

You're listening to *Imaginary Worlds*, a show about how we create them and why we suspend our disbelief. I'm Eric Molinsky.

When I was working as an animation storyboard artist in Los Angeles, some of my work was very creative, but some of it was very technical. And when I was doing the really technical stuff, I found that I drew better if half my brain was occupied. So, I decided to use that brain space to learn about operas.

I began by listening to *Opera for Dummies: The Book on Tape*. Seriously. But my tastes did get more sophisticated over time. I started listening to opera CDs and eventually I started going to The Los Angeles Opera.

*CLIP: TALES OF HOFFMANN*

And one day, I was sitting in the audience, it was a Saturday matinee, and I was watching *Tales of Hoffmann* by Jacques Offenbach. In the second act, we meet a character who seems to be a robot. I double checked the program to see when this opera was written. It was 1881. I thought, how could this be a robot? I mean, was this opera so forward thinking?

I soon realized the character was supposed to be a sophisticated, life-sized wind-up doll. In other words, she was an automaton. Automations are mechanical beings that are designed with clockwork precision to give the illusion of life. People have been making automations for centuries.

I never forgot that singing wind-up doll from *Tales of Hoffmann*, and ever since I started this podcast, I've been trying to figure out a way to talk about this character. Then I came across the podcast *Aria Code*.

*Aria Code* is a co-production of WQXR, WNYC Studios, and The Metropolitan Opera. Each episode, they take an aria and decode the meaning behind it. And in their episode about *Tales of Hoffmann*, they connected the dots between this character from the 19th century and current day concerns about artificial intelligence.

It is a really interesting episode, and we're going to hear it after the break.

**BREAK**

So, here's the episode *Guys and Dolls* from the podcast *Aria Code*, hosted by Rhiannon Giddens.

*Theme music*

**DEBUS:** So Hoffmann is an utterly human statement, because we're dealing not only with the successes. We're dealing also with the tragedies of human life.

**GIDDENS:** From WQXR and the Metropolitan Opera, this is *Aria Code*. I'm Rhiannon Giddens.

**MORLEY:** As she begins to sing she's kind of like a baby learning how to walk, and she's discovering what she's capable of and it's thrilling to her.

**GIDDENS:** Every episode, we take apart an aria to see how it's wired. Today, it's "Les oiseaux dans la charmille" from *The Tales of Hoffmann* by Jacques Offenbach.

**EPSTEIN:** We can't think clearly, when evolutionary forces are driving us in a certain direction. The wishful thinking kicks in no matter who you are.

## **GIDDENS INTRO**

This show is usually about the amazing things human voices can do.

But today we're going to talk about the robots in our lives, and I'm not just talking about Alexa.

Now robots and machines can't sing opera -- But there *is* one exception: her name is Olympia and she comes from *The Tales of Hoffman*, or *Les contes d'Hoffmann*.

In the opera, Hoffmann is a poet and he's recounting three of his biggest dating disasters. The first was with Olympia.

Now Olympia is an automaton -- a wind-up doll in the form of a woman... But Hoffmann's not clued in. He's wearing these special glasses that make her *seem* real, and he's head over heels.

Olympia fans the flames of his infatuation with her incredible, acrobatic aria, "Les oiseaux dans la charmilles," which means "The birds in the arbor." But people usually just call it "The Doll Song."

So Hoffmann is lost in his dream of love. But that's all it is -- a dream, an illusion.

I've got four guests today to help us get plugged into the very human experience of falling for a robot.

First, soprano Erin Morley. She gets pretty jazzed about singing this aria.

**MORLEY:** Olympia's a mechanical doll. She is meant to impress her audience. And so the singer can go nuts! You have permission to show off for the sake of showing off, and that's fun!

Next, Johannes Debus. He conducted the performance from the Met that you'll hear today, and he fell in love with the musical variety that Offenbach writes into this opera.

**DEBUS:** Offenbach seems to have the greatest sympathy with all his characters. The good things, the not so good things. And on top of it he does that with such a light approach. There's always vivacity, elegance, beauty. There's nothing that does not feel human.

Third, Caroline Sindere, a machine learning design researcher and artist.

**SINDERS:** I look at how technology affects people in society through the lens of design and human rights.

And finally, Dr. Robert Epstein, Senior Research Psychologist at the American Institute for Behavioral Research and Technology. He's a leading expert in distinguishing computers from people.

**EPSTEIN:** We're completely different from any computer we've ever built. We're organisms, we're built to socialize, we're built to form relationships, we're not built to think logically and to be rational all the time. Our lives are always going to be driven first and foremost by emotions.

Alright, time to decode "Les oiseaux dans la charmille" -- or "The Doll Song" from *The Tales of Hoffmann* by Jacques Offenbach.

## DECODE

**SINDERS:** It's hard to say, historically, what's the start of artificial intelligence. If we're thinking of machines, I would argue the creation of the Mechanical Turk chess machine in the 1800s would be the start of that. But if we're thinking then of non-human entities with agency, one could hypothetically go back to the beginning of time. What of ghost tales and folktales and folklore and religion that talk about different non-human entities and acting with agency? Perhaps that's also the birth of artificial intelligence.

**DEBUS:** *Les contes d'Hoffmann* is based on, um, source material by ETA Hoffmann, the early 19th century German writer. So we have this wonderful, weird, crazy,

interesting inventor called Spalanzani and he comes up with all sorts of machines that are new and unusual.

**MORLEY:** And he has created this mechanical doll, Olympia.

**DEBUS:** I think in our days it would be an android. It's a figure that looks like a girl. And yet it's, it's fully mechanical, and it can speak and as we will see, it can even sing.

**MORLEY:** He's trying to pass her off as his daughter and he's hoping she'll make him very rich.

**DEBUS:** And he invites people to come to his house and he creates sort of this salon. In our days, we would call it a fundraiser, because he is in deb. and desperately needs money.

**MORLEY:** Coppelius is a sort of co-creator of this doll with Spallanzani. And he has given Hoffman these rose colored glasses.

**DEBUS:** And Hoffmann in his romantic passion, he buys those glasses, immediately puts them on, sees the doll and forgets that this is a doll. The glasses make him believe that this person is a real person.

**MORLEY:** And Hoffman falls madly in love with her.

**EPSTEIN:** About 14 years ago I got online, looking for possible matches for myself, basically trying to find someone to have a date with, or a relationship with. And I ran across a profile and the profile said on it Ivana, and it had some pretty pictures. And so I started writing to Ivana.

I was pretty excited. Her pictures were lovely. A lot of them were family photos, and I thought that was a very good sign. She also indicated that she was, um, educated. And she was expressing affection very early on, and that was fun. So, I would sign my little notes to her, "With love."

**SINDERS:** We're complicated creatures, and beautifully so. And online, we live our happiest moments, our saddest moments, and even our most mundane and neutral moments. Think of the last thing you posted on Facebook or Twitter, for example. We live our fully human lives online, but online structures are created with technology and design, right? Human hands made technology. And this leads to all kinds of friction when companies are using things like artificial intelligence to try to understand the content people are posting and even their emotions.

**DEBUS:** So Olympia's song happens in the salon de Spalanzani.

**MORLEY:** And Olympia is here making her first appearance at this party and performs and impresses everyone. But everyone can tell she's not quite human, except for Hoffman who is viewing her through these glasses, who's seeing what he wants to see. And he is seeing his quote unquote ideal woman.

**EPSTEIN:** It was a good conversation, she was telling me about her family. She was telling me about her friend. She was telling me about her activities. So I told her about my family and my friends and my activities. I was disappointed when she suddenly admitted that she really did not live in Southern California, which is where I live, but that she was actually in Russia. That was disappointing. But it took me, you know, a split second to remember the fact that all four of my grandparents came to the US from Russia. So, okay. She's from Russia, I guess in some sense, so am I.

**SINDERS:** There are noted examples of different dating platforms actually inserting bots into the platform where people think they're interacting with a human and they're actually interacting with a bot. One really well-known example is the dating site, Ashley Madison, where it was geared towards married men. There were thousands of bots that people were interacting with, that were presented as real women. And the amount of bots sort of interacting with people I believe at some point actually was almost equal to the amount of real women online.

**EPSTEIN:** I'm trying to set the stage here, I mean I've got frequent interaction with Ivana, that's a good sign because sometimes when you write to people online, they don't respond, because maybe they're communicating with 50 other people at the same time, but she was responsive at least in the sense that when I wrote to her, she wrote back. So that was good. It was almost a perfectly normal, healthy getting-to-know-you interaction. I say almost because her English was very poor.

**DEBUS:** So what we hear at the beginning of the aria is the harp. The overall sound world of it, plus this beautiful innocent flute on top of the harp accompaniment. So it's something very intimate. On top of it, it's in a key, that somehow I personally associate with, romantic feeling, A flat major.

**MORLEY:** I think it's meant to evoke a very feminine quality in her.

**DEBUS:** It's kind of a waltz. That as well is, I think, associated with lots of positive feelings. Nothing in it that sort of would trouble you, or that would confuse you from the onset.

**EPSTEIN:** And then... then she mentioned something about going on a walk in the park with her girlfriend, and what a nice walk they had in the park. That one caught my eye because this was the middle of winter, and she's in a part of Russia which is very cold. And so I looked up the weather, and when she was supposedly on this walk, there was a blizzard in her area and the temperature was far below zero. So of course I said, "Hey, I looked up the weather. It looks like it's really cold there. Terrible storm. And you know, is that common to go on walks when the weather's terrible?" And she wrote back another nice long email with lots of details about this and that. But she didn't answer that question. So that really made me think. And so I started asking more and more and more specific questions to see whether she ever answered them and generally she did not.

**SINDERS:** Conversations have a rhythm to them. They have patterns, they have a dance, and we can take what can feel abstract like a human conversation, and actually break it into concrete components. And the bots are pulling from a corpus of data, a collection of data responses, a collection of texts they've been trained on, and then they're sort of parroting that back. So if you ask something outside the corpus, that's where you'll start to see the edges and failures of the bot, that's where you'll start to see this uncanny valley, which is something that feels so close to human, and then there's a break and we see how inhuman or unhuman it is. That's the uncanny valley. Machines don't quite understand context, like telling a joke or sarcasm. And that's something we can't really program into these, into these interactions. That's where they really start to fail.

**DEBUS:** It always puts a smile on my face when Olympia starts to sing "Les oiseaux dans la charmille." And it's not the, the, the most profound, texts. Let's put it that way. It has rather a silly angle.

**MORLEY:** All she's actually saying is, "Here is my song. Everything inspires love, aren't you falling in love? The birds in the bower are inspiring me to love."

**DEBUS:** It's a bit like, huh? What, what is she talking about? Does that make sense? Yeah. Okay. She's talking about those birds and so on. And then she's talking about the sky, everything is, is talking about love.

**MORLEY:** Her words are deliberately uninteresting because she's not conscious of what she's singing. It's just a bunch of syllables to her.

**EPSTEIN:** And then I started to type in random alphabet letters. Now if you type in random alphabet letters to a real person, they freak out. I mean, they say, "I can't understand what you're typing. Is there something wrong with your computer?" You

know? But she didn't. It had absolutely no effect. She just sent me back the usual friendly, affectionate email.

**MORLEY:** So there's a lot of staccato...

**DEBUS:** Every syllable has one note and then a rest. So everything is a bit cut off, "Tu parles à la jeune fille."

**MORLEY:** Which I think suggests repetition and machinery...

**DEBUS:** Here we hear so clearly that this is not a real human being, and underneath, the accompaniment of a waltz [sings] a bit of a hurdy-gurdy music.

**MORLEY:** I like to inject certain elements of life and intelligence into the body language of Olympia, and sometimes that means an unexpected wink. But in other moments it's a total vacancy in the eyes. What you're trying to do as a performer is seem brainless and alive at the same time. And it's, it's really tricky to do, it takes a lot of thought to seem this thoughtless, I think.

**DEBUS:** The machine takes over the action and starts its own life in a way, until the system breaks down.

**MORLEY:** The batteries start to run out. And what we see is a lot of really fast melismas, a lot of notes on one syllable that meander and her line slows down to the point where we're left with just an arpeggio that gets halted on a high B-flat.

**DEBUS:** And then comes this kind of composed glissando.

**MORLEY:** This very funny sliding down from the B-flat, it's like a chromatic scale.

**DEBUS:** You know, let's say a motor dies. The pitch level just sinks. And the, uh, machine is out of power.

**MORLEY:** And she collapses.

**DEBUS:** Crash. So they have to rewind the mechanism [noise].

So you have this kind of innocent song of love, this innocent waltz, juxtaposed with those elements of something is not right here. Something's going wrong.

**EPSTEIN:** I began to think something was wrong. I would say something like, "Hey, maybe we should try a phone call," or, "You know, there's a chance I could give lectures

in Moscow, would you like to meet at some point?" Anything, it could be even something about something in the news. And to those kind of questions I didn't get answers. And that was it. I mean, I realized I, I had been fooled.

**MORLEY:** Obviously there's a lot to say here about why Hoffman falls in love with a beautiful but brainless woman. Hoffman sees something really easy in Olympia. He sees zero conflict. He sees someone who is existing to serve his purposes and to fulfill his desires. And when Hoffman tries to speak to her, he goes on and on and waxes poetic, and she just sits there like a sounding board, and then she responds. "Oui, oui," and that is literally all she says, aside from her aria, is "oui," Yes. Whatever you say and I think there's a lot of deep commentary here about what some men want women to be. And how women are often treated as objects and expected to have no feelings, and expected to just be beautiful and impressive and say "Yes," and don't be difficult. And that's who Olympia is.

**SINDERS:** When we think of the bots we engage with in our daily lives, so many of them are female facing, and there's been a few studies into this as to why are female voices more palpable to audiences? Are they more subservient?

The automaton and her design in particular has this lack of emotional resonance primarily because she's designed to only do a few things. And she's also designed in a way where she has to be pleasing, so people will come and buy more.

**MORLEY:** And let's also mention the fact that her inventors are men, they are fighting over who's responsible for which body parts, they're fighting over who's going to make the most money off her, and then one of the men ends up destroying her. So Olympia is really a symbol of the objectification of women.

### **Aria - Second verse**

**MORLEY:** So the second verse comes around, um, she's just been injected with another dose of battery. And so she has totally fresh energy and she's ready to take this to the next level.

**DEBUS:** And she goes on with basically what she has sung before, this time even together with the chorus, who sort of maybe supports our own, as an audience, feelings of admiration, of amazement, of this idea of "Oh this is incredible, I haven't seen something like that, I haven't heard something like that, what is it?" Yeah. And the overall joy of that moment.



**MORLEY:** She spends the whole second verse trying to top herself, really. I like to think of Olympia as a learning robot, and as she begins to sing, she's kind of like a baby learning how to walk and she's discovering what she's capable of and it's thrilling to her. And the further she gets in the aria she's showing that there are no limits on her abilities and she's discovering this as it happens. And she's making fools of her inventors because they discover they can't control her. And that is really fun to play.

**DEBUS:** It's really magical because we see this doll, we know it's not a real human being and yet then starts the music, which is so incredibly charming and beautiful.

**EPSTEIN:** Did I stop communicating with her immediately? No. I sent a few more messages because, you know, I was giving her the benefit of the doubt. That's a wishful thinking operating, you know, that's a single person wanting to find a good mate operating, and it completely boggles our minds. We can't think clearly, when evolutionary forces are driving us in a certain direction. And okay, you know, it's not necessarily a bad thing that keeps, uh, the human race going, I suppose.

**DEBUS:** So Hoffman is an utterly human statement, because we're dealing not only with sort of the successes and our high aspirations, we're dealing also with the tragedies of human life and the failures in a way. I have great sympathy for him. He is searching, he's searching for something, he's searching for real love, and it's his imagination, and isn't it that often the most beautiful moments in life are those where we, we are a bit in an illusion. Yeah where we see things more bright and more vivid and more rosé, than they might actually be. And, um, you know, maybe that's, that's a quality, that's a human quality that, um, distinguishes human beings also from the automaton who can only take things at face value.

**SINDERS:** Humans look for personhood in other things. It's why we can look at a bunch of squiggly lines and see a smile. It's why we can form attachment to things like stuffed animals. We're looking for attachment and personality even inside inanimate objects, this is no different for bots or even robots. And so the design of this technology really matters.

**MORLEY:** So the second verse, we have the exact same moment where she runs out of gas and collapses. And I typically like to perform this in a way where she's aware of what's happening. Like, "Oh no, not again. I was just getting going again."

Then she gets back on her feet and starts singing again and goes further than she did before. Every phrase has a higher note than the one before and every run is more complicated than the one before.

In an effort to outdo herself, she keeps getting higher and higher. And, um, I love to throw in a high-G, above high-C I mean, so we're talking about ridiculously high.

**DEBUS:** It's the range of the voice that I would call stratospheric because we're getting to heights, uh, where we usually would use our oxygen tank to still be able to breathe. It's so extreme that no one can miss that. It's really the trapeze act, it's kind of conquering the impossible.

**MORLEY:** This is really the limit of, of the human voice.

**DEBUS:** The technical command of, uh, their voices, So there's a certain form of freedom. Yeah.

**MORLEY:** It has to feel a little bit like jazz, a little bit improvisational. And although we have all of these cadenzas and variations completely rehearsed. It's just nice to have a few different ones in your pocket so that you can throw them out if they feel good that night. It does need to feel and seem like she's just discovering and trying and pushing, and the ornaments are spontaneous. That really keeps it fresh for me. And I think it keeps everybody on their toes for sure. And you have to have a conductor who really trusts you if you're going to do that.

**DEBUS:** Obviously I try to listen to the singer, try to get an idea what kind of direction the singer is giving those, uh, coloraturas, and which, you know, it's a bit like the describing the, um, the curve of a thrown ball and where it lands. Yeah, you tried to follow the curve of that thrown ball, then you might signal to the orchestra, uh, you know, "Okay, careful. Um, listen, as I try to listen and here we go. Boom. Yeah." And you hope that everyone is on board. Doesn't work all the time, I know.

**EPSTEIN:** Well, these days I'm reluctant to go online. Would I trust myself to resist the temptations of a bot that has a beautiful picture posted online? I don't know. The wishful thinking kicks in no matter who you are. You want the next person and the next person and the next person to be the wonderful partner. So you're easily fooled because of wishful thinking and the programmers and the business people, they are motivated to fool you too, so we're rapidly moving forward into an era in which we won't know when we're dealing with a robot, and when we're dealing with maybe the love of our lives.

**SINDERS:** In building more responsible artificial intelligence and technology, it's important to think about how much the role of design shapes what we see. So I think the answer here is transparency and regulation and more agency and consent for users. You know, we're living in the dream of Mark Zuckerberg, and Elon Musk, and Bill Gates

and Jeff Bezos and so many others, but what if we could live in the dream of our own innovation?

**MORLEY:** It was a big moment for me in my career when I started singing this role. This was the first time I felt like an audience completely went bananas for me in a theater. I mean, what you feel as a performer when you know that the audience is, like, delighted with what you've done, you just feel like you've given them a gift and then they return that gift with their applause. And it's just this wonderful two way communication, this wonderful energy that is passed across the pit. And it feels great. It feels great.

**DEBUS:** It's a bit like turning the candles on a Christmas tree, so to speak. It's like everyone around Olympia turns into a little child full of awe and amazement. That's what it is.

**MORLEY:** You know, and Olympia just standing there receiving this applause. And not really able to react to it in a way that's human, which is kind of hard because I just want to break free of the robot and go, "thank you. Thank you. Thank you."

**GIDDENS:** Soprano Erin Morley, conductor Johannes Debus, machine learning researcher Caroline Sindors, and psychologist Robert Epstein decoding "Les oiseaux dans la charmille" from Offenbach's *The Tales of Hoffmann*.

***Aria Code* is a co-production of WQXR, WNYC Studios and The Metropolitan Opera. And thanks to WNYC for giving me permission to play this episode. You can learn more about Aria Code, and Tales of Hoffmann on my website, imaginary worlds podcast dot org.**