**Outside/In: Falling Doesn’t Count**

**Nick Capodice:** [00:00:01] This is me checking the mike. Do you know how many roadies it takes to change to change a light bulb?

**Nick Capodice:** [00:00:06] 1. 2. 1. 2. Hey! 1. 2. There it is.

**Sam Evans-Brown:** [00:00:15] This is Outside/In a show about the natural world and how we use it. So we are all in the studio here today with Nick Capodice, cohost of Civics 101. One of NHPR's other podcasts and also Justin Paradise.

**Justine Paradis:** [00:00:30] I'm right here.

**Sam Evans-Brown:** [00:00:30] ...and Executive producer Erica Janik.

**Erika Janik:** [00:00:32] Hi there.

**Sam Evans-Brown:** [00:00:33] And Taylor who is you know.

**Taylor Quimby:** [00:00:36] Are you just going to not give me a title?

**Justine Paradis:** [00:00:38] And Taylor Quimby.

**Sam Evans-Brown:** [00:00:40] Taylor is still here. So Nick we're here because we have been vigorously debating a question that you presented to us at one point.

**Nick Capodice:** [00:00:49] Yeah it's a question that I've had that my friends and I have debated for about 20 to 25 years.

**Sam Evans-Brown:** [00:00:55] It's like every time you come together the friendship just picks up where it left off.

**Nick Capodice:** [00:00:58] It's just it's late enough in the night and somebody throws this question out at them we just do it you know.

**Sam Evans-Brown:** [00:01:02] OK.

**Nick Capodice:** [00:01:03] So the question is this: Before planes, before cars, what is the fastest that a human being could go?

**Justine Paradis:** [00:01:14] Trains?

**Nick Capodice:** [00:01:15] Before trains.

**Sam Evans-Brown:** [00:01:16] Before engines?

**Nick Capodice:** [00:01:16] Before engines, before all the fast stuff happened, before we got real fast. What was the fastest a human being went? What was the situation? Now there's some rules. We're not counting falling.

**Justine Paradis:** [00:01:29] You can't count falling?

**Nick Capodice:** [00:01:30] You can't count falling... if you just fall off a cliff? So that's the that's pretty much the only rule is no falling.

**Sam Evans-Brown:** [00:01:36] Horses?

**Nick Capodice:** [00:01:38] Horses can count. I'll go with horses counting. The things I'm thinking about are faster than a horse.

**Taylor Quimby:** [00:01:44] So no falling and no advanced Mechanical --.

**Justine Paradis:** [00:01:48] Internal combustion.

**Nick Capodice:** [00:01:49] Yep you got it.

**Justine Paradis:** [00:01:50] What if you were eaten by a tiger? And then the tiger was running with that count. Do you have to be alive to be moving fast?

**Nick Capodice:** [00:01:59] I think that consciousness is an important part of existence.

**Erika Janik:** [00:02:05] Can it be multiple people working together to move fast?

**Nick Capodice:** [00:02:08] It certainly can.

**Sam Evans-Brown:** [00:02:12] Today on the Outside/In we are taking this long-time thought experiment and putting it to the test. How fast was the fastest person before fast technology. First we're going to toss around some ideas to see if we can make some educated guesses and then we'll split up the research and present our findings.

[00:02:27] [music]

**Nick Capodice:** [00:02:31] Can I should I say my hypothesis?

**Sam Evans-Brown:** [00:02:33] What have we got? I'm going to write these down.

**Nick Capodice:** [00:02:35] So my hypothesis is the Nantucket Sleigh Ride.

**Sam Evans-Brown:** [00:02:38] What's the Nantucket Sleigh Ride?

**Erika Janik:** [00:02:39] Yeah what's that?

**Nick Capodice:** [00:02:40] When you harpoon a whale and then your whaling ship is tugged along in a vast speed by one of these beautiful leviathans of the deep. That's my argument is that's the fastest the human went.

**Justine Paradis:** [00:02:51] All right.

**Sam Evans-Brown:** [00:02:52] Wait, how fast do whales go?

**Justine Paradis:** [00:02:53] I have to research this man. I'm from Nantucket. I bet it's when the sperm whale dove down when it was when it was trying to get rid of the whaling harpoon ship by like going into the deep. And I'd bet the fastest they were going was when they were going down and drowning.

**Nick Capodice:** [00:03:08] When they sounded.

**Justine Paradis:** [00:03:09] Yeah.

**Nick Capodice:** [00:03:09] Yeah. I never thought about that.

**Taylor Quimby:** [00:03:11] But you mentioned something that makes me think... you said sleigh ride. And I think snow has enabled people to go very fast over the course of history. And so I would be curious to investigate how fast people have used either skis, skates, sleds. I bet people hit some real top speeds that way.

**Sam Evans-Brown:** [00:03:30] I don't know though because because like if you look at early skis they were not speedy.

**Taylor Quimby:** [00:03:35] Olympic skiers go what? 80 90 miles an hour?

**Sam Evans-Brown:** [00:03:37] Yeah but that's on like a prepared surface. Old school skiing were going through like deep snow.

**Taylor Quimby:** [00:03:44] OK fine. But would you think whales go faster than--.

**Sam Evans-Brown:** [00:03:46] Well I don't know how fast the whale goes.

**Nick Capodice:** [00:03:48] I think a whale goes faster than a horse.

**Erika Janik:** [00:03:50] What about an ostrich. That's immediately what I thought. Someone Riding an ostrich.

**Sam Evans-Brown:** [00:03:55] Swiss family Robinson.

**Erika Janik:** [00:03:56] But then I also asked about many people working together because I wondered about Polynesians in boats rowing together.

**Taylor Quimby:** [00:04:04] Boats Go Fast.

**Erika Janik:** [00:04:05] Team rowing.

**Sam Evans-Brown:** [00:04:07] Is the supposition that that like team rowing is going to be the fastest boat?

**Erika Janik:** [00:04:11] I feel like it would be. I mean unassisted by chemistry.

**Taylor Quimby:** [00:04:15] I would think a small sailboat with a powerful sail could get you going faster than a big boat.

**Justine Paradis:** [00:04:21] Some of the fastest like hydrofoils, now, what did they go like 60 miles an hour?

**Taylor Quimby:** [00:04:26] They move.

**Justine Paradis:** [00:04:26] They're crazy.

**Nick Capodice:** [00:04:28] I would also count swinging as locomotion.

**Sam Evans-Brown:** [00:04:30] Swinging.

**Nick Capodice:** [00:04:31] Yeah. So you don't have to discount falling just because if you're holding on to something if you're tethered by something.

**Sam Evans-Brown:** [00:04:38] That feels like falling to me. Like someone must have made a massive swing in a very long time ago.

**Justine Paradis:** [00:04:45] Because falling would be specific... is it specific gravity like the fastest that a mass can fall... like it gets to a certain point with the air resistance --.

**Sam Evans-Brown:** [00:04:51] Terminal velocity.

**Justine Paradis:** [00:04:54] Terminal velocity! There's A term for that. So swinging would not reach terminal velocity.

**Sam Evans-Brown:** [00:04:57] No. But even so just like if you can have a long rope and a tall thing and jump off holding it that's basically falling and then the swing stops you before you before you hit terminal velocity. Yes. But like you got to go faster than a whale!

**Justine Paradis:** [00:05:14] I don't know.

**Sam Evans-Brown:** [00:05:16] Nick says no! All right if you say swings are allowed my friend.

**Nick Capodice:** [00:05:20] I'm Ietting swings in.

**Sam Evans-Brown:** [00:05:22] All right.

**Nick Capodice:** [00:05:22] Also I don't know if anyone's ever been flung out of a catapult, but that's one that may be said or maybe you should consider a catapult.

**Sam Evans-Brown:** [00:05:30] Indeed.

**Nick Capodice:** [00:05:31] ...Or Trebuchet which is of much better than a catapult.

**Taylor Quimby:** [00:05:34] Well in that case can we also include other sorts of purposeful falling like being shot out of a cannon or going down Niagara Falls in a barrel?

**Nick Capodice:** [00:05:41] If you can find evidence that some was ever actually shot out of a cannon that survive before circuses. I think you should just you know shun the technology as opposed to...

**Justine Paradis:** [00:05:51] The spirit of the question.

**Nick Capodice:** [00:05:53] The spirit of the question. Thank you. We can't get bogged down in the letter of the law!

**Taylor Quimby:** [00:05:57] Isn't this exactly what happens during your conversations is you get bogged down in the letter of the law? Because because you know technology is... So cannons for example.

**Nick Capodice:** [00:06:06] Taylor, My point is is that no one has ever actually shot out of a cannon. In the Circus I thought it was like a springboard that they like... and so it's not really... they're not really firing a cannon.

**Sam Evans-Brown:** [00:06:17] Oh really?

**Nick Capodice:** [00:06:17] You'd die, you'd be burned to death.

**Sam Evans-Brown:** [00:06:19] Well, but like maybe I don't know. I don't know what I thought was happening.

**Taylor Quimby:** [00:06:23] OK.

**Sam Evans-Brown:** [00:06:24] All right.

**Taylor Quimby:** [00:06:25] Investigate.

[00:06:25] [music]

**Sam Evans-Brown:** [00:06:33] I'm ready. Are y'all ready.

**Taylor Quimby:** [00:06:35] I'm ready.

**Sam Evans-Brown:** [00:06:36] OK so everyone's done the research?

[00:06:41] Yes.

**Sam Evans-Brown:** [00:06:42] I think that we should start with mine because I'm the host. No...

**Justine Paradis:** [00:06:47] oh my god. Power hungry.

**Sam Evans-Brown:** [00:06:49] I think we should start with horses because they are obviously and demonstrably very fast and we definitely rode them. Seems like you got to beat horses if you can't beat horses then then you're nothing.

**Taylor Quimby:** [00:06:59] That seems fair.

**Justine Paradis:** [00:07:00] Do we still have the same horses around that we had back in the day?

**Sam Evans-Brown:** [00:07:03] Interesting question Justine so I had to figure this out. I called a an archaeologist named Sandra Olson. She's with the University of Kansas. She has spent her entire life studying what is believed to be the first domestication of horses which was.

**Sandra Olsen:** [00:07:22] So the Batai culture dates to around five thousand five hundred years ago and it's located in north central Kazakhstan.

**Sam Evans-Brown:** [00:07:31] That's when we first domesticated horses. 5500 years ago. They have a veritable boatload of archaeological evidence showing that this is the earliest known site. There are leather tack, there are huge amounts of horse bones in middens, there's manure in the roofing materials, there's remains of fences and of course mare's milk in pottery.

**Sandra Olsen:** [00:07:47] Nobody in their right mind would milk a wild mare because you know the wild horses were probably quite a lot to contend with.

**Sam Evans-Brown:** [00:07:56] Good way to get kicked in the head.

**Sandra Olsen:** [00:07:58] Yeah yeah.

**Sam Evans-Brown:** [00:07:58] Obviously. Five thousand five hundred years ago Justine's question is the apt one: is this the same horse? Now, I don't think we have to actually limit ourselves to the Batai horse because obviously people started breeding horses for speed and we had faster horses much before the steam engine. However even if we stick with just the Batai horse they were pretty darn fast.

**Sandra Olsen:** [00:08:19] You know this has really got me thinking. So based on the size of the animal I would say certainly they weren't the fastest horse compared to modern day breeds but they were about the size of a quarter horse. Which of course quarter horses are a little more gracile, a little more delicate and they are known for their speed. They can go about 55 miles per hour in short sprints. Now these horses I think would have been more durable they would have been slower maybe 45 to 50 miles an hour but able to just keep going forever.

**Taylor Quimby:** [00:09:03] Wow that's fast.

**Justine Paradis:** [00:09:04] That is fast.

**Nick Capodice:** [00:09:05] I should've just googled how fast does a horse go.

**Erika Janik:** [00:09:09] Episode over.

**Sam Evans-Brown:** [00:09:11] But I think I think they're beatable.

**Nick Capodice:** [00:09:15] Oh thank goodness because I would be very sad if like horses were... There it is horses.

**Erika Janik:** [00:09:19] She described them as gracile?

**Sam Evans-Brown:** [00:09:21] Gracile! Graceful! Long... Long leggy.

**Justine Paradis:** [00:09:25] I thought it meant like grassie in the meadow.

**Erika Janik:** [00:09:28] Me too, I'm glad I asked because I was like... what??

**Sam Evans-Brown:** [00:09:29] I was just like I did and I've got one last clip that might get cut entirely but I just like it so much so you guys get to hear it.

**Sandra Olsen:** [00:09:35] But I've seen some pretty remarkable things at Kazak horse races. Of course this is with a saddle, but they will ride it full gallop and the rider will go pass his body underneath the belly of the horse and back up at full gallop. I don't know how that works I've seen it and it's surprising to me.

**Justine Paradis:** [00:09:58] The Comanches did that too. Like there's stories of like the Native American riding cultures shooting from underneath the belly of the horse using the horse as a shield it's... I believe that.

**Erika Janik:** [00:10:06] Incredible.

**Taylor Quimby:** [00:10:07] Can I just go back and ask why was there poop on the roofs? What were they doing just tossing it up there? Like this poop is on the streets throw it on the roof!

**Sam Evans-Brown:** [00:10:14] It's a good question I don't know.

**Erika Janik:** [00:10:15] I feel like be good like insulator like holding things together.

**Sam Evans-Brown:** [00:10:18] She did say insulation, but then as Taylor asked the question I was like really?

**Justine Paradis:** [00:10:23] It's basically just Grass.

**Taylor Quimby:** [00:10:25] OK.

**Sam Evans-Brown:** [00:10:27] Well so so that's that's...

**Nick Capodice:** [00:10:30] That's the mark to beat isn't it?

**Sam Evans-Brown:** [00:10:31] That's the mark to beat.

**Nick Capodice:** [00:10:32] Horses.

**Taylor Quimby:** [00:10:32] What's next?

**Justine Paradis:** [00:10:40] Oh it's me.

**Nick Capodice:** [00:10:40] Oh Justine you got to help me out.

**Justine Paradis:** [00:10:42] So Nick yeah your theory was the Nantucket Sleigh Ride.

**Nick Capodice:** [00:10:46] Yeah. When a whale is made fast to a whaling boat and then the whale sounds, dives below and that it scoots off and drags the whale ship behind it. Yeah thought that was the fastest.

**Justine Paradis:** [00:10:57] All right. So the Nantucket Sleigh Ride. People have been whaling for a long time. It is not just Nantucket and New Bedford they also in Japan and across the Arctic Circle and the Basques since prehistoric times. But we are going to focus on Yankee whaling here because this specific Sleigh Ride did come from Yankee whaling. So between the 1600s and the end of the 19th century Japanese traditional whaling used nets and surrounding and herding the whales and like Basques hunted right whales and bowhead whales which are both slow. So the Yankee whalers hunted sperm whales.

[00:11:34] [sperm whale sounds].

**Justine Paradis:** [00:11:34] And that's what the sperm whales sound like. Those those clicks are so loud that they can paralyze your hand if you're in the water. It's like one of the loudest animals on Earth. So anyway.

**Nick Capodice:** [00:11:46] What?

**Taylor Quimby:** [00:11:47] Just like the vibrations?

**Justine Paradis:** [00:11:48] Yeah yeah yeah. So the whale ships many of them out of Nantucket. But since the Nantucket whaling museum was closed this month they had to call the New Bedford Whaling Museum. Michael Dyer he's the curator of maritime history at the New Bedford Whaling Museum. And I think I actually interrupted him in the middle of a train of thought when I called him.

**Michael Dyer:** [00:12:08] Howdy do, Justine?

**Justine Paradis:** [00:12:09] I'm well, how are you?

**Michael Dyer:** [00:12:11] Trying to figure out who the Russo and when.

**Justine Paradis:** [00:12:13] The Russos a Whale ship. He was all despondent about it.

**Michael Dyer:** [00:12:17] We all of our jobs do. It was like well it must be kind of hard fact checking something that happened you know centuries ago.

**Michael Dyer:** [00:12:24] Well you know it isn't. Especially when it comes to American maritime history and whaling history is absolutely an extraordinarily well documented. We can tell you the eye color of the people who sailed on any given ship in New Bedford 1840s.

**Justine Paradis:** [00:12:43] So I was like well you'll absolutely be able to help me figure out how fast the Nantucket Sleigh Ride was.

**Michael Dyer:** [00:12:48] Well yes and no because one of the real tough bits about that is the amount of disinformation, misinformation, disagreement... conversation that took place among whale men as to exactly how fast they were going.

**Justine Paradis:** [00:13:02] I imagine that like a whale ship had to be like a really bro-y environment don't you think?

**Taylor Quimby:** [00:13:07] If fishermen exaggerate right then whalers must like really exaggerate.

**Justine Paradis:** [00:13:11] Certainly. But happily the New Bedford Whaling Museum is like thousands of log books kept on ships and other primary materials in their archives. So there's like a canon of like a dozen or so like whaling documents and one of them was written in 1874 by William Morris Davis. It's a book called "Nimrod of the Sea" and in this book he says that sperm whales could go...

**Michael Dyer:** [00:13:31] For a very short spurt, a sperm whale could tow a whale boat at about 20 20 or 25 miles an hour.

**Justine Paradis:** [00:13:42] The is this short spurt thing is really important because sperm whales are sprinters and there's this other government document that pulled out the fisheries and the fishery industries that the United States published in 1887 and they're kind of doubtful of this 20 to 25 miles number.

**Michael Dyer:** [00:13:57] They write in here 20 or 25 miles per hour is rather a high estimate of the speed of a whale.

**Justine Paradis:** [00:14:02] So Nick are you ready for this I'm about to really let you down.

**Nick Capodice:** [00:14:06] I can't go any lower.

**Taylor Quimby:** [00:14:08] His eyes have been cringing and...

**Erika Janik:** [00:14:10] They have.

**Justine Paradis:** [00:14:10] Yeah. So this next part he says in the same document it's written that a sperm whale could do do this.

**Michael Dyer:** [00:14:16] Sperm whales have been known to run out 300 fathoms in the line and four minutes.

**Justine Paradis:** [00:14:20] 300 fathoms. Eighteen hundred feet so you can actually calculate this out.

**Michael Dyer:** [00:14:24] It was figured that six a six to ten miles per hour sort of was was a Nantucket Sleigh Ride.

**Taylor Quimby:** [00:14:31] So it's slow.

**Nick Capodice:** [00:14:33] I just got... Don't don't keep going.

**Justine Paradis:** [00:14:35] And actually actually you calculate it out and it actually goes to like five points six six miles an hour. So six to ten miles is even generous.

**Nick Capodice:** [00:14:43] I can walk that quickly.

**Justine Paradis:** [00:14:45] But Mike did throw a caveat.

**Michael Dyer:** [00:14:49] But the big unknown here is the fin whale and that is a big unknown.

**Justine Paradis:** [00:14:55] So the fin whale was not really hunted in the yankee whaling usually because it's open ocean. It's an open ocean creature doesn't schools and way sperm whales do and it's very very fast. So he says.

**Michael Dyer:** [00:15:09] Every once in a while a yankee whaleman would get fast to a fish and whale and those things can swim you know 50 miles an hour.

**Nick Capodice:** [00:15:21] 50 miles an hour. As fast as a horse!

**Taylor Quimby:** [00:15:23] Tied.

**Erika Janik:** [00:15:23] yeah tied.

**Nick Capodice:** [00:15:26] Fast to a Fin whale!

**Justine Paradis:** [00:15:28] I could not find any other corroboration of this by the way. I think this is a stretch. I think that what's cool about a Fin Whale is it can cruise around 20 or 23 miles an hour and it can sprint up to 30 or so. So we're going to have to we're going to fact check this and we might have to cut this.

**Sam Evans-Brown:** [00:15:43] Well we don't have to cut it. We can just say like we can leave it as a tantalizing thing that is completely uncorroborated and...

**Justine Paradis:** [00:15:50] All right.

**Sam Evans-Brown:** [00:15:51] ...because Look at Nick's face when you say that.

**Nick Capodice:** [00:15:52] No but it's ok it's ok. Did you guys know that intrepid Yankee whalers would go below the belly of a whale during a whale hunt back the top again?

**Erika Janik:** [00:16:02] And shoot from underneath?

[00:16:03] [music]

**Justine Paradis:** [00:16:08] So I would say I would say the Nantucket sleigh ride has been defeated in my opinion.

**Sam Evans-Brown:** [00:16:14] I think it did much better than I thought though the fin whale twist. You know I was not expecting the fin twist.

**Nick Capodice:** [00:16:22] All the kids doing the fin whale twist.

**Taylor Quimby:** [00:16:28] So what's next.

**Erika Janik:** [00:16:29] Boats.

**Sam Evans-Brown:** [00:16:30] Boats.

**Erika Janik:** [00:16:31] So I just want to say the boat is probably not going to win but I think that I can impress you. So first the Polynesians 2000 years ago explorers from Samoa Fiji Tonga. They set out to explore 10 million square miles of ocean in canoes with twin holes outriggers and full sails. They were great navigators. Captain Cook great explorer traveled around the world. He estimated that a Tongan canoe could sail three miles to our two.

**Sam Evans-Brown:** [00:17:01] Captain Cook was the one who popularized calling them canoes as a way to trivialize them.

**Nick Capodice:** [00:17:08] Why. Why would that trivialize them.

**Sam Evans-Brown:** [00:17:09] Because oh it's just a canoe... Just a canoe! When you see these things and they're huge and like two dozen people are sleeping on them.

**Nick Capodice:** [00:17:17] So warthogs in the Polynesian islands are called Captain cookers. I think that's fit. That's an apt ending to a man who did such horrible things.

**Justine Paradis:** [00:17:24] That's a a sick burn.

**Erika Janik:** [00:17:26] So then on the other side of the world are around the same time. If you're in Europe and you spotted some ships on the horizon in the eight hundreds or nine hundreds they were probably Viking ships and you know if you're just a regular monk you know you're just illuminating some manuscripts. You see a ship on the horizon and you're like that looks dangerous but I know I've got a couple hours because you know that ship has to drop anchor then they're gonna row to shore or they have to find a harbor. But if it is in fact a Viking ship that is not true.

**Bill Short:** [00:18:02] Their ship technology was better than anyone else in Europe so they could go places no one else could go and there's two reasons for that. One is the ships could sail very close to the wind so they could sail more into the wind than other ships allowing them to go places even if the wind was not favorable. And the other thing is they had very very shallow draft so they could sail even though the water was not very deep which meant that these warships could sail very far upriver and make raids where they were completely unexpected. And they didn't need a pier or dock or anything else you can just sail it up onto a sandy beach jump off the bow and they'd be ready to fight.

**Justine Paradis:** [00:18:43] So you wouldn't even have time to finish a cherub on your illuminated manuscript.

**Nick Capodice:** [00:18:49] The letter O.

**Erika Janik:** [00:18:49] So That was Dr Bill Short. He's the author of several books on Vikings and he has a specialty in Viking combat. So the Viking ships are moving really fast in these special boats that can go basically anywhere and these ships often look like dragons. Here's the entry from the Anglo-Saxon Chronicle from 793 on the first Viking raid on Lindisfarne which is the Holy Island off the northeast coast of England. They wrote here were dreadful for warnings come over the land of North Umbria woefully terrified the people. These were amazing sheets of lightning and whirlwinds and Fiery Dragons were seen flying in the sky.

**Erika Janik:** [00:19:35] Terrifying.

**Sam Evans-Brown:** [00:19:36] That is terrifying.

**Nick Capodice:** [00:19:37] But I haven't heard how fast these things go.

**Sam Evans-Brown:** [00:19:40] Yeah it feels like we're dancing around something here.

**Nick Capodice:** [00:19:40] Doing the Viking dance.

**Erika Janik:** [00:19:44] How fast are they going. Well Bill told me that he's actually participated in a number of rowing experiments in recreated longships and he said that they were able to go comfortably about three point two knots.

**Taylor Quimby:** [00:19:57] So what's a knot? How much?

**Justine Paradis:** [00:19:57] It's not like less than 10 miles an hour though.

**Erika Janik:** [00:20:00] Yes. No the warships are mostly rowed because that's how they can you know get close to whoever they want to attack. But they also had sails onboard these ships and they also had cargo ships and I asked them how fast these boats could travel and.

**Bill Short:** [00:20:17] And it depends who you ask. So it seems like something like 10 to 12 knots is not not unbelievable under wind power. And some people believe that you know even 20 20 plus knots is possible under the most ideal conditions. And then a final anecdote there was a Viking ship that sailed across the Atlantic some years ago and the skipper is someone I have met who told me that one day just conditions were just wonderful. So they all said why not let's see how fast this ship really will go. And he said he got 30 plus knots according to the GPS which is just unbelievable.

**Taylor Quimby:** [00:21:01] Again I don't know what a knot is.

**Erika Janik:** [00:21:04] I can give you that. Let me look quickly look it up I didn't write down the 30.

**Taylor Quimby:** [00:21:08] Feel like we need a drum roll.

**Erika Janik:** [00:21:10] That is thirty five miles per hour.

**Nick Capodice:** [00:21:13] It's still faster than a sperm whale.

**Sam Evans-Brown:** [00:21:16] It would be too scary to be on a boat going 35 miles an hour.

**Erika Janik:** [00:21:20] If we're just talking about boats without regard to time period then the fastest sailing record was set in 2012. And that boat was going sixty five point four or five knots which is 75 miles per hour.

**Nick Capodice:** [00:21:34] That's one of those new fangled fancy...

**Erika Janik:** [00:21:35] That's a fancy boat.

**Sam Evans-Brown:** [00:21:37] Is that a hydrofoil?

**Erika Janik:** [00:21:38] Yes. But the thing that I think is really cool and why I told you about Polynesians and Vikings is that they were sailing at speeds that are as fast if not faster than your average regular boat today.

**Justine Paradis:** [00:21:50] They didn't have fiberglass.

**Erika Janik:** [00:21:52] exactly.

[00:21:53] [music]

**Justine Paradis:** [00:21:57] Speaking of hydrofoils I have another thing to add to the boat discussion. Can I can I add this. Yeah yeah there's another type of boat that I wanted to explore which is the the ice boat.

**Taylor Quimby:** [00:22:08] Ice boats.

**Bob Dill:** [00:22:10] Well Bob Dill. Live in Burlington Vermont and I designed and built two different ice boats.

**Justine Paradis:** [00:22:17] It's basically like a boat with ice blades on it. So there's three points of contact.

**Sam Evans-Brown:** [00:22:22] And it's two in the back one in the front.

**Justine Paradis:** [00:22:24] Two in the front one in the back and the back is steering.

**Bob Dill:** [00:22:27] In a conventional water both are constrained by having to move the boat through the water. With an ice boat the main constraintor the Dabic track that's created by the boat so make the boat go fast has a lot to do with making the arrow to Dabic drag as low as possible.

**Justine Paradis:** [00:22:45] I actually have a picture.

**Sam Evans-Brown:** [00:22:47] What's it look like it just looks like a bunch of like plywoo... Or two by fours with a sail and then on the bottom of the two by fours are skates.

**Justine Paradis:** [00:22:55] Bob is a nice boater himself.

**Bob Dill:** [00:22:57] Fairly early to get a good ice boating. I realized that there was a lot of folklore about how fast that gone.

**Justine Paradis:** [00:23:02] People say Oh they go 100 miles an hour all the time.

**Bob Dill:** [00:23:05] And it just didn't make sense, so I bought a radar gun and started going to regattas and of course nobody was score hundred miles an hour people the fastest boats were barely getting over 80. Which is still very fast, don't get me wrong.

**Justine Paradis:** [00:23:20] Some of the fastest Ice boats go like 80 miles an hour. In our first phone call Bob Dill told me he spent 35 years trying to figure out this question of how fast ice boats could could have gone and how fast they can go now. So Ice boats were first invented in Holland in the seventeen hundreds, the mid seventeen hundreds.

**Justine Paradis:** [00:23:35] What's it like to write a nice boat. An antique ice boat?

**Bob Dill:** [00:23:38] They're very excited to ride in. They have an instability they call a flicker which occasionally spins the boat. It often throws some of the passengers out of the boat at the same time.

**Justine Paradis:** [00:23:49] How thrilling.

**Sam Evans-Brown:** [00:23:49] Weeeee!

**Justine Paradis:** [00:23:51] How fast do you think those antique boats could have gone in the 17 and 18 hundreds?

**Bob Dill:** [00:23:55] All right. I think the ice boats that were sailing back in the early days of ice boating were probably sailing at 30 or 40 miles an hour where they were sailing in Holland for example. I don't have a lot of data but there is a lot of data, just but looking at the configuration how the boats were built they weren't really designed for high speeds. By the early 1900s late 1800s they were probably doing 50 maybe 60 miles an hour.

**Justine Paradis:** [00:24:25] So this is the question do they count that late in the game? Do we have ice boats that 50 60 miles an hour?

**Sam Evans-Brown:** [00:24:32] I think Nick's the referee here.

**Nick Capodice:** [00:24:33] Oh gosh. I mean what year was the year one more time?

**Justine Paradis:** [00:24:37] The Heyday of the Hudson Valley. I suppose CN was 1870 to 1900 or so.

**Nick Capodice:** [00:24:43] I think ice boats kind of nudges into that modern era.

**Sam Evans-Brown:** [00:24:46] It's sort of like when when did we transition to this newer more slippery faster ice boat and does that does that feel like the same thing as transitioning into the combustion engine era?

**Nick Capodice:** [00:24:58] It sort of does to me.

**Taylor Quimby:** [00:24:59] Another another wrinkle I will say because I was curious about the timing of different things. Is that the first... The first quote unquote automobile that was used or the steam engine was invented in like the 1700s.

**Nick Capodice:** [00:25:13] But those didn't go very fast.

**Taylor Quimby:** [00:25:14] No correct but that's the measure. So if we're arguing about if it's when things started going fast the mid 1800's I think is legit because at that point cars still sucked.

**Nick Capodice:** [00:25:25] Did you know that the cars of these to have to have a guy at the front waving a flag when they would drive down the road... For real, like there was a guy waving.

**Taylor Quimby:** [00:25:33] Car here!

**Nick Capodice:** [00:25:35] Car coming through!

**Sam Evans-Brown:** [00:25:36] I'd just like to dwell for a second though on the fact that ice boats go 80 miles an hour? Just like recreational boaters?

**Erika Janik:** [00:25:42] Terrifying.

[00:25:42] [music]

**Sam Evans-Brown:** [00:25:51] Ok, so we're going to have to take a quick break. We still have a few more theories to test when we come back: skis, sleds, and slides when Outside/In continues.

**Sam Evans-Brown:** [00:26:04] Folks welcome back to Outside/In. Today we are taking on Nick Capodice's friendly thought experiment. What was the fastest speed achieved by a human body before people started zipping around in cars and airplanes and what have you. There are two rules. You can't die and falling doesn't count. ok Taylor you're up.

**Taylor Quimby:** [00:26:22] So real quickly before I get into what I think was a contender but based off our conversation maybe isn't. I'll just I'll just talk about skis for a second because we mentioned it before and I knew that skis go way back and this is crazy. Who would have known skis go further back than domesticated horses.

**Sam Evans-Brown:** [00:26:40] Oh yes absolutely.

**Taylor Quimby:** [00:26:41] OK well Sam wasn't surprised but I was. The earliest documented evidence of skiing goes back 10000 years. There's a cave painting in the Altay mountains of China. Now these are traditions that were passed down from generation to generation. They are now being lost to modernity but Mongols and Kazaks in this area have been like I said passing it down in this ancient method of skiing looks a little bit different. So instead of two poles they have like one big pole so they almost look like a Venetian...

**Nick Capodice:** [00:27:10] Gondolier.

**Taylor Quimby:** [00:27:11] Yeah yeah so they use that sort of as a rudder and they lean way back on these long wooden skis that have animal hair sort of on the bottom. So that way they can walk upwards if they're going uphill and then ski down.

**Nick Capodice:** [00:27:25] That's amazing, because animal here goes one way and it doesn't go the other!

**Sam Evans-Brown:** [00:27:28] That's what they call -- that's why they call the things you put on modern back country skis skins. You skin up the hill on these like modern microfibers.

**Nick Capodice:** [00:27:38] This is delightful.

**Taylor Quimby:** [00:27:39] Yeah and one of the things when I first started looking at this which felt promising as those cave paintings show them hunting ibex. So I'm thinkin all right if they're hunting a fast animal they must be going pretty quick. Luckily I've got to outsource pretty much all of the research here to National Geographic. They did a big story on this a few years back.

**Sam Evans-Brown:** [00:27:59] Which is great I recommend it to everybody.

**Taylor Quimby:** [00:28:00] It's a good story and they went out they saw how the skis were crafted and they went hunting with some of the people that are still doing this.

[00:28:08] [Nat Geo video narrator] I was always trying to stay ahead of the curve from how to do photography trying to get position, trying to get past them, trying to get a good angle. We found that we had quite a hard time keeping up with them.

**Taylor Quimby:** [00:28:24] The thing is is that you're right Sam. They're going through really deep snow and they are moving, I would say like just visually they might be going 20 25 miles an hour which is really fast considering these are like completely wild mountains. They're skiing in between trees. But it doesn't seem capable of even coming close to some of the records we've talked about. And in fact the hunting of the IBEX the reason it works is because the IBEX are in like chest deep snow and are barely moving and they surround them on the skis and then lasso them. So I would say that we can pretty much totally rule out skiing as an option. However I did start digging into ice like you Justine and that is when I came upon a very different story.

**Stephen Bartley:** [00:29:06] I think around 1900 I always thought that the cresta riders were the fastest men on earth. Well I'm Stephen Bartley and I'm the honorary archivist for the St. Moritz tobogganing Club.

**Taylor Quimby:** [00:29:18] I don't know if you cut that that is the St. Moritz tobogganing club. So you know I mean ice skates fast skis you know pretty fast... sledding who here thought sledding had a chance of winning this contest.

**Justine Paradis:** [00:29:32] Sledding's for children.

**Taylor Quimby:** [00:29:33] Sledding sounds like it's for children. But apparently there is races going back to the 15th century in Scandinavian countries. In the 1870s there was a big technological change it's not a huge shift but they started making them steerable. and these are sort of like the little I mean it's like a little toboggan with a wooden top and metal runners. If that makes sense. So back in the 1870s people were racing down the streets of this place in Switzerland called St. Moritz. It's in the Alps so it's got these like long crazy streets and people were crashing into stuff and literally causing disruption. So they kind of gave them a place to do this. And they started deliberately icing this long chute. It was kind of like a slide.

**Sam Evans-Brown:** [00:30:18] This isn't sledding This is the luge.

**Erika Janik:** [00:30:20] Yes.

**Stephen Bartley:** [00:30:21] So they had to shoot down this hill and then you ended up going over the lake and if you got up enough speed you could go right across from Lake which is probably about two thirds of a mile across. But they probably were injured because they were sort of be going so fast and they got it slightly wrong they sort of fall and they go over the side of the path for hitting the lake. Yeah. Charles Darwin's was nearly killed doing that apparently.

**Sam Evans-Brown:** [00:30:49] That's where the Darwin Awards came from.

**Justine Paradis:** [00:30:53] Not messing around. Oh my God yeah.

**Taylor Quimby:** [00:30:55] So. So I mean obviously people were going pretty fast just like launching down this chute at this point this is just ice like it's not super well constructed or anything. But in 1884 or five a handful of guys built something called the Cresta which is pretty much at this point the world's oldest well documented ice track and it is basically a much rougher version of what you would see at the Olympics for luge or bobsled or skeleton.

**Stephen Bartley:** [00:31:21] It was all natural. Basically it was a natural formation combined with a footpath and then they know to make them life more interesting they added a couple of major corners. About three quarters of a mile long, and it gets built from scratch every year it's based off an artificial track.

**Taylor Quimby:** [00:31:38] All they do is sculpt it from snow and then poor buckets of water over it and it freezes and it turns into basically a luge track.

**Sam Evans-Brown:** [00:31:46] Yeah that feels like pretty clearly within within these fuzzy rules.

**Taylor Quimby:** [00:31:51] From the technological standpoint.

**Justine Paradis:** [00:31:53] And the the spirit too I feel like.

**Nick Capodice:** [00:31:55] How fast though Taylor we didn't get a -- do you have a number on this?

**Taylor Quimby:** [00:31:58] Well so this became an annual thing pretty much right away. And I should say that pretty much everybody doing this were like wealthy British folks who would vacation in St. Moritz and try their hand at the Cresta. They started doing organized races and then finally in 1897 we have our first documented speed trial. And they actually used electric contacts placed a certain distance away at the fastest parts of the tracks so that they could see when they were hitting both those contacts and then calculate the speed. And...

**Stephen Bartley:** [00:32:28] In 1897 I think from a speed of 68 miles hour was recorded. In 1900 a speed of 73 miles per hour was recorded.

**Taylor Quimby:** [00:32:45] And so here is what I submit to you is that I have in my hands actual notes and documentations of getting the 73 miles per hour... It's hard to read because it's like old school. It's super cursive. They should have a name for this kind of writing.

**Sam Evans-Brown:** [00:33:01] So this is really interesting because this is the first time they've recorded the speed.

**Taylor Quimby:** [00:33:07] Correct.

**Sam Evans-Brown:** [00:33:07] But they could have been going there fast for a while.

**Taylor Quimby:** [00:33:10] They could have. Although to the point that Erika made earlier about the fact that we've have all this technology but for the most part we don't go that much faster. What's crazy is that the record today you know over 100 years later is 82 miles per hour. And that is held by an Irish skeleton racer who's been in the Olympics his name is Lord Clifton Rosli.

**Sam Evans-Brown:** [00:33:33] Still just still just fancy British folks do this sport.

**Taylor Quimby:** [00:33:36] They're the worst. They they banned women from 1923 until this year. And the reason they gave is because there is a chance that women riding chest down would have a higher chance of developing breast cancer. They did have one 1 one day a year was ladies day.

**Erika Janik:** [00:33:58] I hate them.

**Nick Capodice:** [00:33:59] I was so excited to root for the toboggans of St. Moritz.

[00:34:03] [music]

**Taylor Quimby:** [00:34:14] So when I hit this 73 mph number I was pretty confident that the speed was good. But again I wasn't sure if it would pass the time muster.

**Sam Evans-Brown:** [00:34:24] Once you have electric contacts that you're hitting with the blades of your runners that does feel like we've hit a technological point where we're like this doesn't really feel like it anymore, but but if they were doing that for you know a couple of decades before they just figured out how to measure the speed... I could go for it.

**Taylor Quimby:** [00:34:45] Well and I took this as an indication of how fast one can go on a on a icy track down a steep hill on something with metal runners right. And interestingly enough I did find this other fascinating older example which is that do I do any of you know where the roller coaster comes from.

**Nick Capodice:** [00:35:04] No I thought some guy invented it.

**Taylor Quimby:** [00:35:06] So the precursor too... was that...

**Justine Paradis:** [00:35:07] That was a slow burn

**Taylor Quimby:** [00:35:12] That was good.

**Taylor Quimby:** [00:35:13] Okay so the precursor to the roller coaster was something that translates in English into Russian mountain. Catherine the Great, during the mid seventeen hundreds... Basically in Russia at this point they used to build these massive towers huge ice slides and then people would go down them. And the stories that people told from those are pretty similar in terms of people just like whizzing for a half mile once they hit the bottom of these curves. There was one that I read I think was 200 feet tall this tower that went down an ice slide. Later Catherine the Great actually was like hey we should do this during the summertime and threw wheels on it and it became the first roller coaster.

**Erika Janik:** [00:35:54] That's why she's great.

**Sam Evans-Brown:** [00:35:57] The Spanish word for roller coaster is montana rusa and I've never known why.

**Taylor Quimby:** [00:36:01] Russian mountain.

**Sam Evans-Brown:** [00:36:01] Yeah so due to acceleration from gravity to get over 55 miles an hour is about a hundred and four foot freefall.

**Nick Capodice:** [00:36:11] So with the friction and with the slight angle.

**Sam Evans-Brown:** [00:36:14] It's possible to a 200 foot roller coaster would get you over 55.

**Nick Capodice:** [00:36:21] That's what I'm going with right now.

**Sam Evans-Brown:** [00:36:22] Hey we're we're debating the final and I haven't given my final... The rope swing. Quintessential human experience right.

**Taylor Quimby:** [00:36:30] Yeah I think the upswing has been around a long time.

**Sam Evans-Brown:** [00:36:31] Ready?

**John Ochsendorf:** [00:36:32] That is a great feeling which is not limited to any time or place I would say the human heart sings when you're on a swing and a release and you drop into the water.

**Sam Evans-Brown:** [00:36:43] This is John Ochsendorf. He is a professor of architecture and engineering at MIT MIT. He studies the mechanical strength of ancient building techniques.

**Justine Paradis:** [00:36:52] Cool job.

**Sam Evans-Brown:** [00:36:54] My question. So we know that swings are a thing right. We have images of swings going all the way back to ancient Greece. Like people have figured out how to swing on things. The question then is would it be possible to construct a swing big enough to go faster than our benchmarks that we've that we've been setting here. So let's just say the horse fifty five miles an hour. So I called up John because he has studied Peruvian rope bridges.

**Nick Capodice:** [00:37:22] I like where this is going.

**John Ochsendorf:** [00:37:23] The longest one that I have found exists in the remote region of Peru today and it's 150 feet or about 50 meters. And by comparison the longest free span achieved by Roman engineers in ancient Rome is about 100 feet. Up until 150 feet they were able to build ropes strong enough to cross the canyon. And these were also strong enough to carry horses and cannons when the Spanish arrived in the high Andes Mountains in 1532.

**Sam Evans-Brown:** [00:37:58] Objectively cool that is.

**Erika Janik:** [00:38:01] Very cool.

**Sam Evans-Brown:** [00:38:02] Well so 150 foot span.Easily they were able to build these ropes. There's still one Peruvian rope bridge today that is being rebuilt every single year by by the two villages on either side. They come together they weave them together. You know they're made of grass. The whole village comes together they make these giant sort of cables and one bridge consists of six of them and then they weave in between them with smaller... with smaller fibers. John has taken one of these grass ropes tested it to failure and it can hold about 2 tons so could lift a car.

**Justine Paradis:** [00:38:34] Oh my God!

**Sam Evans-Brown:** [00:38:35] Grass grass ropes. Two tons. So clearly you could build a big enough rope to make a pretty big swing. So then you know from there I took this to a pendulum calculator which you can easily find online to figure out how high you would have to what angle you'd have to jump from and how high you'd have to jump from on your 150 foot long rope in order to get above 55 miles an hour. Thoughts guesses?

**Nick Capodice:** [00:39:06] Wow 150 feet right.

**Sam Evans-Brown:** [00:39:08] Yeah the length so a 90 degree angle would be level with the point that you're swinging from.

**Taylor Quimby:** [00:39:13] I'M just picturing people doing this like thousands of years ago. Just like what are you guys doing on Sunday?

**Sam Evans-Brown:** [00:39:21] Well so so I will make you speculate and more to get on a 150 foot rope to get a swing that goes faster than 55 miles an hour. You'd have to be at a 75 degree angle 111 feet up. That is a huge jump. It's massive. That's like that's like you stand the top you're like nope I'm not going to do that because I would die.

**Justine Paradis:** [00:39:39] But would you have to how would you erect this swing. Because you would have to have already been over to the other side.

**Sam Evans-Brown:** [00:39:46] There'd have to be something in the middle... I don't even know. I don't even know.

**Justine Paradis:** [00:39:51] You could like slam into the side of the mountain if you got it wrong. I don't know. I think the survivability thing. I don't believe it.

**Sam Evans-Brown:** [00:39:58] Yeah I think I think it is theoretically possible but I think that there is no evidence that a swing this big existed. Probably because one did not exist.

**Justine Paradis:** [00:40:12] Well let's let's go through them so it's the sperm whale is the lowest 6 to 10 miles an hour. Although I think probably they did go 25 miles an hour.

**Nick Capodice:** [00:40:24] Me too.

**Justine Paradis:** [00:40:25] Then it's the Viking rowers around either 14 or 30. And then what comes after that.

**Taylor Quimby:** [00:40:34] Horses.

**Justine Paradis:** [00:40:35] Horses are fifty five.

**Taylor Quimby:** [00:40:36] Fifty five at max fifty on a good day.

**Sam Evans-Brown:** [00:40:38] Yeah yeah let's say that.

**Justine Paradis:** [00:40:40] Fin well also potentially.

**Nick Capodice:** [00:40:42] Just above horses I think.

**Justine Paradis:** [00:40:45] Just notching in right above the ancient horses.

**Sam Evans-Brown:** [00:40:46] I guess I would say that notching in just below.

**Justine Paradis:** [00:40:49] And then after that.

**Taylor Quimby:** [00:40:50] This is where we'd stick the less dangerous version of Sam's hypothetical swing.

**Justine Paradis:** [00:40:54] Gotcha. So then after that ice boating depending on the era though I spoke with either 30ish or 60 miles an hour. And then we have luges.

**Taylor Quimby:** [00:41:10] If we count it.

**Nick Capodice:** [00:41:13] The mysoginist tabogganers of St. Moritz.

**Justine Paradis:** [00:41:13] I feel so sad about it. I don't... I feel like there's a little bit of when the Olympics went from amateur to professional. I feel like in my heart I don't like it.

**Sam Evans-Brown:** [00:41:24] What's the one you like in your heart? Is it ice boats? I like ice boats.

**Justine Paradis:** [00:41:28] Not ice boats, because they too feel a little bit more modern.

**Sam Evans-Brown:** [00:41:39] I think my big takeaway is that people were able to go really fast. Like much faster than I expected them to be able to go on the reg.

**Justine Paradis:** [00:42:09] Nick have you got any other questions for us?

**Nick Capodice:** [00:42:13] I'd like to thank you all. I'd like to thank everyone. And like a sort of entreaty to whenever possible to not Google things so you can figure these things out. And if next time if you could tackle my what came first: bread or stairs?

**Justine Paradis:** [00:42:24] That's for next time on outside/in.

**Sam Evans-Brown:** [00:42:26] We expect emails.

**Sam Evans-Brown:** [00:42:39] Outside/In was produced this week by me Sam Evans Brown, Justine Paradis, Taylor Quimby, Nick Capodice, and our executive producer Erica Janik. Maureen McMurray is the director of waving checkered flags in front of antique cars. Chances are that we forgot about some wild ways that pre-engine humans hit high speeds. So e-mail your ideas for this thought experiment to outsidein@nhpr.org. Bonus points if you have specific stories or documented records and if we get enough of them we might just do this again. Also feel free to call in your ideas or critiques to the Ask Sam hotline at 1-844-GO-OTTER. Music in this episode by Blue Dog sessions. Our theme music is by brakemaster cylinder. Outside in a production of New Hampshire Public Radio.