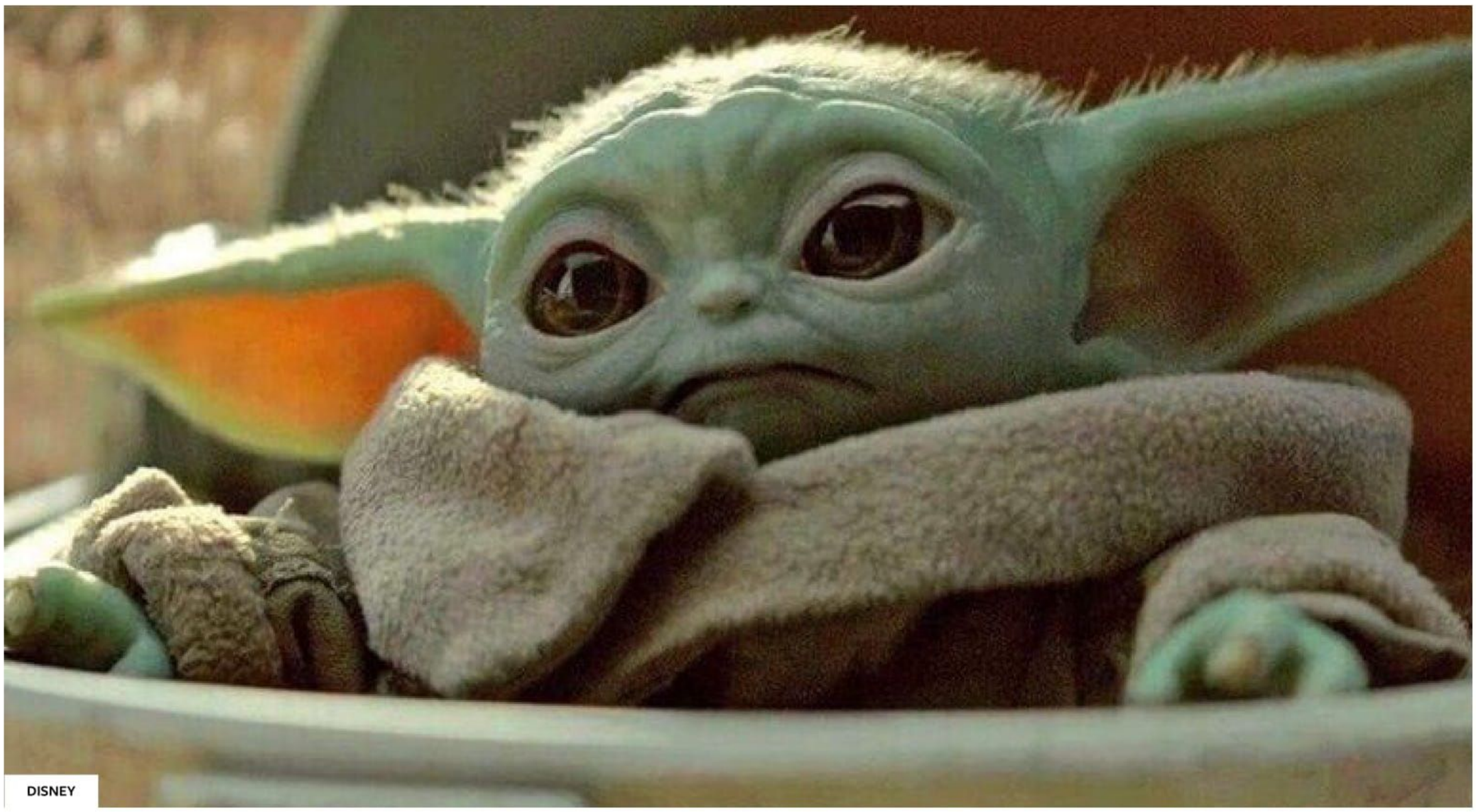
# An Alarmingly Deep Dive Into the Science of Baby Yoda

We talked to eight actual scientists to find the answers. This is a cry for help.

By Eric Spitznagel Dec 2, 2019



DISNEY

There have been many famous babies throughout history: The Lindbergh Baby. The Gerber Baby. Baby Jessica. *Rosemary's Baby*. But has there ever been a baby as universally loved and fawned over as Baby Yoda?

For all the joy that Baby Yoda brings us, he can also be confusing. And not because of the obvious questions, like whether Baby Yoda is the *real* Yoda. Obviously he's not. *The Mandalorian*—the Disney+ original series that's given us our favorite non-English-speaking *Star Wars* character since BB-8—is set between *Return of the Jedi* (when the O.G. Yoda dies) and *The Force Awakens*.

It's arguable that Baby Yoda could be the illegitimate love-child of Yoda and Yaddle, the lady Yoda from *The Phantom Menace*, and there's been some scholarly speculation on that topic, including an investigative report with the refreshingly blunt title, "Did Yoda F**k?"

But whether *the* Yoda is Baby Yoda's true daddy isn't what fascinates us every time we tune into *The Mandalorian*. What keeps us coming back for more is trying to figure out what in the actual hell Baby Yoda is supposed to *be*.

## So … What *Is* Baby Yoda?

We know almost nothing about Baby Yoda, other than that he appears to be the same species as a famous Jedi Master with big ears and a bizarre linguistic quirk. But the details, and even the name of that species, remains a mystery. Even George Lucas has no idea. In a 2005 *MovieFone* interview, the guy who single-handedly invented the *Star Wars* universe admitted he'd "never really figured out where [Yoda] came from, what his species is called. It doesn't even have a name. Maybe it's somewhere but I don't know what it is."

Here's what we do know about Baby Yoda: He's almost unbearably cute, he can walk but spends most of his time in an egg-cradle, he naps a lot, he has put two frogs (as of this writing) in his mouth but never eats them, and he has at least enough control of the Force to briefly levitate a Mudhorn.

Baby Yoda, or "The Child" as he's sometimes called, is 50 years old despite seeming, by all accounts, like an infant. Which isn't all that crazy given the lifespan of his species. Yoda lived to the ripe old age of 900, when he was still mentally agile enough to sass Luke, telling his young apprentice that he'd never look as good in his old age:

But things get confusing when you try calculating Baby Yoda's age in human years.

If the lifespan of Yodas are similar to humans, given certain lifestyle factors—regular exercise, not drinking or smoking, and maintaining a healthy weight—Baby Yoda could reasonably anticipate living anywhere from 72 (the average life expectancy) to 90 years. The original Yoda died at 900, and given his clean living and omnivore diet, we can guesstimate his death age at somewhere around 90 in human years.

Which means Baby Yoda, at 50, is the developmental equivalent of a five-year-old human child.

In many ways, Baby Yoda's brain maturation is consistent with humans. He's hit all of his motor milestones, like sitting up, crawling, and walking. He also seems in line with fine motor milestones like grasping small objects and eating. But he's displaying a lot of behaviors that hint at cognitive delays.

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"He likes to put things in his mouth, like small chrome knobs and frogs," notes Duke University biologist Eric Spana. "The putting-all-the-things-in-your-mouth stage in humans is at about one year, plus or minus six months."

It's all perfectly normal—yes, even the frog-sucking—but by age three, most kids have stopped exploring their world orally.

"Developmentally, Baby Yoda seems like a human one-year-old," Spana suggests.

He's also noticeably behind in language comprehension. Baby babble is typical during the first 12 months, but some children may say their first words as early as nine months. By four years old, they should be speaking fluently in a way that even strangers can understand. Baby Yoda, by contrast, doesn't seem to have advanced beyond cooing and baby gibberish.

The developmental lagging probably won't last for long. If Baby Yoda matures in the same timetable as old-school Yoda, he should (according to the official record) became a Jedi Master at the age of 100—or, in human years, when he's approximately 10 years old. Talk about a cognitive leap.

So what's going on here? The first problem, according to evolutionary biologist Alan Cohen, is putting too much trust in the "dog years" multiplier for translating age between species.

"The rule of the rule of thumb that one human year is seven dog years is clearly not quite right," Cohen says. "For example, after two years the dog is more like a 20-year-old human than a 14-year-old. Also, lifespan varies substantially across breeds, but there are many 12-to-14 year old dogs that display energy levels and vitality unthinkable for 84-to-98 year-old humans."

## The Evolution of Baby Yoda

While Yodas and humans may be dissimilar in many ways, we do share some developmental markers with the green-skinned, floppy-eared aliens. Not unlike Baby Yoda, humans also have "a prolonged infancy and adolescence followed by a growth hiatus, then a growth spurt with a long adulthood," says David Reznick, a distinguished professor of Biology at the University of California, Riverside.

"For women, the growth spurt comes at around ages 12 to 15, and for men it comes later," Reznick says. "We then attain full size, complete the maturation of brain function, and look forward to a long adulthood. Yoda is really quite human in his pattern of development."

So why does Baby Yoda seem so developmentally delayed compared to humans? He's been alive for 50 years, and he's the cerebral equivalent of a one-year-old. Spana points to a recent study from Vanderbilt University, which showed that the longevity and sexual maturity of animals is correlated with their number of cortical neurons.

"Since Yoda lived much, much longer than any human, we could extrapolate that he had many more cortical neurons," Spana says. "In humans, much of the first years of life is spent growing the size of the brain, adding

neurons and adding connections between the neurons. Essentially building a brain. A bigger brain would require even more time for neurogenesis and synapse formation."

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So Baby Yoda's slow cognitive development, at least compared to humans, isn't cause for alarm. If you're a human parent who has adopted a Baby Yoda—something the entire Internet has daydreamed about—and you're worried that he or she isn't hitting their developmental milestones, and you've had whispered discussions with the pediatrician about whether your Baby Yoda is on the spectrum, you can relax.

"We can equate the first 50 years of his development to one human development year," Spana says. "But we don't know how fast he might develop those next two human developmental years so that he can be ready to enter with the other younglings who are at the same developmental stage."

As droid bounty hunter IG-11 remarked of Baby Yoda in the first episode of *The Mandalorian*, "Species age differently." And just like Mando, the hero of the series, shouldn't jump to ageist (and probably speciesist) conclusions, it's a little presumptuous to think Yoda should follow a human-like life course, says Cohen. We're not even entirely sure he's a mammal.

"What we can certainly say is that evolution doesn't just act on lifespan, stretching or contracting the whole life course," Cohen says. "It also can adjust the relative lengths of life stages, at least to some extent."

Take birds, for instance. Cohen points out that most birds reach close to full adult size in a matter or weeks or months, despite the fact that they can live for many years or decades. "Some of these birds may take years to start breeding. Albatrosses can pass a decade at sea without once coming to land before they reach breeding age," he says. "But in terms of size, they are mature within the first year."

Some species, however, take much more time to fully mature. "Cicadas stay in a cocoon or larval state for 17 years, underground, before emerging as adults for a brief period," Cohen says.

So we shouldn't be quick to judge Baby Yoda because he's not speaking clearly with complex sentences or using a fork and spoon. He's not necessarily behind the curve—he may just be following his own evolutionary time scale.

## Going Through Changes

Another thing to consider—and this can be painful if you don't want to think of Baby Yoda as anything but an innocent and adorable baby—is puberty.

When is Baby Yoda going to become Man Yoda? Or at least Hormonal Yoda? When is he going to lock himself in the bathroom for hours and Mando is like, *"What the hell are you doing in there all day?"* And Pubescent Yoda is like, *"Leave me alone, you will! Understand, you do not! My real dad, you are not! Me alone, you will leave!"*

Jon Chase, coauthor of *The Science of Star Wars*, explains how the unthinkable could happen. "Humans live between 80 and 120 years, reaching sexual maturity around age 13 on average, or between 11 to 16 percent of their lifespan. Giant tortoises can live over 100 (maybe 250) years and reach sexual maturity at around 30 years, or between 12 and 30 percent of their lifespan. The Greenland shark can live for roughly 270 to 400 years, reaching sexual maturity around 150 years old, or between 38 to 55 percent of their lifespan."

What does this mean for Baby Yoda? If his species lives to age 900 on average, then we could estimate that he'd reach sexual maturity anywhere between 10 and 55 percent of his life, based on those three relatively long living species.

"That could be as young as 90 years or as old as 495 years," Chase says. "This would mean that at 50 years old, Baby Yoda would be at best half way toward puberty—6.5 years human equivalent age—or at worse, only [10 percent] of the way toward puberty—1.3 years human equivalent age."

The latter estimate is probably closer, given the 50-year-old Baby Yoda's representation as a toddling baby. Great news for anybody worried that season three of *The Mandalorian* will feature a preteen Yoda with a squeaking voice, underarm hair, and mood swings.

## The Jedi Equivalent of Potty Training

The most noticeable way that Baby Yoda is unlike other infant species is his supernatural gifts. He may not have a mastery of the Force just yet—lifting an animal the size of a Mastodon for just a few seconds is enough to inspire a full-afternoon nap—but damn, that infant has some skills.

The tricky thing, according to Duke University biology professor and *Live Long and Evolve* author Mohamed Noor, is that we don't really know how much of a cognitive leap is required before a young Yoda is able to use the Force for the first time. "Maybe it's as simple for Yoda species as saying two-word sentences is for human toddlers," Noor says.

Noor can remember the exact day his 21-month-old daughter instantly transitioned from calling his friend "Day-day" to the more grammatically correct David. "It was a very abrupt moment, and then there was no turning back," he says. "One could almost imagine new neurons suddenly starting to fire in her brain. And I have heard of many kids—not via scientific literature but people I know—who don't really speak until slightly older ages but then abruptly do so pretty well and show no difference from then on."

Maybe that's what we witnessed when Baby Yoda lifted that Mudhorn into the air like a Jedi badass. It could've been a milestone that nobody saw coming, least of all Baby Yoda. He was as shocked by his abilities as Noor's daughter was that she was able to call David by his actual name.

We've all been Baby Yoda at some point in our cognitive development—stunned by what we just did, and then immediately ready for a long nap.

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So it's a good thing Baby Yoda is just "playing" with the Force and not using it in earnest yet, says Iddo Friedberg, an associate professor of veterinary microbiology and preventive medicine at Iowa State University.

"A species like that, which can use the Force while still in diapers, would require a lot of nurturing before it is let loose on the world," he says. "Otherwise, destruction to itself and others is almost guaranteed. Think a temper tantrum where your baby can choke the family dog, or take the family landspeeder SUV off a cliff."

Maturing too quickly in his ability to manipulate the Force wouldn't just cause chaos—think *Problem Child* but with more levitating objects—but could seriously shorten Baby Yoda's life expectancy.

Friedberg compares it to toilet training, but not a milestone that parents of a Baby Yoda are all that adamant about encouraging, especially in an infant whose midichlorian count is off the charts. "It can take decades," Friedberg says of the Jedi equivalent of toilet training. "But with a life expectancy of 900 or more, no one is in a rush."

## Wise Beyond His Years

Baby Yoda may seem like the dumbest kid in your kid's kindergarten class, but former NASA astrophysicist Jeanne Cavelos (and author of *another* book called *The Science of Star Wars*) suggests he might actually be the gifted child we never notice because of our species favoritism.

"He shows some solid knowledge of the situations he's in and behaves appropriately in those situations," Cavelos says of Baby Yoda. "He's able to get out of his bassinet by dropping from a distance twice his height without injury and walk short distances without any assistance. He is aware and empathic with beings not of his species even when they are covered completely, including their face. He recognizes injury in others and attempts to repair it. Without given specific instructions, he knows when it is safe to leave his cradle and when it is not."

Some of the physical limitations that make Baby Yoda seem especially infantile, like his waddle of a walk, may not be developmental delays at all. The Yoda species isn't built for getting around quickly. In fact, even in late adulthood, they have very, very short legs that aren't designed for rapid, fluid movement.

"Remember that Luke carries Yoda around in a backpack [in *The Empire Strikes Back*], much like a baby," says Cavelos. "They also have fingers about half the length of human fingers, relatively speaking. So they aren't built for tool-making either. Even making dinner for Luke Skywalker seemed to be a bit of a dexterity challenge for Yoda."

In other words, what seems adorably baby-like to us could be traits that are characteristic of the species, and not just during infancy.

"It may simply be our natural prejudice as humans to conclude that a creature with Baby Yoda's appearance is a baby, since he looks somewhat like a human baby," says Cavelos. "So if he is beyond baby stage, why wouldn't he talk?"

There are a number of possible explanations for Baby Yoda's poor verbal skills. Cavelos suspects it may be his nomadic lifestyle—if the Yoda species have tribe settlements, we've yet to see them—and the lack of a common tongue. "If he doesn't know the language, there's not much point in speaking."

Or it could be the lack of consistency with language cues. "He seems to spend most of his time alone in a floating egg," Spana says. "So maybe he lacks language role models. Children won't learn languages without a role model."

We know that the adult Yoda speaks in a peculiar object–subject–verb syntax, so there are a lot of missing pieces in his linguistic development. We know how he speaks at 50 years old (mostly non-verbal with occasional baby gurgling) and at 900 (like a tourist trying to ask for directions in a foreign land), but how does he get from point A to point B?

Allison McDonald, a biologist at Wilfrid Laurier University in Waterloo, Canada, wonders if Baby Yoda's backwards grammar isn't just because he's required to speak something other than his native language. "His syntax could be indicative of his atypical neurobiology," she says.

Obviously there's a lot still to discover about Baby Yoda, and we haven't even scratched the surface. Like, say, how his species is born, or if that's even the right word for it.

"Does he come from an egg, or does he develop inside a womb?" Noor asks, blowing our minds with questions that didn't even occur to us until now. "Maybe in some way he's more like an infant kangaroo—they don't have placentas, so they're 'born' super-early but have a prolonged 'outside body' developmental period before they're more like baby mammals with which we're more familiar."

universe so enduringly fascinating. (Don't get us started on whether Ewoks are really pygmy relatives of Wookiees.)

But the next time somebody makes a passing observation like "Baby Yoda is so cute," we're not sure we'll be able to resist answering with, "Cute, sure. But it's hard not to wonder if his prolonged infancy is because he's in neurogenesis, developing an unusually high number of cortical neurons, or if he's somehow developmentally challenged, but maybe it just seems like he's not hitting his cognitive milestones because of my species privilege. Do I really want to be one of those human-centric 'my five-year-old is smarter than Baby Yoda' jerks? Why do we even jump to conclusions that Baby Yoda *must* be a mammal? Who's to say that he doesn't have more genetically in common with a duckling or a kangaroo? Look at the ears! You're telling me Baby Yoda doesn't have at least a little kangaroo DNA? Anyway, yes, cute, of course."

That's how you find out who your real friends are: Just how deep are they willing to get dissecting the hypothetical species backstory of Baby Yoda?