotional photos of recent years: perfectly mod in tight black with matching leather backpack and fanny pack. She wears tinted hexagonal goggles and sings her jet black hair into a mop cap that slides down her forehead. This is his department: Ishiguro, 54, is a distinguished professor at one of the best universities in the country, with two laboratories, partnerships with a dozen private companies across Japan, a recent \$16 million government grant (one of his most generous in science and engineering, he says), and seven secretaries to handle it all. Subscribe to WIRED. November 2017.Sculpture for WIRED By ELASTIC Today, the technical ability to produce a robot that really looks and moves and talks like a human remains far beyond our reach. Even beyond our reach is the ability to impregnate such a machine with humanity, that presence that the Japanese call sonza-kan. Because to recreate the human presence we need to know more about ourselves than about the accumulation of signals and micromoviments that trigger our empathy, put us at ease and earn us our trust. Someday we can solve the problem of creating artificial general intelligence, a machine brain you can intuitively perform any human intellectual task, but why would we choose to interact with it? Ishiguro believes that because we are connected to interact and put our faith in human beings, the more human we can make a robot appear, the more open we will be to share our lives with it. To this end, their teams are pioneers in a young field of research called human-robot interaction. HRI is a hybrid discipline: part engineering, part AI, part social psychology and cognitive science. The goal is to analyze and cultivate our evolution of the relationship with robots. HRI seeks to understand why and when we are willing to interact with, and perhaps even feel affection for, a machine. And with every android he produces, Ishiguro thinks he's approaching building that trust. In a secluded room in IRL, a collection of androids is stored and maintained: their toughest workers. Arranged in this space today, with its blackout curtains, thin corporate carpets, and shelves full of cables and monitors and a series of wigs, it's a couple of its replicas of adult women. They are models of the Geminoid F series. The name is a play off geminus (Latin: twin), a reminder that their human counterparts exist somewhere in the world. At any given time, students and staff may be testing, measuring and recording the responses of dozens of volunteers to the androids at their disposal. What about their behavior or appearance, their specific facial expressions and tiny body movements, is alienating to them? What brings you closer? These androids are used to find answers to a growing list of research questions: How important is nonverbal communication to build trust between humans (and therefore between human and android)? Under what circumstances could we treat an android like a human? In this way, ishiguro's collective of laboratories is dedicated to the engineering of human intimacy. SCROLL DOWN A conversation is a kind of illusion, says Ishiguro. I don't know what's going on in your brain. All I can know is what I'm thinking. During the several months we are in contact, Ishiguro will share information that I find deeply personal: he has contemplated suicide twice in his life, although he has a family, he considers himself a lonely man. I'll hear him use that word to describe himself, alone, a half-dozen times. As for me, when I first visited Ishiguro, my situation is this: I am 23 months away from what seemed like the beginning of a serious relationship, but it was not. I'm 15 months away from a rebound relationship that stayed too long. I am 13 months in a period of spending long periods in a small town in up and over The State of New York for the sake of productive tranquility. I'm a book to go to the printers, work that, for me, is all it consumes and is necessary. And lately, when I pass the manuscript for an afternoon or at night, I'm sorry; isolation. This isolation is not complete—I have my close friends, a wider circle of less close, close friends, family, but it's the absence of intimacy. Nothing romantic, no sex life. This absence has been, in part, an election: certain men have always been curious about me. But what I miss more than sex is the feeling of closeness with someone else, something I've never thought could be conjured. And although sensory deprivation has become a little extreme, most of the time, can I put a percentage on it? It's as high as 80 percent? I am semi-radically independent and some kind of artist and in many ways an unconventional liberal woman. As alienating as it is, for me this is a moment of deep creativity. It's that extra 20 percent of the time, that's when I feel dizzy. This is where I am when I fly 17 hours to meet Ishiguro. And as a result, if I'm honest with myself, my time abroad feels particularly charged. The very concept of human connection has never felt so enigmatic to me. It makes sense that someone is trying to measure it, to weigh it, to calculate its dimensions. To be able to replicate the feeling of human intimacy would be to control the same thing that confuses us most and eludes so many. This is how Ishiguro recalls his childhood: His family lives in the city of Adogawa, on the western shore of Lake Biwa, from which a river flows through Kyoto into Osaka Bay. At school, in a classroom of disciplined children, Hiroshi does not listen to the instructor. It's like she doesn't realize she's talking. He spends the day drawing drawings that have nothing to do with the lesson. His mother's worried there might be something wrong with him. Hiroshi rarely sees his mother or father, as schoolteachers are as consumed by his work as his son will one day become. Instead, his grandparents are raising him. His mother's father is a farmer, a devoted Buddhist with fixed and traditional ideas on how to behave like a Japanese man. It shows the child the right way to use chopsticks, pray, prepare the house for the New Year's celebration. Unlike school, Hiroshi has the patience for these lessons: His grandfather is not telling him how to think; he's teaching him to aspire perfectly. They live at the foot of the Hira Mountains, and Hiroshi likes to comb the mountainside in search of snakes and insects. Perhaps a deer beetle, bright black and segmented, almost 3 inches long, with a pair of antler-shaped jaws emerging directly from its head. He attaches new parts to his body: razor blades, found pieces of metal. It's an improvement. The insect can go on living like it, if the glue doesn't kill it. These are his first cyborgs. One of Hiroshi's close friends is a boy who lives in a poorer community by the water, and his parents collect and prepare the bodies of the recently dead for burial. Hiroshi not yet that these people are considered minor than their family, because they have a job that, according to local prejudices, is contaminated. For this reason, when mother discovers friendship, she asks her son to break it. You'll remember this moment for the next 40 years. Hiroshi is a delicate child. He has suffered from extreme skin allergies from the moment he was born; the back, chest and arms are covered in itching, ugly rashes. His only consolation comes from the constant touch: Every night, his grandparents take turns sitting next to him and scratching his back until he is able to settle down. Each week your doctor gives you three painful injections to try to cure the condition, without any effect. (When he is about 12, steroids will finally help, requiring him to keep the drug handy to this day.) His own body will always be alien to him. Human emotions, for Ishiguro, are only responses to stimuli and are therefore subject to manipulation. When it comes time for Ishiguro to go to college, he chooses a school using three criteria: He will accept an eccentric student, sometimes indifferent like him; it is a place where you can follow your drawing and painting; and it's not very close to home. In the fall of 1981, he landed at Yamnashi University near Mount Fuji. Once there, Ishiguro continues his careless approach to his studies, finding more pleasure in the series of strange jobs he takes to pay the bills: he works as a cook, supervisor of an after-school school program, a door-to-door textbook salesman (which one lasts a week), and, most lucrative of all, a professional pachinko player. It is found on the margins of student life, rejecting any reentrust of conventional Japanese ambition. At the same time, he's getting into the most romantic of outsiders: an artist. Always in a black leather jacket, he skips classes, packs his pads and pencils, and mounts his Yamaha helicopter in the nearby field to draw the landscape. This is his approach: the strange organic shapes of the trees, the peach flowers that appear in the spring. He produces drawings and oil paintings, and manages to sell some. Laughter, you're totally fine ... If you feel drowsy, if your head feels heavy, you can lean back. Like sleeping ... But in his third year, Ishiguro abruptly renounced painting. Unless he can become a great artist and tremendous public success, he sees no point in it. (Blame, in part, for his color blindness: he is attracted to landscapes, but the whole spectrum of green eludes him.) He's lost the little advice he had. In his darkest days, when he takes his motorcycle on a steep and winding road, Ishiguro imagines giving in to the urge not to turn around. To drive straight, fly from the edge, how would that feel? Then there's a way. Yamnashi offers courses in the new field of computing, and Ishiguro begins to wonder what relationship computer graphics and vision might have computer with the visual arts. These are the first days of the PC, and the programming seems very creative. Feeling like he has little to lose, he changes his specialty. Specialty, immediately, certain elements of his brain fit into place: Ishiguro realizes that he can still think like a painter in this sinplicated field, but with different tools. He falls in love with the new vocabulary; Assembler, Pascal. Students are relegated to work in a single room kept bitterly cold, noisy with the hum of huge computers, conditions designed for the comfort of machines, not humans. He works alone, in software development, but is learning to communicate with a system, a system that responds to his commands. They've entered into a dialogue. Ishiguro soon gives up his travels around the country for whole days spent in the lab. And as it becomes more fluid in this new language, more immersed in a conversation with big machines, a fantasy takes shape: Could there be a way to make this language more human, so that one day computers can intuitively understand us, on our own terms? For this dialogue to become a relationship? This relationship becomes his singular quest, his dream. His hands, at rest on his lap, are elastic to the touch. Lean nearby and you can hear the gentle hum of a hidden engine; a soft click is audible every time it blinks. In 2000, Ishiguro, as an associate professor at Kyoto University, produced his first humanoid robot: a mechanical-looking contraption that moves on a platform with wheels, wearing his articulated steel arms. But he has begun to think that a relatable, human appearance is essential if people are going to form real attachments to robots. It's about a decade of his marriage (with a pianist he met through a college friend), and he asks his wife if he can make video tapes of her: sit, breathe, respond to random stimuli. He is trying to determine the nuances of human behavior, to isolate the physical signs that read to us, consciously or unconsciously, as humans. A minor revelation: humans never stood still. Ishiguro is aware of the resistance to the concept of android, at least in the West, from which many Japanese researchers take his example. Some are concerned that consumer revulsion of a human-like robot (the so-called strange effect of the valley) would be too great to overcome and that a failed android project could undermine the public support of robotics. Ishiguro is also concerned that moving forward with a non-traditional approach could cost him his academic career. But he can't resist. So when the company with which it has partnered in a new robot insists on hiring a respected designer that makes it look, in Ishiguro's opinion, like an insect, it loses patience. With his next project, he decides to become rogue. He'll create an android to convince them. Ishiguro believes that his first android should have same height as the insect (about 31.2 feet tall), for comparison purposes. In other words, it will have to be modeled after a human child. And given the thorough production process, a model must spend hours locked in plaster to is just a child who can possibly get permission to use: yours. A few years earlier, Ishiguro became the father of a daughter, named Risa, and now turns to his wife to explain his plan. She agrees: she is in charge of raising the girl, and the experiment would be difficult without her help. And so, in early 2002, the whole family, along with makeup and special effects artists, gathers in their lab on campus and begins the two-day process of creating a replica of Risa. In the lab, Risa's mother helps her get naked. He takes off the girl's clothes and stands her on a small wooden platform. Together his father and an artist soften a layer of pale green paste on his torso and under thighs: On that, they apply large samples of fabric submerged in plaster, asking it to stay very still while drying. Then the 5-year-old girl, wrapped in a pink towel, the scalp covered with a rubber cap and her ears covered with cotton, is placed on a table, her head fenced with styrene foam and duct tape. An artist lifts a plastic bucket and pours the paste until it rises to cover her ears, while the father and mother try to reassure her: Don't worry! And you're fine! They finally prepare the girl for the final part of the process: her face. Through the viewfinder of a video camera, Ishiguro observes the rigid expression on his young daughter's face as his mother and an artist slowly cover her in thick paste. Once we're done, his father says, you can eat whatever you want! He slather it through his forehead, around his chin, and through the front of his neck; They apply it thickly to his cheeks and through his nose, then suuppe his entire mouth, his mother laughing, keeping the mood light. Keep your eyes closed. Like you're going to bed... good night! All the time, remarkable for a child her age, she does not move or make a sound. And then the paste closes on it as they soften it over her eyelids, and within minutes her face is layered into the creamy things, which has already begun to harden. His whole face is underneath: he saves his nostrils: a single hole made clear to breathe. You're all right, the artist says. A little longer... Then Ishiguro, from behind the camera. Laughter, you are totally fine ... If you feel drowsy, if your head feels heavy, you can lean back. Like sleeping ... They press a square of plaster-soaked fabric over his face (again, a breathing hole) and it begins to harden. And maybe the professor is worried now, because he loses the shot, tilting the camera up to point at the wall. Laughter, if you can breathe well through your nose, please squeeze my hand ... Laugh, her mother says, make sure you don't cry, because it'll block your nose. Anyway, there's no crying! Be patient ... It's okay to sleep. Go to bed... When, months later, the package arrives at the lab, Ishiguro and his team open the box to reveal their daughter's full-body silicone leather casing: Laughter, bald, naked, made of rubber. They stretch stretch around the foam padded machinery and prop it up in the lab. His wife has donated one of his daughter's sun suits, so he's got something to wear. Ishiguro names him Reply R1—R for Risa. The results of the experiment are mixed. Ishiguro has to admit that the low-budget android, with its limited movements and stutters, is more zombie than human. And although it shows the project only to an inner circle of trust, the word of the android daughter spreads, becoming a strange legend. (In describing it, a robotist I talk to uses the word crazy, another strange, and a little scary.) But Repliee R1 gives Ishiguro the confidence to move on. As for her daughter, Ishiguro rewards her with several Hello Kitty dolls. But still, he says, he exclaimed. To this day, they've never talked about the incident. Geminoid F traveled the world performing in a play conceived with her in it intended. He also played an accompanying robot in the 2015 film Sayonara. Three years later, in 2005, Ishiguro presented Q1 Expo responses to the public. Modeled on an adult woman (a popular Tokyo news presenter) and produced with better funding, this version can move her upper body fluidly and lip sync to recorded speech. Ishiguro's laboratory conducts several studies with him; the results appear in a major Japanese robotics magazine; the lab is filmed for television; learns of an android copycat in South Korea. As a growing audience is attracted to Ishiguro's simulated human, his instincts are validated. But now he wants something else. Twice he has witnessed that others have the opportunity, however confusing, to meet his robot self, and he coveted that experience. In addition, his daughter was too young, and the news host, though an adult, was, in his words, simply an ordinary person: Neither was able to analyze his android encounter as a trained scientist. A real researcher should have his own double. Returning to his former life as a painter, Ishiguro thinks: This will be another form of self-portrait. It gives the project its initials: Geminoid HI. His mechanical twin. Ishiguro has hundreds of photos of the Assembly of Geminoid. Here's your assistant wrapping the facsimile of his then-43-year-old face around the head of the machine and compressing it from the back, his bald scalp dotted with sensors. Here's the Geminoid sitting upright, a padded vest instead of his torso, his visible mechanical biceps, his arms just flesh under his elbows, as if he were wearing fancy gloves. The hands have veins and sunspots and weak wrinkles that gather around the wrists; nails have cuticles, pale and precise. Here he dresses, in a black shirt identical to Ishiguro's. His assistant raises his arms, one by one, to pull his sleeves, as if dressing a complicated child. She also wears tight black pants, such as Ishiguro's, and black sneakers stuffed with prosthetic feet in matching socks; a black wig, stylish as its manufacturer's hair, looks at the android android with brooches. Here's the machine that pumps air into his chest, a series of wires ranging from his tailings to a metal box, while the teacher's double sits in the eye and speaks for the first time. This android is a step forward, but it still falls well below plausibility. His hands, at rest on his lap, are elastic to the touch; his eyes have a surprising intensity, not unlike Ishiguro's, but they are clearly made of hard, shiny plastic. Lean nearby and you can hear the gentle hum of a hidden engine; a soft click is audible every time it blinks. Sometimes its overall effect, and that of its sisters, is a human-sized puppet, like animatronics in a Disney World exhibition. But the Geminoid is also disturbing. Because, in a way, all these elements work together to simulate a sympathetic interaction with a human. The viewer can not fail to assign a wide range of emotions to his face: melancholy (face down), altered (squared eyes), skeptical (a side look), thoughtful (the tilt of his head to the left). When his eyes meet yours, motion sensors detect your position, only for a moment do you feel that he, this is ishiguro, is aware of you. Android has my identity, says Ishiguro. I need to be identical to my android, otherwise I'm going to lose my identity. This replica, Geminoid HI, brings to Ishiguro the recognition he has longed for. Using his double, he and his team publish dozens of studies, analyzing the range of participants' reactions to him and his doppelegänger. (Studies involve operating the android remotely and wirelessly; teleoperation.) Alongside him and his Geminoid make appearances on television shows in Asia and Europe. Ishiguro also begins to lecture around the world without leaving his lab in Osaka, teleoperating and talking through the android, which is carefully transported abroad by an assistant. (His paws and torso are checked with luggage; his head is by hand.) Ishiguro-sensei becomes a source of fascination; transforms from an investigator to the man who made his copy. Invitations for conferences and festivals are broadcast. The success of this particular android is due, in part, to how it seems to operate on several levels. It is, like its predecessors, a circus trick: Look at the human, look at his copy! Try to tell them apart! It is also Ishiguro's bet to solve an existential dilemma, a surprising attempt by the manufacturer to dominate himself, to make himself more lasting. At the same time, you have created a new situation. Ishiguro has discovered unexpected consequences of living alongside his own replica. He has been wearing black since his graduate years, and now this has become his official uniform and that of the HI: was delighted to give himself of this clearer view of himself. But now you must keep your human body (naturally changing, aged) cornered within the static limits of the android. He finds hes accommodating his android, measuring against being defined by it. In this way, your android makes you both painfully aware of your aging body and more physically confident than you have ever been. Ishiguro is multiple myths simultaneously. With her female androids, she is Pygmalion, giving life to her Galatea. But with his own replica, he's Narcissus, looking at his reflection for hours. Unlike Narcissus, of course, Ishiguro is aware of the situation he has created, but has set an unexpected trap for himself through his image. He poses with his android, in press photos and television appearances, in ways that accommodate the Geminoid, putting his face to reflect his expression. (At a time at the research institute, Ishiguro realizes that he photographs it in front of his android and reflexively drops his smile to match the robot at rest.) Soon his students begin to compare him to the Geminoid—Oh, teacher, you're getting old, they're making fun—and Ishiguro finds little humor in him. A few years later, at the age of 46, he has another cast of his face made, to reflect his aging, producing a second version of HI. But repeating this process every few years would be costly and hard for his vanity. Instead, Ishiguro embraces the logical

alternative: altering its human form to match that of its copy. Opt for a number of cosmetic procedures: laser treatments and the injection of your own blood cells into your face. He also begins to see his diet and lift weights; loses about 20 pounds. I decided not to get any older, says Ishiguro, whose English is excellent but syntactically imperfect. I'm always getting younger. Staying twinned with his creation has become a compulsion. Android has my identity, he says. I need to be identical to my android, otherwise I'm going to lose my identity. I think of another photo of the construction of its first double: is a sickly yellow plastic shell with openings for glassy teeth and eyeballs. When I ask him what he was thinking when he saw this replica of his own head that was gathering, Ishiguro says, maybe just half-joking, I thought I might have this kind of skull if he took my face off. Now he's pointing at me. Why are you coming here? Because I created my copy. Work is important; android is important. But you're not interested in myself. A beautiful woman you can't imagine going to the bathroom or getting tired, says Ishiguro. So I think beauty is better represented by Android. On a winter's day in 2012, a crowd gathers around a large glass box at Tokyo's Takashimaya department store. Perched inside is a Geminoid F in an elegant silk day dress, long brown bangs separated like curtains around her face. Valentine's Day is coming soon, and she sits, as I was waiting for someone, against a backdrop of gift boxes wrapped in rose-printed paper and large red bows. He spends his days looking at his smartphone and ignoring mostly the thousands of visitors who press near the glass. All it goes through a range of facial expressions, a spectrum of subtle emotions, as if reacting to some text you just received. It's an intelligent ploy: By not interacting much with its viewers, the simulation maintains the appearance of a human likeness, after all, real people spend a lot of time deliberately ignoring their environment. But every now and then, as you approach, she looks at you and smiles, and for a moment this feels like an encounter with a stranger. Some days, Ishiguro stops in front of the corridor, next to the main entrance, and observes the people stopping in front of it. He likes to imagine what they think he's thinking. As complex as we happen to be, our bonds between us are often built on very little. Given all the time we now spend living through technology, not many of us would realize, at least at first, if the friend we were sending messages was replaced by a bot. And humans don't require much to arouse feelings of empathy with another person or creature, even with an object. In 2011, a university of Calgary test found that subjects were quick to assign emotions and intentions to a piece of raft wood operated with a joystick. In other words, we are so accustomed to empathy that our brains are willing to make the leap to humanize a piece of wood. It is a level of animal instinct that is hilarious and a degree of vulnerability that is frightening. But as the object of our attention approaches the human, our expectations of them become much more complex. The strange effect of the valley begins, a great drop in the graph of our empathy, as we feel that we are encountering something familiar and not quite correct. The same year as the Calgary test, having recently developed its first generation Geminoid F, Ishiguro and the University of California, San Diego published a study of neurons associated with empathy. The team used an fMRI machine to scan the brains of 20 people in their twenties and thirties while watching separate videos of one of Ishiguro's female androids, the same android with its revealed machinery, and the living human that the android was later modeled on. The subjects saw in turn waving his hand, nodding with the assistant, picking up a piece of paper, cleaning a table with a cloth. Of the three videos, it was while watching the movements of the human android that the parietal cortex of subjects' brains would further illuminate, in particular, the areas that connect our detection of body movement with our so-called empathy neurons. Researchers believe this revealed that smaller gestures can create perceptual contradictions in the brain, triggering the strange effect of the valley. Ishiguro returned to the lab and your focus on the most minuscule movements of the android: the precise tilt of the chin, the rotation of the head, the holding of the smile. Around the same time as the department store exhibit, Ishiguro managed to use the Geminoid F to generate a link between two humans. Tetchan, then a game designer in Tokyo, she recently divorced when she met Ishiguro in 2012, and mentioned that she was curious about the possibility of an affair with an old friend named Miki. Ishiguro invited them both to his research institute in Nara, where he had asked his students to have an android ready for teleoperation. He placed Tetchan on the teleoperation table and closed the door; took Miki to the other room to meet the Geminoid F. He then invited Tetchan (who was listening) to talk to him and Miki through the robot. As Tetchan spoke, her voice computer altered to sound feminine, the android's lips moved in sync with her words, the tilt of her head and her long human hair in rhythm with her own movements. She's like a real female, Ishiguro told Miki, having fun. This is not Tetchan, this is a new woman, very cute and beautiful. And so they played, doing a little talk, Tetchan testing his new female incarnation. He made Miki and Ishiguro laugh, and seeing Miki's face through the monitor, he could see a change. It was when Ishiguro, knowing Tetchan's complicated feelings for Miki, said to her, Well, you should kiss her. And Miki, who seems hesitant, leaned towards the android, the android inhabited by Tetchan, and kissed him on the cheek. The feeling, Tetchan said, was like thunder. Any boundary between them suddenly disappeared. Soon after, Tetchan and Miki decided to live together. Tetchan is still not exactly sure how Ishiguro's machine worked on them, but remains convinced that he turned them into a couple. SCROLL DOWN Ishiguro believes that because we are wired to interact and put our faith in human beings, the more human we are human, the more open we will be to share our lives with him. Over dinner with Hiroshi: He has spent a lot of time talking to himself through his androids, trying them out, imagining its effect on other people. Hiroshi (who has already asked me to call him by his first name) tells me that he would like to record himself saying I love you and then program an android to repeat it with a female voice. He's joking when he says this, but maybe it's another one of his half-jokes. At the very least, he believes that there is a need for such an exchange. It would be, he says, a real conversation. A conversation with himself. A conversation is kind of an illusion, he says. I don't know what's going on in your brain. All I can know is what I'm thinking. I always ask myself questions, but through conversations. Over the years of operating your androids, communicating through them or with them, you have found that you are not really concerned about the other person's thoughts. I'm always thinking about myself. I need to understand your intention, but it's not a priority. Before that, I want to make something clear in my brain. Otherwise, what's the motivation to talk? In words, you can only imagine using conversation with others as a means to better understand nothing is more pressing than that. He's headed for the conversation we're both having. We don't know how much information we share, he tells me. I'm always guessing, and you're always guessing, and through our conversation patterns we can believe we exchange information. But I can't access your brain directly. What is 'connection'? he asks. Another person is just a mirror. On some fundamental level, we understand the immediate intentions and desires of others, of course; How else would we work? But Hiroshi's point of view, though harsh, seems sadly correct: There are entire planets of intimate information, our interest level of consciousness, which we will never be able to fully share. Our desire to connect, to save this division, is a human desire that drives, one that Hiroshi believes will one day be satisfied through human machines. He is convinced that human emotions, whether empathy or romantic love, are but answers to stimuli, subject to manipulation. Through the fluid interaction of its pneumatic joints, the arc of its mechanical front, the inclination of its plastic skull, the many subtle movements achieved through years of research studying the human template, the android becomes more able to encompass that gap, to form a perfectly designed bond with us. An elaborate metaphysical trick, perhaps, but what does that matter, if it satisfies a need? If it feels real? I think of the soft look on Geminoid F's face as he looks down on a smartphone he can't read. She wants us to imagine her reading notes that we have sent her, that we imagine her loneliness, that we love her. Every time we project our own feelings about her—imagine a shared experience, a connection—her work inches forward. Hiroshi says little about his personal life, but, with his constant travels and self-imposed 16-hour working days, I understand that he and his wife lead fairly independent lives: We have some simple rules. He never asks about my work, I never ask about his hobbies. Quickly, it lights up, he has found a way to return, in his mind, to the work. I want to know the meaning of 'love'. Do you know the true meaning? What is 'love'? I think for a moment. It changes all the time in my mind. That's good, he says, surprised. You're like a scientist. I'm changing too. I'm having different hypotheses every year. Before I fail, I want to have a better understanding of love. Hiroshi now tells me about the two times he has seriously considered suicide: first at age 36, when one of his best students won him in a computer programming challenge (his focus at the time), and again 10 years later, when another student proved to be a sharper, more prolific writer of technical documents (something of which prided himself greatly). Both times, he came out of depression when he found a new angle in his work. But those cases increased his fear that he might not be able to prevent the slow and natural deterioration of his mind. That's it, that his concentration is not what he once was. Developing dementia as it ages is your worst fear. Without being able to generate new ideas, I probably can't find any reason to survive in this world. I don't like to imagine that. We're quiet for a moment, and then he leans back in his. The soul is not so personal. In Japan, when we die, our souls return to the same place, back on the mountain. So now we're living inside you, so he makes us sit on mats. We have our own souls. But when we fail, we'll share something. The soul is returning to the place where souls are gathering. The soul is not alone, he says. The soul is not alone. Ishiguro must now keep his human body (naturally changing, aged) conered within the static limits of the android. One Saturday night, I meet Hiroshi and Rosario Sorbello, a professor of robotics at the University of Palermo who makes a couple of pilgrimages to Hiroshi's lab every year. He often sends his students to study there, and arranged for Hiroshi's android game to take place in Sicily. For a tall man in a well-made suit and fine leather shoes, Sorbello is childish, and clearly enjoys his access to Hiroshi, reminding me, twice, that Hiroshi is a very important person. We are in Minami, one of Osaka's hectic shopping districts, and we have a night of street food: huge bowls of ramen and fried octopus balls. (Hiroshi used to come here a lot in his day as a poor graduate student.) After the red bean dessert soup, served by a woman in a flying apron, Hiroshi makes a decision: instead of going to a bar, he says we should go to the bar in my office. Along the way, we stop at a convenience store with 24-hour fluorescent light to collect food to drink food (wasabi peas, octopus meat, Pocky chocolate sticks) before boarding the train back to college. As Hiroshi moves around his phone, Sorbello talks about the desire for intimacy with androids, something he has clearly thought about a lot. Can you imagine what it would be like, ask, to want to kiss a robot? There are people who have such desires. Imagine if you could run heat through your skin so it doesn't feel like cold rubber but hot to the touch? There are people who want to try things with that. Human sexual and romantic relationships are inevitably messy, he says, and many people would like to keep their lives simple, in which case a relationship with an android could be a solution. I think this is the future, he says. Sex is possibly the last physical act of human connection, but it can also be just that: an act, a simulation of intimacy. Sex can be regarded as something that the purely physical, but in reality it is often an experience that is mostly physical, not as intimate as we pretend it can or should be. Looked at this light, a whole range of sexual experience, at least in can be replicated with an android. On Sorbello's recommendation, I later read Love and Sex With Robots, a 2007 book by AI expert David Levy. In it he proposes that we are not far from a time (suggests about the year 2050) when humans will want robots such as friends, sexual partners, even spouses, a premise with which he seems unsettlingly agree. It all comes down to our willingness to believe in the emotional life and desires of the robot. Designed with the physical proportions that its human owner prefers, the preferred voice timbre and eye color and personality type, and the ability to remember and riff in the personal stories of its owner and small jokes, android will captivate humans. Levy takes Alan Turing's famous claim that the compelling appearance of intelligence (in AI) is a test of intelligence, and expands it in the emotional realm: If a robot behaves as if he has feelings, can we reasonably argue that he does not? If a robot's artificial emotions drive him to say things like 'I love you', surely we should be willing to accept these statements at face value... why, if a robot we know is emotionally intelligent, says, 'I love you' or 'I want to make love to you', should we doubt it? Human emotions, he argues, are no less programmed than those of a smart machine: We have hormones, we have neurons, and we are wired in a way that creates our emotions. In other words, Levy argues, our inner lives are essentially algorithmic, as are those of an AI. From a few decades, he writes, the differences between human and android may be no greater than the cultural differences between peoples from different countries or even from different parts of the same country. As for real sex, Levy believes it will become not only a resource for the socially isolated, but also an accepted outlet for sexually adventurous people or for someone whose partner is sick or traveling. These are quite radical ideas about human nature and intimacy, and yet I recognize the desire that some might have of resorting to an android for closeness: for the company, for comfort when you are away from home, perhaps on the other side of the planet, in the assignment for weeks at a time. And if someone gives you a save, why don't you take it? Most of us already allowed technology to mediate what was once a simple and direct human interaction, what is really the difference? And is that difference so essential to the human experience that it must be preserved? Back on campus, we pass the few students who are still abducted in the lab, working late, and we hide in Hiroshi's office. There he slides back his slate to reveal a hidden liquor closet. It serves us a local whiskey, and we sat down and listened to his music collection, from Japanese pop ballads to Simon & Garfunkel. We've all had a few drinks. Hiroshi tells us how, from the moment he started exposing people to his androids, a change took place: Androids, he says, he says, humans around him, to reveal a desire they had been carefully concealing, for connection, for touch. There was what was expected: Men who looked at female androids during industry displays, men who had to be watched closely, for fear that they would try to kiss and grope robots. But something more complicated was also happening. Shortly after his daughter's android was completed in 2002, Hiroshi had his Kyoto University students use it to test the differences in human response to a mechanical-looking robot and one that was similar to the human. When not in use, the android was left in the middle of the lab, and soon some students complained that they were having trouble working in front of it. They felt it staring at them. (Then then on, he got used to placing it with his face to the wall.) Things got even more complicated when Hiroshi was informed that one of the students had associated with his daughter's retort. During the day, this student conducted the experiments, but late at night, when he thought he was alone in the lab, he would serenade the android with his flute and then chat with him, asking what he thought of his performance. It was as if he felt that he could only reach out this way, in secret. This incident made Hiroshi realize that these androids could have an unexpected emotional impact. That was the first android, Hiroshi says. We didn't know what was going to happen. He moved the android to Osaka University and assigned another student to oversee the work. He also set some basic rules on how it could be used: not late at night and not alone. It feels like, how can I say, not to my daughter, but to a special person to me, says Ishiguro. When she created the first replica of an adult woman, she distrusted a little of what her students might do with her in the lab. Would you like to sleep holding her in her arms? Hiroshi witnessed how a staff member, who had been closely involved in the production of Geminoid, became visibly nervous in front of it. Hiroshi's theory is that a friendly human woman will always be simply a real person, never as elegant as her android counterpart. We want to have an ideal companion, and the android can be a very strong mirror to reflect your own idea. In this way, a relationship with an android is like having a partner who is literally an extension of yourself. Hiroshi's response to Hiroshi's female androids troubles him. But he's also one he's been growing. In 2014, he embarked on a new project that combines his personal perfectionism with his ideas on feminine beauty: During my visit, he and his robotics team are working on what he refers to as the most beautiful woman. Your not entirely empirical of his appearance has included talking to a popular cosmetic surgeon in Osaka (his own), analyzing images of the finalists of the Miss Universe pageant and, in the end, relying on his instinct. (It has reminded me a couple of times that he thinks more like an artist than Hiroshi worked for two 12-hour sessions with a technician to create the 3D representation of the android. He was delighted to discover that the slightest change in his eyes or nose transformed the representation into a completely different person. It feels like, how can I say, not to my daughter, but to a special person to me, she says. Now, when I ask Hiroshi why he puts so much emphasis on pretty mechanical women, he reminds me that the biggest goal in his field is for people to accept robots in their lives. And which is more acceptable to many people, asks, beautiful woman or ugly woman? At a corporate conference I later hear her give, she sums it up like this: A beautiful woman you can't imagine going to the bathroom or getting tired. So I think beauty is better represented by android. At this point, Hiroshi rises from his ergonomic chair, as if inspiration had struck. He turns his back on me and Sorbello, rummages through his drawers and produces a black zippered bag. From the inside, he pulls out two foam models the size of a humanoid figure and offers me one as a gift. Take the other one and hold it for me. Let's do an experiment, he says. We put them together and make them kiss. I'm not sure where this is going. Very good I bring my little figure's face to find his face, and his motionless mouths touch. Feels weird, doesn't it? And it does. It feels a bit like crossing a line. I'm going back to Tokyo for a few days to meet more of Hiroshi's colleagues. And in the middle of this round trip from Osaka, something is starting to happen: I'm falling in love with someone I met on the second night of my trip. My literary agent, who knew he'd been looking for useful contacts in Japan. He is an American (also in his thirties) who moved to Tokyo to work in graphic design a decade ago and speaks Japanese fluently. Ethan (a pseudonym) emailed me the names of fixers and translators and boutique hotels and agreed to join me for dinner before taking the Shinkansen bullet train west of Osaka. When I found him that night, at our meeting place in front of a Shibuya-ku subway station, his eyes reflected again for me the thought at that moment crossing my mind: This will be a very good night. I've never been particularly attracted to men who are handsome in a conventional way. But Ethan's looks are so classically beautiful that it seems impossible for him to walk with such a face and a jaw so strong and such a finely formed head. (Have I ever thought about the shape of a man's head?) There is also the small gap in the back of his neck and the width of his shoulders (something about his proportion gives me a feeling of sitting on my chest) and the smell of his skin and the timbre of his voice (deep and musical). He becomes my guide in an unknown city. They take me around and I'm much happier about it. We drink in a white bar sliding paper screens; a jazz bar where no one can put out loud; an eight-seat space, covered with Wim Wenders film posters; a hotel lounge with a piano singer and city views on the 52nd floor. We talk about books; we talk about our families. We talk about the people we've thought we love. We walked through the streets at night with our arms slightly touching; we sat with our knees slightly touching; I put my palm in that hole in the back of his neck. And in private, we lay down in his bedroom, on a thin mattress on the floor, and took off all our clothes. Centuries have passed since any of us were attracted to someone in this way, an attraction that feels like a planetary pull, apparently outside the realm of reason and predictability, just as we spend so much time trying to conjure up but over which we have no control. It's exciting. And for me right now, immersed in the world of android design, a strongly middle world in which soft silicone shells stand in the way of human skin, in which we look for signs of human kindness or sadness or pity on a mechanical face, it is also a relief that something so simple can still happen. It is a relief because it means that we are animals, not ideas; that our chemistry is not as great as a set of programmed responses, there is an immediate magic in it. Knowing that that instinct is not broken in me, and being able to answer it, makes me feel like a person again. We tracked Ishiguro's landmarks on the android on uncanny Valley Road (near) Total Turing. —Caitlin Harrington 2002 REPLIEE R-1: Ishiguro's first android was produced in 2002 and modeled on his 4-year-old daughter. He seemed human enough, but his movements were all machines: jerky and crispy-gear-sounding Photo: Osaka University 2005 REPLIEE Q-1: The lab installed pneumatic actuators on this model, allowing human-like gestures. To increase authenticity, they added autonomous elements such as breathing and posture change. The android debuted at the World's Exhibition of Japan in 2005. Photo: OSAKA UNIVERSITY AND KOKORO CO., LTD 2006 GEMINOID HI-1: The first replica of its creator, HI-1 was also the first android of the laboratory to work through teleoperation: Ishiguro controlled his Doppelbot through microphones and webcams. Photo: ATR HIROSHI ISHIGURO LABORATORIES 2010 GEMINOID F: The team simplified its new model, Geminoid F, for experimental use outside the laboratory, limiting the mobility of its limbs. He went on to appear in numerous international productions of a work written with the android in mind. Photo: OSAKA UNIVERSITY / ATR HIROSHI ISHIGURO LABORATORIES 2010 TELENOID: Hiroshi and his team stripped differentiators like age and gender to make this droid universal, then sent several of them to nursing homes as companions. Photo: ATR HIROSHI ISHIGURO 2011 ELFOID: The team miniaturized the Telenoid and turned it into a cell phone. Elfoid creates what Ishiguro calls telepresence: the feeling that the person you're talking to is physically embodied in the 8-inch-long device. Photo: ATR HIROSHI ISHIGURO LABORATORIES 2015 ERICA: ERICA: First fully autonomous android from the lab, Erica can hold 10-minute conversations. Voice recognition, infrared human tracking, speech synthesis and natural movement generation reinforce their humanity. Photo: ISHIGURO SYMBIOTIC ERATO HUMAN-ROBOT INTERACTION PROJECT When Hiroshi first considered building an android, he began a search for the right silicone. He headed to Orient Industry, a company that specializes in high-end love dolls, sex dolls that can cost thousands of dollars. They collaborated on a test model, but Hiroshi soon cut the relationship. As his reputation grew, he cared about what such collaboration might look like. The government doesn't want your money associated with love dolls. The sex industry, however, does not need government approval to thrive. When they worked briefly together, Orient Industry operated from a single room; now, nearly two decades later, it occupies an entire building, and sells nothing more advanced than the fissar dolls. Human-robot sex, Hiroshi believes, will definitely be part of our future, it's just a matter of when. He knows that his research would be very useful in that arena, but as a respected academic he would require a non-commercial reason, for the improvement of society to follow that line of research. Maybe for people with disabilities, he suggests. Once we create a pretty good sex doll, definitely other people want to use it, he says. It's a basic wish. We return to Osaka from Nara, as he says this, speeding down the road in his tiny black Mazda—Hiroshi drives the way he walks: irrationally fast—and finally our talk heads to the 1982 film Blade Runner. He's trapped in the main female replicator, whose name he can't remember. She looks like you! Hiroshi pauses for a moment, and when he speaks again, it's with a thoughtful voice. Someday I want to have my own replicator, he says. Everybody probably wants to have one, right? Don't you think? Your own attractive robot? Yes, I guess. In what would be another one-sided conversation, he agrees with himself. It's not just robot, it's almost human. It's ideal. An ideal woman? Probably. I have no idea. He laughs. That's one of the projects, the most beautiful android. We drive in silence, and then he asks a surprising question: What would people think if I made my copy? For any reason, the possibility, even in the abstract, has never occurred to me, and the idea is unexpectedly intimate. I'm trying to figure out how this would take. They would enclose my body in plaster, and then my various parts would be molded and manufactured and screwed together. And a replica of silicone from my face, a bald, half-smiling non-me, would stretch around his mechanical skull. And then my pieces would be delivered to one of the Hiroshi and unpacked and assembled and dressed in a skirt and blouse and a long black wig; maybe a student would take a pair of heels (leather patent leather, slipped from an older model) old place them on my feet. Eyes that are not mine, but of convincing brightness and color, would seem to look back at the researchers' meeting. Let's say I'm not used to it in the lab at first, but put in the world, on display: destined for a new play or an android opera. An assistant teacher and I will travel together from one place to a place; at the end of each international stop, back at the hotel, maybe open the suitcase that holds my head and tell me about your frustrations. And finally, when this android theater reaches the end of its career, I will retreat to an observation room, stacked against the wall with my clothes and hair stripped and my head tilted. And students sometimes entertain themselves late at night making my replica sing karaoke while drinking beer. And for the rest of the time—or until my silicone is no longer considered to be worth replacing, this facsimile of myself will be made to do things, to say things, that are out of my control, always borrowing my appearance, my face, my expressions, the memory of the living woman who was his model. I'm not willing to give away my resemblance. SCROLL DOWN The delicate characteristics of the Telenoid sometimes look feminine, sometimes like those of a young child, but also know from someone so young. I compared Hiroshi to Pymgallon, but that comparison is only partly correct. His desire to create, that personal obsession, is driven less by romance and more by ego. In all my time with him, I never get the feeling that Hiroshi, unlike some of the fans of his robots and perhaps some of his colleagues, fetishes his female androids. What excites him is the power of his role as Creator, the notion that one day he can decipher the code of our emotional bonds. And he doesn't care what form that solution takes. If I could reduce the human form to its slightest structure, I would. What if many of these physical details—the precise silicone mold, eyelashes, and perfect cuticles—were a distraction from the true nature of sonzai-kan? One way to know would be to strip the android of something more essential. He's done just that. The shape came to him in a dream. When he woke up, he sculpted a clay model. The Telenoid is about 11-foot tall and ghost-white, a small child with a soft alien face. It has atrophied arms and, instead of legs, a bulbous stump, as if, instead of the genitals, the halves of the had continued all the way to form two spheres. A stretch of silky white spandex serves as the lower neck, bridging the head and body, but otherwise it is a continuous piece, without flexible plastic joints, as soft as a naked child. At rest, the expression on his face is serene enough to be unsettling, perhaps because of his deep black eyes; his lips thin, pursed, so slightly up in the corners, and its soft forehead, barely noticeable. His delicate and slender features sometimes seem feminine, sometimes like those of a little boy, but but also know, too serene, for someone so young. His face conveys a quiet authority that a child would not possess, but his body and small gestures convey the vulnerability and need of a child. In a research room at Hiroshi High School, his team shows a group of Danish visitors the latest model. Supported by a tripod, low to the ground, the Telenoid twists to life once activated. He looks at us and begins to do a work for our attention, looking around, moving his short arms. Its small movements are completely fluid and easy, giving it sweet behavior. She begins to speak to us in Japanese in a female voice, drawing a graduate student named Miriam in an animated conversation. For now the Telenoid is teleoperated, but Hiroshi hopes to make it autonomous in the coming years. His face conveys a quiet authority that a child would not possess, but his body and small gestures convey the vulnerability and need of a child. Miriam raises the thing as a child to cradle her stump on the thieves in her arms, and the two continue to chat in squeezing and affectionate tones. And at this point, after a few minutes of observation, the words that come to mind are no longer repulsive and nightmares, but small and dear and friendly. It becomes easy to feel protective of the little alien. Turns out visitors to the lab when I visited were there because Hiroshi hoped to partner with a venture capital firm to set up Telenoids in senior care centers across Denmark. For a couple of years, I had been traveling there every few months. Hiroshi's team and his Danish partners were in the final stage of their field trials; expected to have a viable business plan in place soon. Everyone was optimistic: test subjects have rushed to connect with the strange humanoid. Media events for the Telenoid in Denmark were attended by Japanese ambassadors and the Danish crown prince, who hugged the humanoid in the chamber. He said the experience reminded him of having his own child. And the video images, of the elderly in nursing homes, each supposedly with a certain degree of dementia, are compelling. In one, an older woman in a colorful turtenek sits on a couch at a facility in Kyoto with a Telenoid on her lap. Although his caregivers have explained that he rarely talks to them, he is shown here in an excited conversation with the humanoid (who may or may not understand that he is being teleoperated by a volunteer in Osaka). In another clip, a much more fragile-looking woman, over 100 years old, feels collapsed at a desk, her arms wrapped around herself. She's depressed and doesn't talk to others, says one of Hiroshi's investigators. However, when a caregiver sits next to him and gives him a Telenoid, he lights up, and laughing. For pleasure, start making short, cut-out sounds like babies: Ah-ah-ah-ah! She grabs the mechanical child to her chest, a blissful expression on her face, and begins to shake it slowly slowly and forward. This clip is a powerful proof that a machine can conjure an emotional connection, but a connection to what? Is it a look of recognition that blinks on the face of this century-old woman, resurrecting her from a long-time happiness? We don't know yet, exactly, the investigator says. But those who love Telenoid tend to be someone who used to have a baby. It takes a moment for the horror of this statement to sink: that someone would be left alone in their outpost was to relieve the joy of having a child through the cradle of a robot with atrophied limbs. More than a dozen years of progress have taken Hiroshi into a full circle: from his young daughter's android to another child robot, one that's blank, one that can be anyone's youngest son. A human-like robot that is terrifying in appearance at the most primary, intestinal and undeniably effective level: Once it is in operation, it attracts you, in sync with it, can not fail to feel empathy with it. The countless ways in which we judge someone based on their appearance evaporate in the face of this neutral appearance, as Hiroshi calls the abstract and blank body of the Telenoid. And what's left in place is that ineffable thing he's been trying to define: a clearly human presence, free from the strange. He is an outsider, like his creator, but one who manages to trigger our affection. While holding the android, it doesn't matter that this humanity emits something that hardly resembles a human at all. At rest, the expression on the face of the Telenoid is serene enough to be disturbing. Today, Hiroshi's daughter-android is located on a white platform, sealed inside a glass screen in one of her laboratories. Even covered in a pale yellow sun dress, it is a disturbing sight. Her arms are too long, almost ape, her hands dangling too high, one perched awkwardly on her crotch, to protect her. The face, with its mouth so grimly drooping, is printed with tension. It seems to bear the look of its beginning 15 years ago, the very human discomfort of the girl that was her prototype. Risa is now studying in her father's department in college, one of only a handful of women. The family is pleased, though Hiroshi is a little confused: They had never spoken of his work. But this is positive, isn't it, you ask me with a note of vindication. I'm not sure if making your android was a positive or negative effect for her. And finally, she came to my lab, she says. I can have some excuse for people now. This makes him laugh. For Hiroshi, Risa seems to exist in opposition to her most beautiful female archetype: intelligent and impatient, not feminine, a free thinker. He seems to be surprised. He sees it as a mixture of typical female characteristics and some strong character as she has a talent in math and physics, and he has the impression that she is competitive, particularly with boys. Sometimes it's very hard, he says. Meet her for the first time in a small conference room of his father's office, immediately catches my eye risa's calm intelligence. With the same round face and eyes, Risa is undeniably the girl in the video clips, now in a tight blouse, glasses, and wearing a glass pendant, her hair pulled back into a low suspension ponytail. This is the girl who as a child was already playing with her father's first robots, happy, trying to get me to chase her around the lab. (You still use this footage in your PowerPoint presentations.) She has never seen him lecture and recently read his books for the first time. On the subject of her retort, Risa is as pragmatic as her father. I was the closest example I was able to find out what to model an android on, I haven't really thought about it more deeply than that. (Laughter and I speak through a translator.) Students sometimes ask Risa about her last name. Because, I guess, my father's famous, he says. But just as there is still a clear distinction between Hiroshi and his rubber and steel appearance, Risa sees Professor Ishiguro and his father as two very different entities (if similar). At the university, surrounded by students and professors, he is charismatic, a role model, attracting others to his work: at home he becomes himself again, a researcher focused on satisfying his own curiosities. A real researcher, Risa says, is someone who's trying to figure out what's interesting to himself. Although Risa has not yet declared a specialty, she knows she is not interested in android science. His level of ambition, however, is familiar: What comes after the Internet, he says, the next great innovation, whatever it is, that's what I'd like to be a part of. She believes that being tied to her father's work at such a young age, an experience she will not call positive or negative, has made her bolder than she might otherwise have been. I was forced to be part of my father's project. And because I had this experience that others had never had before, I had the feeling that anything could be done. And since then, when other people say 'No, that's not possible, we can't do that,' I think maybe I can do it. My father can do what other people can't do, and I'm his daughter. As far as I can tell, Hiroshi has no idea he's talking like that. Risa was 9 years old when she created her own replica, and she made a visit to the university then, to interact with the Geminoid, while Hiroshi telegraphed it. I didn't focus as much on the android as on my father's voice, he says. What he remembers best about that day was his father's presence, not by his side, but in another room, beyond the wall, only out of sight. One night after a long dinner at a traditional Osaka restaurant, Hiroshi takes me to a karaoke bar. Maybe it's day of the week in particular or the late hour, but the place seems empty when we arrive. Hiroshi pays the bored young assistant, who takes us to the last one in a long room chain and closes the door. Surface surfaces black formica and fake leather. In the blue light on the flat screen, Hiroshi queues ballad after ballad in Japanese. Sitting at the banquet, I watch as he grabs the microphone and sings, each song more sincere than the previous one. With the same look on his face as I've seen in the lab, Hiroshi takes his performance, for me, to the empty room, very seriously. Another number begins, and this time he reaches out to me; I can take it. With the microphone in one hand as he sings (with a small, artless voice) and the other hand at my waist, Hiroshi guides me through a slow dance. We danced awkwardly, like two kids in high school, just touching them, looking the other way, focusing on our steps. The time I've spent with Hiroshi—months of Skype correspondence and calls, weeks of uninterrupted hours with him, for what he values most (his work)—has been another tension of choreographed intimacy: journalist and subject. Hiroshi's version of me is a woman completely fascinated with him, a mirror that reflects his image, an echo chamber for his ideas, a conversation with himself. Hiroshi's version I know is a black eccentric, the man who made his double a valuable subject for my work. These models of ourselves are the ones who now dance together in a small black room. What connects them is a close fascination that serves a narrow purpose. What kind of connection do we need most? How much is enough, enough to sustain us, to alleviate the feeling of being alone? Would you trade four months in a bad relationship for an hour of karaoke and a slow dance with a robotist in Osaka, Japan? Would you trade a few weeks of meaningless sex for the physical comfort of a Telenoid? Would you trade a couple of unsatisfactory dates for a loving phone conversation with a woman you may never realize is a chatbot? Is the feeling of your hands at someone's waist while dancing the same as the touch of your fingertips on the most perfect silicone skin of the future? Does a dance with me have the same value as a dance with a Geminoid? When the track's over, it's time to go. Outside, the shopping square is dark and quiet. Hiroshi and I split up. My time with Hiroshi is over. I'm leaving Japan. My time with Ethan may also be over. None of us know what's to come. What we do know is that there are now 7, 000 miles between us. And so we do what comes instinctively. As a substitute for physical closeness, we use our voices. We insist on the link between us through language: carefully scheduled phone calls, bursts of text messages. I listen carefully to his voice (deep and musical); I imagine him sitting in that corner room surrounded by high windows. I tell you the stories I keep for the people I like the most; tells me yours. We send ourselves to the other titles of and movies; we exchange pictures, so we can imagine better. I imagine him bowing his head on his phone, and that little hole in the back of his neck. We barely know each other, we know each other, something between us has been synchronized. Each of us carries a part of the presence of the other, built through touch and then the memory of touch. A small collection of sensory memories. In the week since I left, he tells me, he has risen twice in the middle of the night, half asleep, to make me more comfortable, raising the heater, pulled an extra pillow out of the closet, a part of him convinced that he was still in his bed. I'm echoing through your house, even though I'm not there anymore. For a short period of time, this feels like falling in love. After this story was reported, Hiroshi Ishiguro unveiled his most beautiful android woman, named Erica, at the Miraikan Science Museum in Tokyo. It works autonomously, analyzing human speech and using neural network technology to give fashion responses. Erica models are currently being used for human-robot interaction research at three universities in Japan. Alex Mar (@_alex_mar) is the author of Witches of America. This is your first article for WIRED. This article appears in the November issue. Subscribe now. Listen to this story, and other WIRED features, in the Audm app.app.

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