

## Wonderful! 301: Thanks Science, You're Doing Great

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[theme music plays]

**Rachel:** Hi, this is Rachel McElroy.

**Griffin:** Hi, this is Griffin McElroy.

**Rachel:** And this is Wonderful!

**Griffin:** A show where we talk about things that are good, we like, is— In— Then— Are into them. The... This is a show where we talk about things we like that's good.

**Rachel:** Mm-hmm.

**Griffin:** Um, I'm gonna say one I like, small wonder, right off the bat. Uh, the SAG strike is... has ended.

**Rachel:** Yeah.

**Griffin:** And so the... I think maybe two different times that I prepared segments and then was, like, "Wait a minute, I can't... I can't talk about this at all!" Uh, good...

**Rachel:** Yeah.

**Griffin:** Those can— We can trot those right back out.

**Rachel:** There's gonna be so much stuff we didn't know about that's all gonna, like, drop today.

**Griffin:** Shrek— They already announced a new Shrek today.

**Rachel:** [laughs]

**Griffin:** Not a joke! Shrek 5, they announced today, which is so...

**Rachel:** Magical.

**Griffin:** Which, like, I'm on tenterhooks to find out what other kind of delightful surprises... Boss Baby 3! Like, what else has Dreamworks got, like, fully ready to launch?

**Rachel:** Yeah.

**Griffin:** I don't know.

**Rachel:** Have they said whether or not Michael Myers is also attached to this product?

**Griffin:** Maybe! Maybe. We don't know. I don't know if Mike Myers is attached to it either.

**Rachel:** Yeah, I realized as I said his whole first name that that was not...

**Griffin:** A wild... A wild take.

**Rachel:** Not traditional.

**Griffin:** We can also talk about the fact that apparently I am in the new Trolls movie because they have my voice in the trailer doing a joke from the second Trolls movie.

**Rachel:** Yeah! Did you ever...?

**Griffin:** They never got to the bottom of that. Couldn't really put the... put Trav-nation on the case to dig into it...

**Rachel:** [laughs]

**Griffin:** ... because I couldn't ding-dang mention it. Didn't know, wasn't informed, but, uh, who knows, man? Who knows? We're looking forward to those residency checks. Thanks, SAG, for, uh, for getting that good deal. Um, yes. So that's very exciting news. Do you have a small wonder?

**Rachel:** Yeah. I wanted to bring up the realization we had yesterday which is that our, uh, one of our neighbors has their Christmas lights up.

**Griffin:** Sh— Huge. Huge, huge choice to do that on November 8th.

**Rachel:** Yeah. [laughs] Yeah, I was talking to Griffin about it. Because it's not, like, they don't have, like, inflatables.

**Griffin:** No.

**Rachel:** It's like, it's festive, but not...

**Griffin:** Tasteful.

**Rachel:** Not, like, tied really to the holiday. The only reason I recognized it was because it was the same light pattern as last year and I thought, like...

**Griffin:** Right.

**Rachel:** "... Oh, they're doing it!"

**Griffin:** Oh, I— Well, I'm sorry, honey. Are you suggesting that there is a version of what they did that could be charitably considered Thanksgiving lights?

**Rachel:** [laughs]

**Griffin:** But, like, if people festoon their house in small lights, I usually... I don't assume, like, "Oh, man. They are really going all out for Veteran's Day this year."

**Rachel:** Well, it's just, like, it's a little less committal, I guess? It's— I mean, obviously, there's not really a widely known tradition of Thanksgiving lights.

**Griffin:** Yeah.

**Rachel:** But it's not, like, they have, like, Mr. Claus out there, like, with a bag saying, like, "Hey, I'm on my way!"

**Griffin:** Yeah, yeah, yeah. Sure.

**Rachel:** It's more, like, "Look at all these lit up trees! Isn't that pretty?"

**Griffin:** Yeah.

**Rachel:** And I thought, like, "Yeah. It is pretty. Thank you."

**Griffin:** You're saying slap a nativity out there...

**Rachel:** Too much. Too early.

**Griffin:** Okay. Too much, too early.

**Rachel:** But lights? Well, why not?

**Griffin:** Okay. That's awesome. I didn't know how I felt about it at first. I felt challenged, but then I realized it's not about me.

**Rachel:** Exactly.

**Griffin:** You go first this week.

**Rachel:** I do.

**Griffin:** Let's hear it.

**Rachel:** This is another one where it's difficult for me to figure out what to call it.

**Griffin:** I had the same issue with my shit this week.

**Rachel:** Yeah. Uh, but I feel like it's just kind of learning new things as an adult.

**Griffin:** Okay.

**Rachel:** Uh, is kind of my general category. If I say, like, adult education, that's, like, a very specific kind of thing.

**Griffin:** That's a different thing, yeah.

**Rachel:** Uh, so I didn't really want to say that. I just realize for me, part of what I like about my job - and I'm speaking of my job outside of the podcasting space, although it happens here, too - uh, is that I'm always getting to learn new things.

**Griffin:** Sure.

**Rachel:** Keeps me, like, more engaged and enthusiastic about what I'm doing. And I feel like it does something to my brain that feels, like, good, you know?

**Griffin:** Yeah. I think that's what all brains do. When they learn something new, they're, like, they shoot out, you know, the juice that makes the brain feel good...

**Rachel:** Uh-huh.

**Griffin:** ... so that the brain is, like, "Well, let's keep doing that, then!"

**Rachel:** And I think when I was researching this topic, it helped me kind of get a more positive perspective on it.

**Griffin:** Okay.

**Rachel:** Because, like, there was a period of time, back when I had free time, where I would take up, like, "I'm gonna do pottery."

**Griffin:** Yes.

**Rachel:** And, "I'm gonna do rock-climbing!" I just thought, like, how, um, how uncommitted was I that I gave it up so quickly, you know?

**Griffin:** Well, rock-climbing is hard.

**Rachel:** [laughs] Yeah.

**Griffin:** So, I can understand that one. Pottery is also very hard. You would come home from pottery class and your arms would look like The Rock.

**Rachel:** Thank you. I'm gonna take that as a compliment.

**Griffin:** You should.

**Rachel:** But now I'm realizing that just the act of learning something new, even if it is only over a short period of time is valuable in itself.

**Griffin:** Sure.

**Rachel:** And then I don't need to feel bad about not committing to something, like, for the rest of my life, you know?

**Griffin:** Yeah. Yeah.

**Rachel:** Uh, so I wanted to do some research on kind of what benefits you got from that and kind of what it said about the brain, like, as you try to learn things as you get older.

**Griffin:** Yeah.

**Rachel:** Uh, so first what I found was a lot of, like, adult-adult stuff. Like...

**Griffin:** Pornography.

**Rachel:** [laughs] What pornography does to your brain.

**Griffin:** Yeah. What— Your algorithm is as such that when you Google anything, you have to sift... You have to wade through a good few pages of pornography before you can reach the, sort of, salient...

**Rachel:** [laughs]

**Griffin:** ... search results.

**Rachel:** But the important thing is that you tried, you know?

**Griffin:** Yeah, sure.

**Rachel:** You put the effort in to find new pornography. [laughs]

**Griffin:** Uh, yeah!

**Rachel:** No, I'm talking about, like, people who are, like, dealing with, like, the effects of aging. People in their, like, 60s and 70s who, like, are at risk for a number of health conditions.

**Griffin:** Right.

**Rachel:** Namely, like, dementia, for example. Um, and how the benefits of learning new things for them are significant. Particularly if it's, like, a hard thing.

There was a research, um, a research study that I saw from, uh, UT Dallas that talked about assigning 200 older people different activities. One was just, like, a more social activity. One was actually specifically digital photography and Photoshop.

**Griffin:** Cool.

**Rachel:** It was interesting, they show that in an interview with one of the guys who was, like, "It was really quite a challenge for me when I got into the photo class because it involved a computer and I had never even touched a computer." [laughs]

**Griffin:** I love that. When was this study done?

**Rachel:** Uh, this was 2014.

**Griffin:** Okay, so we should have been all... We should all have...

**Rachel:** You would think.

**Griffin:** ... Mrs. Beacon and done her incredible typing classes at this point.

**Rachel:** Uh, but that, um... The greatest improvement was for people who learned digital photography and Photoshop, uh, because it was perhaps the most difficult. Whereas the people that did tasks that were maybe simpler, didn't have as long term of, uh, gains.

**Griffin:** Well, and also, they learned Photoshop.

**Rachel:** Yeah.

**Griffin:** Which is fun.

**Rachel:** You know, they can go and make themselves look young in all of their photos.

**Griffin:** Or stronger or...

**Rachel:** [laughs] There's actually something my grandma used to do when she got into, like, retouching photos, she would always improve her neck and she was, like...

**Griffin:** I did not know that about...

**Rachel:** She was like, "I haven't seen my real neck in I don't know how long." Because... [laughs]

**Griffin:** Rachel, we've— I mean, we've talked a bit about Rachel's grandmother on this show, maybe even in this exact context, but Rachel's grandmother was an early adopter of computers...

**Rachel:** Mm-hmm.

**Griffin:** ...and specifically was into early computer games.



**Rachel:** Yeah!

**Griffin:** She also, like, showed you, like, Wolfenstein and...

**Rachel:** A lot of, like, CD-ROM games.

**Griffin:** Yeah.

**Rachel:** Um, like I learned about, like, Heretic and Doom from my grandma.

**Griffin:** That's so... Hearing, just hearing you say Heretic out loud...

**Rachel:** I know!

**Griffin:** ... really, really makes me excited.

**Rachel:** Um, but then I wanted to look, like, more specifically at, like, adults, you know, in our age group.

**Griffin:** Yeah.

**Rachel:** Um, so there was a New Yorker article that came out in 2021, uh, where they interviewed a variety of authors who've kind of written about this thing. Um, one of them was, uh, Rich Karlgaard who was the author of Late Bloomers: The Hidden Strengths of Learning and Succeeding at your own pace.

Uh, and he said that, uh, "our brains are constantly forming neural networks and pattern recognition capabilities that we didn't have in our youth when we had blazing synaptic horsepower." Uh, so he talks about a couple things. He talks about fluid intelligence, which is your ability to sus out novel challenges and think on your feet.

And said this is often enriched by advancing age, uh, and that particular cognitive skills rise and fall at different rates across your lifespan. He said that processing speed peaks in your late teens and short term memory for names at around 22.

**Griffin:** That sounds right to me.

**Rachel:** Short term memory for faces at around 30 and vocabulary at around 50.

**Griffin:** Cool. Yeah, no, I remember words much better than names.

**Rachel:** [laughs]

**Griffin:** That's why I usually give people names that are just words in my mind.

**Rachel:** I think about that a lot because I feel like if you asked me to name 50 people I went to high school with, I could do it.

**Griffin:** Really?

**Rachel:** Yes. First and last.

**Griffin:** Well, okay, that is cheating because, like, I had a lot of Jessicas. I could just say, "Jessica, Jessica, Jessica, Jessica..."

**Rachel:** [laughs] Yeah. Yeah, no, I feel like— But if I had to name anybody I went to college with, it gets a little bit harder.

**Griffin:** That's a really good point.

**Rachel:** Yeah.

**Griffin:** That's a really good point.

**Rachel:** I mean, granted, you had more continued access to people when you were younger.

**Griffin:** Sure, yeah.

**Rachel:** But still, like, it's interesting to think about that. I also thought it was interesting... Short term memory for faces at around 30. This is something that has come up for us, I feel like, because we have met a lot of parents. Uh...

**Griffin:** Yeah.

**Rachel:** ... at Henry's school and many of them I can recognize on sight. I could not tell you...

**Griffin:** Their names?

**Rachel:** ... what their name was.

**Griffin:** Yeah.

**Rachel:** Um, part of it is my own fault because someone will tell me their name and I will do nothing to retain it.

**Griffin:** There's a little guy in my head that... you activate by saying, "Oh, sorry, what's your name?" And then the guy turns on and the guy's just, like... [gibberish] And then the guy's, like, "Just say, 'oh, cool.'" And I'm, like, "Oh, yeah. Alright."

**Rachel:** Yeah. We went to a function the other day where people had to wear name tags and I was so grateful for it.

**Griffin:** Normalize this. Normalize this. Normalize...

**Rachel:** Just daily name tags?

**Griffin:** Do you remember when people would wear jewelry with their name, like, J-Lo sort of got that ball spinning?

**Rachel:** Yeah!

**Griffin:** That would be so huge if we all have just, sort of, like, accessories with our names on them.

**Rachel:** That reminds me, I was in a conference with somebody earlier today who wore their astrological sign around their neck.

**Griffin:** Awesome.

**Rachel:** And I just thought a lot about it. I thought, like, I bet that's, like, a great conversation starter.

**Griffin:** Were you able to clock the astrological sign?

**Rachel:** No because it was one I didn't know a whole lot about. Sagittarius.

**Griffin:** Yeah. The fish!

**Rachel:** I think... No.

**Griffin:** The archer. The archer! The deer!

**Rachel:** I think that's actually what our son is maybe? I think it's like a fall sign? I don't really know a lot about it. But I just thought, like, "Oh, wouldn't it be great if I knew anything at all and I could speak to that with this person?"

**Griffin:** Yeah.

**Rachel:** But I didn't.

**Griffin:** It's a shame.

**Rachel:** So, I—

**Griffin:** I'm a shag-ittarius. [cackles]

**Rachel:** You know what makes me sad? Is that's probably gonna be the episode title and that makes me sad.

**Griffin:** Well, that's the challenge! The glove has been dropped...

**Rachel:** Oh, now we have to say something more compelling.

**Griffin:** Now we have to say something better than shag-ittarius.

**Rachel:** Mm-hmm. Uh, so I think this is particularly interesting, and this article talks about it, in Science and Technology, uh, the article says, "We often think of people who make precocious breakthroughs as the true geniuses.

For example, Einstein developed his theory of relativity at 26." And at the time, Einstein said, "a person who has not made his great contribution to science before the age of 30 will never do so."

**Griffin:** Awesome! Get 'em. That's easy to say if you're Albert Einstein.

**Rachel:** Uh, but in a 2014 paper, uh, for the National Bureau of Economic Research, the average age at which people made significant contributions to science has been rising during the 20th century. Notably to 48 for physicists.

**Griffin:** Okay, just as a sort of counterpoint to that, just because it's important from a statistic standpoint to keep in mind that people don't die when they're, like, 48 years old anymore.

**Rachel:** That's a good point. That's a good point.

**Griffin:** Used to be you got to 48 and you were, like, "Aw, man. Any second now, right? I should just stop doing science and go hit the beach." But now it's, you know, now we've got longevity...

**Rachel:** That's a good point.

**Griffin:** ...because of science.

**Rachel:** That's a good point. Thanks, science. We don't say that enough. Thanks, science.

**Griffin:** Thank you, science. You're doing great.

**Rachel:** The other thing I wanted to say, um, is that there has been research to say that people may learn better when they are learning multiple skills at once. A recent study looked at the experience of adults over 55 who learned three new skills at once.

For example, Spanish, drawing, and music composition. Found that they not only acquired proficiency in these areas, but improved their cognitive functioning overall, including working and episodic memory. So this is basically, like, go back to school.

**Griffin:** School. Yeah.

**Rachel:** [laughs]

**Griffin:** It's called school.

**Rachel:** That did make— I never really thought about the fact, like, you have to take a certain number of classes when you're a student, but now it makes me wonder, like, "Oh, is that for a reason?"

**Griffin:** Just a compound effect, yeah.

**Rachel:** I thought it was, like, to just get you out there as quick as possible.

**Griffin:** Yeah. Your parents have to work for 8 hours today so we need to find lots of stuff to fill up here... Do you feel— I've almost certainly talked about this on the show before, but, like, in, uh, overwhelming sense of guilt for—

Like, I'm so deeply curious as an adult about anything and, like, delight in, you know, tumbling into, you know, a YouTube crash course. Uh, and just, like, learning about a thing. And then I think, "Well, shit, I had the opportunity to do that..."

**Rachel:** I know.

**Griffin:** "...for many hours in my youth that I just did not, could not have been assed to do."

**Rachel:** Yeah.

**Griffin:** It's a bummer.

**Rachel:** Yeah. It is. And also a lot of what I was reading suggested that, like, the interactive element of, like, sitting in a classroom can be really valuable. Like, it is easy to watch a video and think that you are retaining and learning at your full potential but, like, to have the feedback and the engagement is actually...

**Griffin:** Yeah, sure, of course.

**Rachel:** ... more accurate demonstration. Okay, so the last thing I'll say, so there is a 2017 paper by Rachel Wu who is in neuroscience at UC Riverside. Uh, proposes six factors that are needed to sustain cognitive development.

**Griffin:** I'm listening.

**Rachel:** These include what the Stanford psychology professor, Carol Dweck, calls a growth mindset, the belief that abilities are not fixed but can improve with effort.

**Griffin:** Yeah.

**Rachel:** Like, yeah, of course. A commitment to serious rather than hobby learning in which the learner casually picks up skills over a short period of time and then quits due to difficulty.

**Griffin:** Yeah.

**Rachel:** That would be maybe an issue that I have had in the past.

**Griffin:** Or everyone over the pandemic. Every living human being.

**Rachel:** Very true. Uh, a forgiving environment that promotes what Dweck calls a "Not Yet" rather than a "Cannot" approach.

**Griffin:** Cool.

**Rachel:** Which, of course, that's tremendously valuable for me. I, like, for example, I don't know that I would take up, you know, like, rocket science at this point, you know? Because, uh, if you struggle with that, there are some real consequences. But I feel like—

**Griffin:** You blow up a rocket in space and people get hurt? Is that the consequences?

**Rachel:** Yeah, yeah, yeah. But if you take on something that maybe you don't know it yet, but you can kind of struggle towards success, like, maybe that's a better thing to take up now is what I'm saying.

**Griffin:** I agree.

**Rachel:** And the final one is a habit of learning multiple skills simultaneously, which I just mentioned, which may help by encouraging the application of capacities acquired in one domain to the other.

So that's another thing we didn't mention, is that when you're learning a bunch of stuff at once, you can kind of ping pong them off of each other, which gives you, like, a new kind of understanding.

**Griffin:** Yeah.

**Rachel:** We had this great opportunity at my high school, I don't know if I've talked about it before. It was, uh, junior and senior year, you could take your literature class paired with your history class. So it would be a two hour block and half the block you would spend reading a book of the time and then the other half you would talk about the historical aspects and it was incredible.

**Griffin:** Oh, I was gonna— It sounds mad boring to me.



**Rachel:** [laughs]

**Griffin:** But you and I feel different ways about stuff sometimes.

**Rachel:** So we would look, for example, like, we read the Grapes of Wrath, and then we learned about, like, Depression Era, like, US and kind of...

**Griffin:** Yeah, but see, I don't want to do either of those things. [laughs]

**Rachel:** [laughs] Anyway, I just felt like all classes should be taught this way. I mean, obviously it's a little trickier with math, because then you'd be, like, "Well, if you had..."

**Griffin:** Math and cooking? That would be kickass.

**Rachel:** Yeah, that's...

**Griffin:** Math and music?

**Rachel:** That's true.

**Griffin:** That's great. Spoiler alert, that's what my segment is gonna be this week.

**Rachel:** Yeah.

**Griffin:** So I think that that's a good pairing.

**Rachel:** So anyway, I just— The whole reason I brought this up, it was also kind of helpful for me because I always— Whenever I sit down to do something, I'm always, like, "Well, how long are you really gonna do this, Rachel?"

**Griffin:** Yeah.

**Rachel:** You know, it's just kind of my own, like, I don't want to start something I don't think I can finish. But, like, this is just a reminder of, like,

there's always value in putting time into learning something, even if you don't stick with it.

**Griffin:** I find that in my adult life, I am having to deprogram sort of all-or-nothing thinking in general...

**Rachel:** Yeah.

**Griffin:** ... especially when it comes to areas of self-improvement or learning where it's, like, you know, I could start playing piano again routinely and, like, you know, practice my scales and what have you, but I'm never gonna play at Carnegie Hall so what's the fucking point in any of it?

**Rachel:** [laughs] Yeah. Yeah.

**Griffin:** Uh, that is how my brain tends to go and I have to fight that instinct at every step. Can I steal you away?

**Rachel:** Yes.

**Griffin:** Thanks!

[Home Improvement sting]

[ad break plays and ends]

**Griffin:** I think it's really funny that that was the segment that you had because my segment is sort of case, like, proof of that, uh, in practice of, like, a thing I have been learning about the past couple weeks that I've gotten very excited and fascinated in that I am now going to attempt to explain and probably only do a sort of okay job of it.

If I can pull off a sort of okay job on this, then I will be, uh, thrilled. Um, I want to talk about microtones. It's a fun name already, uh, and do you know... Do you know anything about this? Because you played music for school, you played instruments and stuff, but I don't know how, like, funky with the theory they got... [crosstalk]

**Rachel:** No, uh, in fact one might say there was no theory. [laughs] I mean, we learned how to read music and we practice playing music, um, but I never really understood anything about it.

**Griffin:** I mean being able to read music represents a pretty firm understanding of the core principles of music.

**Rachel:** Yeah, but it was, like, more memorization than, like, I don't know...

**Griffin:** Why it sounds good.

**Rachel:** I didn't have any kind of deeper access to it.

**Griffin:** I don't have, like, a... I, you know, I've been making music for Adventure Zone to varying degrees. Uh, I used to make it a lot more and so, you know, this is not a... This is not false humility. Like, I did not have a particular formal, like, music education growing up outside of, like, piano class in high school which was very much the same, like, memorize the notes in order that you play in order to get a passing grade on the thing.

Uh, but my YouTube algorithm now is, like, all wild music theory stuff. Um, and I find that whole sector of YouTube just, like, infinitely watchable because I've been listening to music for such a long time and I love listening to music, but the more I watch these videos, the more I, like, understand the fact that, like, I only understand maybe 2% of, like, music theory and why music sounds good and, uh... You know, chord progression, like, logic and all of that jazz. And jazz. Uh, I'm so, like, out of the loop on...

**Rachel:** That's the thing, like, if I had done any kind of improvisational music, I think I would have learned a lot more.

**Griffin:** You would have to, yeah, right? This is the...

**Rachel:** Yeah.

**Griffin:** ... the basics of that. I think I got onto this track, by the way, by watching, like, a lot of Lawrence videos and Vulfpeck. Like, a lot of, like, Joe

Dart bass solos and shit like that. And then I followed a sort of path through...

There's a guy named Jacob Collier who was very, very prominent in this scene. He has a great video he did with Wired where he explained the concept of harmony to five different groups of people so there was, like, a kid and then, like, a middle schooler, and then, like a college student and then a professional pianist, and then Herbie Hancock.

And it's just, like... evolving conversation about harmony throughout those that... I love that shit.

**Rachel:** Yeah.

**Griffin:** And so this is, like, where I've gotten, uh, deep into. My fascination these past couple weeks is microtones. So I'm gonna try and summarize this and I don't have, like, a music theory background, so if you don't, I— Hopefully this... You can grock this. Uh, so pretty much all music, all western music, at least, for the past, like, five centuries, has been created using a series of 12 notes that fall along what's called an equal temperament.

**Rachel:** Uh-huh.

**Griffin:** Those are the 12 notes that we have. So you think about a piano, you have the seven white keys in an octave and then the five black keys, right?

**Rachel:** Okay, uh-huh.

**Griffin:** You have, uh... You know, A to G and then the flats and sharps. That's the 12 notes that we have divided the music system that we all know. And that is called an equal temperament. It was sort of, like, codified in the 16th century and it all works because the wavelength of all 12 of those notes follow, like, a logarithmic scale. They follow a pattern so that they play nicely together to the ear. Uh, I guess, subjectively.

Like, this is just the way that music has been because people thought it sounded good in, like, the 1560s and then people were, like, "Fuck yeah,

man. That's great. Let's go with it." And there's an infinite way of, like, exploring just those 12 notes and that is where you get most of, like, composed music.

**Rachel:** Yeah.

**Griffin:** Uh, A440 is the standard tuning. That's 440 hertz for the A above Middle C. That is, like, the goal— The starting point for how you would tune that 12 note scale.

**Rachel:** Uh-huh.

**Griffin:** Uh, everything would be in relation to that following this logarithmic pattern. It's called 12edo is another way of describing it. 12 equal divisions of octave. Um, and... What I have learned because of weird music theory YouTube is that is not the only way to divide up an octave into a series of notes.

For example, there is something... a much, much older way of doing this called the Arab tone system which is one of the oldest equal temperament models where instead, it uses 24 equal divisions of an octave. So twice as many.

This, I think, is kind of easy to visualize, even if you've never heard a song using 24edo because it's just, like, you think about the step between, you know, C and C#, just imagine an invisible step between those two, right?

**Rachel:** Weird.

**Griffin:** And it does— It sounds, uh, pretty wild. You can listen to, like, a full range of the 24 notes on this, uh, this division of the octave and it sounds wild. It sounds wrong to an ear that has been trained to just think in terms of 12edo equal temperament.

**Rachel:** Yeah.

**Griffin:** Uh, but this is an older sort of way of thinking about notes and tones, uh, it still has scales. It still operates on scales, following, like, wicked

different rules, but scales of seven notes, uh, with different intervals between them, but it can pull from twice as many tones as a traditional 12edo sort of, uh, tonal scale.

Um, so, like, that still kind of makes mathematical sense, right? Like, it's just our 12 note model but with a half step between each of the things, right? You can kind of... Even if you're not listening to that, you can kind of envision what that sounds like, right?

Then you can get into, like, really, really wild shit. So, like, a very popular one in, like, weird YouTube theory is 31edo. This is 31 equal divisions of the octave. So now it's not, like, you're moving from C to a weird C-C# to C# to a weird C#-D to D... Now, it's like, fucking all— Like, it does not divide evenly at all.

**Rachel:** Yeah.

**Griffin:** And so you hear some, uh, you can get to the standard range of, you know, natural notes that are in there, but scattered in there is just a plethora of other wild sounds that do not divide up evenly into, like, any other type of music you've ever heard before.

Uh, it sounds very, very strange. You have to, like, compose in a completely different way. The harmonies are all completely different. Uh, and it still sounds kind of bad to the ear if you're not kind of, like, accustomed to it or able to sort of, like, think about it in, like, a weird lateral way.

Uh, I find that so fucking cool. I find that so cool because it's not, like, a new genre of music. It's not like a new instrument playing a song. It's not like a new composition that is an arrangement that is clever, you've never heard before. It's, like, what if there was different math? And...

**Rachel:** Yeah.

**Griffin:** Uh, and that is, uh, really, very, very cool and exciting. What sort of makes it more exciting is that a lot of the videos that I have watched of people playing piano in 31edo, you can't just use a piano, right? Because it

doesn't have the buttons for it. Uh, it uses a divide called a Lumatone which, I sent you a video of someone playing this instrument...

**Rachel:** Yeah, okay, okay.

**Griffin:** And it is gigantic. It's, like, the size of my desk and it is covered in, like, a few dozen glowing hexagons...

**Rachel:** Uh-huh.

**Griffin:** ... that you, that sort of look like they follow a piano pattern of, like, you know, notes in rows except there's, like, six rows of different shades and they play, like, the different, you know, semi-flats and other weird notes.

**Rachel:** Yeah. I thought it was like a soundboard, which I mean, I guess it basically is, but, like, I didn't realize it was, like, a whole new system of music.

**Griffin:** Yeah, so the whole Lumatone system is specifically for pianists to explore other, uh, equal divisions of octave. 'Cause 31 is not the only other one. There's, like...

**Rachel:** Yeah.

**Griffin:** I mean, virtually, you can divide up an octave any number of notes that you want. Some of it makes a little more mathematical sense than other ones and 31 just happens to be a sort of standardized version of that. This thing looks like the flight deck of, like, an alien spacecraft.

It looks really, really sick and I realize I've described, like, a music theory thing without actually playing it and I probably haven't done a great job explaining it, I apologize if there's, like, you know, music majors out there who are pulling their hair out listening to this.

Uh, but I'm gonna play a piece by a YouTuber named Zheanna Erose. Uh, it's in 31edo on one of these, like, crazy Lumatone keyboards that you should, uh, just look up a video of because they are sort of hypnotizing just to see. Uh, it's an etude? I don't think I'm saying that word correctly. But it's

a piece called Paranola, uh, and it's just this minute long microtonal piece that just boggles my mind, so I'm gonna play that now.

[music plays]

**Rachel:** Can I say something?

**Griffin:** Yeah.

**Rachel:** I thought it sounded a little bit like the music they would play in Mr. Roger's Neighborhood.

**Griffin:** Oh, wow!

**Rachel:** But, you know, the little transitional music and the music they'd play, like, when they would get to the Land of Make-believe. I don't know why, maybe it's just like the kind of... I don't know. I don't have a lot of reference points for, like, kind of jazzy piano. [laughs]

**Griffin:** Yeah. I mean, I think that has more to do with, like, the jazzy nature of the piece and less to do with, like, the microtonal nature of the piece. Because I don't know if Mr. Roger's Neighborhood got that fucking trippy.

**Rachel:** No, probably not.

**Griffin:** Uh, 'cause it, like, a lot of music theory is, like, sort of in an abstract manner, describe how a different sort of composition can elicit a different mood or a different feeling, right? Like, you get into taking about, uh, how chord progressions resolve or don't resolve to, like, create tension.

The idea of, like, a major key being positive, happy, bright and a minor key being, like, sad and melancholy, even though, like, that's a human association. Like, those notes... That's not a sad note on the piano. It's just, like, when you hear a minor key, your brain thinks, "Oh, that is a sad... That is a downbeat thing as opposed to an upbeat major thing."



All of that is, like, how we map our emotions and response to the music that we hear, right? And then microtonal pieces, it feels like just, like, come swinging in on a vine and just, like, smashes through the wall Kool-Aid man style, like, "What do you fucking make of this? I bet you don't know because it doesn't even use notes that..."

Like, my first blush is, like, it kind of sounds like a piano that's out of tune being played, but then, like, in the context of the bigger piece, as it starts to, like, you know, contextualize itself and...

**Rachel:** Yeah.

**Griffin:** ... harmonize with itself and these, like, weird offshoot notes, it's like, "Oh!? There's a lot of comments that are on that video that I just played a clip from that kind of, like, echo my first thought which is, like, "It's like seeing a color that you haven't seen before."

**Rachel:** Yeah.

**Griffin:** Which is not really an experience you get to have in the visual realm all that often but, like, this is something that, like, once I started watching, like, these weird microtonal compositions, it's, like, "Oh, okay. So, like, there's a whole different ball game that is out there, uh, that is infinite and kind of crazy." Uh, and I just think that's so cool.

**Rachel:** It is cool.

**Griffin:** I don't know that I'm gonna be, like, you know, bopping to microtonal beats. I mean, who knows, though, you know? The future, the future of music can be anything, I guess.

**Rachel:** Fair. Yeah. It's... It's almost like finding a secret room or like a secret passageway. It's just, like, this idea that... I don't know, there's this whole other existence that you hadn't even considered.

**Griffin:** Yeah. Anyway... That's— I hope I did an okay enough job trying to explain that. Uh, hey I got some small wonders here. Um, I would like to read them. Mel says, "My small wonder is sharpening my set of colored

pencils. There's something satisfying about the routine and seeing them all freshly sharpened right before starting a new coloring page."

**Rachel:** That's really great.

**Griffin:** I do like that. I miss colored pencils. A lot. I guess I could just get some.

**Rachel:** Uh-huh.

**Griffin:** I'm an adult.

**Rachel:** You're an adult.

**Griffin:** Awesome! Alex says, "My small wonder is static electricity at night. Like when spreading a blanket over a bed. Seeing the dim flashes of tiny lightning really is a cool reminder of how the world is the same, even if the scale is different." Beautiful, beautiful, I like that.

**Rachel:** Yeah.

**Griffin:** I used to like biting into certs in a closet, getting that little spark. I don't know if that's the same concept.

**Rachel:** We have a lot of static electric experience on our trampoline.

**Griffin:** That's true, that's true.

**Rachel:** Mm-hmm. That's fun.

**Griffin:** One time, I had my face against, like, the mesh net surrounding the thing, like, pushing it in, trying to, like, do like a funny... You know, a funny face for the kids bouncing on it. And then, Gus reached forward and touched me through the screen and it hurt— Like, it hurt.

**Rachel:** [laughs]

**Griffin:** Like, the zap was so fucking powerful... He actually touched my lip through the screen and zapped my lip and it, like, really, really, uh... Like, I felt numb for a little bit afterwards.

Thank you to bo en and Augustus for the use of our theme song, Money Won't Pay. You can find a link to that in the episode description. Why don't you go check that out for me? And, um, go check out all the stuff we have over at MaximumFun.org.

Uh, we got some details. Our Candlenights virtual, uh, spectacular is gonna be happening against this year. Uh, all proceeds gonna be going to benefit Harmony House and we're gonna have a bunch of fun stuff. You can watch it, you know, live when we put it up or video on demand and, uh, you can find all the details for that over at McElroy.family.

**Rachel:** Perhaps not as important, but just as exciting, is the now promised return of 'Til Death Do us Blart.

**Griffin:** Yes. Uh, yes. Yes.

**Rachel:** [laughs]

**Griffin:** There was a while there where we were wondering if we were going to be able to do that project this year...

**Rachel:** Yeah, uh-huh.

**Griffin:** ... what with the ongoing strike, but, um, Fran and the gang have given us the all clear, so.

**Rachel:** [laughs] Uh, that is where Griffin and his brothers and, uh, Tim Batt and Guy Montgomery, uh, our friends in New Zealand, correct?

**Griffin:** Yes.

**Rachel:** Uh, they all get together and they watch Paul Blart: Mall Cop 2.

**Griffin:** Yes. Which is now on the 'Flix.

**Rachel:** And, uh, record a commentary or an experience track.

**Griffin:** Is this our tenth year? Jesus Christ.

**Rachel:** Is that possible?

**Griffin:** I don't— It can't be. It can't. I can't. I can't think about that. I can't do that. I can't do that right now.

**Rachel:** [laughs] It's a delight.

**Griffin:** It's very good. I haven't watched it this year, but... Have I made you watch it?

**Rachel:** Uh... I watched maybe part of it with you?

**Griffin:** Let's do it. Let's do it this year.

**Rachel:** Mmm... We have so much that we like watching that we haven't been able to talk about.

**Griffin:** That's true, that's true.

**Rachel:** We're watching Our Flags Means...

**Griffin:** Our flags is death, guys.

**Rachel:** Our flags is death right now.

**Griffin:** Our flags is death.

**Rachel:** It's so good.

**Griffin:** It's real good. Um, but enough of that. Enough of us. Away with us! Enjoy your day! Off with you!

**Rachel:** Sorry we're late again.

**Griffin:** It's fucking wild over here.

**Rachel:** It is.

[theme music plays]

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