

## **Oobleck! Make Up Your Mind!**

**By Mindy Thomas**

<<Opens with Guy meditating to an app>>

**Guy Raz.** Ahhh. Okay, let me just start up my science meditation app here...

**Meditation guide.** Welcome to Meditation Matters. The only meditation app that really matters... Now let's focus our breath... On matter.

**Guy Raz.** <<Takes a deep breath>> <<exhales>> <<slowly>> matter

**Meditation guide.** Matter is all around you. Solids, liquids, gasses....

**Meditation guide.** You are a solid. A human being with a definite size and shape.

**Guy Raz.** I am a solid.

**Meditation guide.** And flowing through your body...are ....liquids . Liquids have a definite size, but no definite shape.

**Meditation guide.** You are also full of gas.

**Guy Raz.** I am full of gas. Wait...what?

**Meditation guide.** There is gas inside of you. Your gas has no definite size or shape. Let's release it. Release your gas, Guy Raz...

**Guy Raz.** Wait a minute! How do you know my name?

**Mindy.** Okay, back her up boys.

<<Beep beep beep of a dump truck>>

**Guy Raz.** Minndyyyyyy!

**Meditation guide.** Now breathe deeply.

<<Gets up and turns off the meditation app>>

**Mindy.** A little to the left. No, the other left.

**Guy Raz.** Mindy, what is all that noise!? I can't even meditate peacefully on my own micro deck.

**Mindy.** Right there....annnnnnnnnd dump!

<<Loud dumping sound>>

**Guy Raz.** <<Calling from afar>> Mindy?? Mindy?!?

**Mindy.** Oh hey Guy Razzy! Come on over, and get a load of this!

**Guy Raz.** Whooaaaa! What in the?? Mindy...what are you doing?!? Why are you filling your pool with....baby powder!?

**Mindy.** This is not baby powder, Guy Raz! What you're lookin' at here is 220,000 pounds of Grade A cornstarch!

**Guy Raz.** Huh. Mindy, when you told me last week that you were planning to get your pool ready for the season, this is not at all what I had envisioned!

**Mindy.** Guy Raz...this year, I have decided to fill my pool with...a shiny, creamy, milky-white mixture of cornstarch mixed with water...in other words...fine oobleck!

**Guy Raz.** <<Agast>> you're filling your pool with a non-newtonian fluid!!!?!?!?

**Mindy.** Well, I couldn't think of any Newtonian fluids, so...

**Guy Raz.** Mindy! Water! Water is a Newtonian fluid!!! And it works great in pools!

**Mindy.** Oh yeah! Water! Huh.

**Guy Raz.** A non-newtonian fluid is a fluid that doesn't *behave* in the way you would *expect* it to.

**Mindy.** Yeah...and this non-newtonian fluid known as oobleck is a big scientific trickster 'cause one minute it'll look like a liquid and the next minute it's acting like a solid.

**Mindy.** Hey Guy Raz, can you give me a hand here?

**Guy Raz.** Oh sure...what do you need?

**Mindy.** If you could just hold this garden hose over my pool here, while I run over to your house to turn on the faucet....run run run run run...

**Guy Raz.** <<To self>> my house??

**Mindy.** Is it on!?

**Guy Raz.** <<Yelling a little>> yes, it's on! Now as I was saying earlier, *water*...the newtonian fluid that's about to come out of this garden hose, is a much, much better fluid for a swimming pool.

**Mindy.** <<Yelling a little>> yep! Just keep holding that hose right over the pool!  
<<Turns on the water>>

<<Water starts flowing>>

**Guy Raz.** <<Yelling a little>> ...and the reason it's a better fluid, is because its viscosity, or how thick or thin it is, stays the same no matter what happens!

**Mindy.** But where's the surprise in that?

**Guy Raz.** There is no surprise Mindy! That's the point! Water is constant and consistent! You can shake it, you can squeeze it, turn it upside down, or even jump in it, and the water will always behave the same way...like a liquid! A nice thin liquid..

**Mindy.** <<Calling from the side of the house>> uh huh, can you let me know when the pool is overflowing?

**Guy Raz.** Blaaagh! Mindy!! You filled this entire pool with oobleck!!

**Dennis.** Hi Mindy! Hi Guy! Ooooh! What are you swimming in? Milk?! Let me just slowly get into the pool here....oh that's cold ooo....but very creamy! Are you sure this isn't milk?

**Guy Raz.** Dennis, why don't you roll that pasty oobleck between the palms of your hands...

**Dennis.** Ok...ooooh! Look! It's turning into a ball! I made a rubbery ball! Raaaah! My ball!!!! It's melting! Meatball, nooo! -- I named it meatball -- meatball, noooo!

**Mindy.** Since this oobleck is a non-newtonian fluid, its viscosity...or thickness, changes depending on how much force is put on it!

**Guy Raz.** Wait! You didn't tell me you already knew this?!

**Mindy.** Oh yeah! I was inspired to fill my pool with oobleck after I read this really interesting study on the stuff, from a team of engineers at MIT.

**Guy Raz.** Oh, that's the Massachusetts Institute of Technology.

**Mindy.** The engineers created this computer model that could predict the exact moment when oobleck would change from a liquid to a solid and then back to a liquid after force was applied to it.

**Dennis.** Ok! Here I go!

**Reggie.** Cool!

**Guy Raz.** Like...the force that would come from someone rollerblading through a swimming pool full of oobleck?

**Dennis.** Uhng! The harder... I try... To rollerblade through this stuff... The harder it is to rollerblade. It's like... Some sort of life lesson!

**Mindy.** So what's happening right now, Guy Raz...is that Dennis is putting so much bodily force on the oobleck, that it's actually transforming from a liquid to a solid right before our very eyes!

**Dennis.** Ooo, I'm like a wizard!

**Reggie.** Cool

**Dennis.** Reggie! Let me have this!

**Guy Raz.** So as Dennis puts pressure or force on the oobleck, its viscosity goes from being thin like a flowing liquid, to thick like a non-moving solid.

**Dennis.** Ahh! Uh oh! Ahh! Ahh! I'm stuck! I'm stuck in the goo! Helllllp! I can't move and I'm going to need to pee soon!

**Dennis.** Reggie, save me!

<<Baywatch style rescue music>>

**Reggie.** Cool

**Guy Raz.** Whoah! Look how swiftly Reggie was able to swoop in at the first sign of stickiness!

**Dennis.** Ahh! Reggie! Don't land on me.

**Mindy.** Grab hold of Reggie's feet Dennis so he can pull you out of the oobleck!

**Reggie.** Coo

**Dennis.** Oh I see...ok. I'm holding on!

**Guy Raz.** Come on Dennis...you can do it!

**Mindy.** Easy does it Reg...not too fast!

**Dennis.** ...I can't... Hold on... Much longer

<<Reggie pulls Dennis from the oobleck>>

**Dennis.** Whoaaaooooaaahhhh!

<<Success>>

**Mindy.** You did it Reg!!!

**Reggie.** Coo

**Mindy.** Uh Dennis, why don't you go rinse yourself off a little.

**Dennis.** Good idea.

**Reggie.** Coo

**Dennis.** No, Reggie! You can't spray me with the hose!

**Guy Raz.** Mindy, Mindy...what happened in there?!

**Guy Raz.** How exactly does a non newtonian fluid like cornstarch mixed with water go from being a liquid to becoming a solid?

**Mindy.** Well, I could tell you....

**Guy Raz.** Yesss?

**Mindy.** But I'd rather show you!

**Guy Raz.** No way! I am not getting into that pool of goop.

**Mindy.** Okay, fine. Here just put on these magnifying goggles and I'll bring the goop to you, okay? Walk walk walk

**Mindy.** There we go. Now before you take a look at the oobleck under the goggles, I want you to compare *this* tiny grain of sand with *this* single particle or grain of cornstarch .

**Guy Raz.** Whooaaa! The cornstarch is so much smaller than the grain of sand! In fact, according to these magnifying goggles, it's 100 times smaller than the grain of sand!

**Mindy.** Yeah! And because the particles of cornstarch are sooo teeny tiny, they're way more affected by things like temperature and electric charges between them.

**Guy Raz.** And those electric charges can either attract particles, pulling them together, or repel particles, pushing them apart!

**Mindy.** Exactoritos! And because the cornstarch grains are so small, the electric charges build up between them and start repelling or pushing the particles away from each other!

**Guy Raz.** So if you're moving slowly, the grains will push apart and slide past each other like a fluid.

**Mindy.** Yeah...so like when Dennis slowly climbed into the pool, the oobleck felt like a creamy liquid.

**Guy Raz.** Okay.

**Mindy.** But...when Dennis started freaking out and trying to rollerblade through the pool with all of his force and might...

**Guy Raz.** His quick and forceful movements made it so the grains couldn't repel or push apart even if they tried!

**Mindy.** Right! Not only could they not repel, but they touched, and that touching caused friction, forcing the grains to bunch together like a solid!

**Guy Raz.** But when Reggie slowly and carefully lifted Dennis out of the pool, the oobleck went back to acting like a liquid!

**Mindy.** Pretty wow huh!

**Dennis.** I'm baaack!

**Guy Raz.** Wait! Dennis! Why are you wearing my bathing suit??

**Dennis.** What, you mean this navy blue three piece suit made out of spandex?

**Guy Raz.** Yes!! That's my formal bathing suit!

**Dennis.** Well my swimsuit was covered in goop, so I went next door and found this in your closet.

**Mindy.** Okaaaay! Well, before we have Dennis give you back your bathing suit Guy Raz, I wanted to try one more quick experiment with my pool full of oobleck.

**Mindy.** I wanted to see if we could make history, by having you Dennis, be the first neighborhood snoop in the world, to successfully rollerblade across the length of an olympic size swimming pool.

**Reggie.** Coo

**Mindy.** Dennis, why don't you roll on over to the diving board here.

**Dennis.** Okay

**Mindy.** You ready Dennis?

**Dennis.** Yeah, just let me climb up on the diving board here--woah! Easy does it!

<<Break for PSA>>

**Announcer.** Attorneys for Wow in the World would like to remind all listeners that in-line skating on a diving board is never, ever, ever, ever, ever, ever, ever a good idea. This message was paid for and approved by the, "Don't be a Dennis" foundation.

**Dennis.** Okay, up on the diving board. Now what??

**Mindy.** Ok, on the count of three, you're going to jump feet first into the pool of oobleck.

**Mindy.** And I'm going to predict that as soon as Dennis jumps into that pool of liquid oobleck, the force from his body will overcome the electric charges that were pushing the particles of cornstarch apart, and instead, force them to bunch together! Turning that liquid oobleck into a solid!

**Dennis.** Mindy, are you positive it's going to turn into a solid?

**Mindy.** Well....there's only one way to find out! On the count of three...one...two...three....jump!

**Guy Raz/Dennis.** One...two....three....jump!

**Dennis.** Geronimo! Ahhh, woaaaah! Weeehhheeeeeeee! Look at meeeeee! I'm rollerblading across an olympic sized pool!

**Mindy.** Go Dennissss!!

**Guy Raz.** It's like the oobleck is turning into a solid right beneath his feet!

**Mindy.** Only to turn back into a liquid as soon as he passes! And it's all because of the force of his rollerblades changing the viscosity or the thickness of the oobleck!

**Dennis.** Woo! That was awesome!

**Reggie.** Coo

**Dennis.** Uhh, I don't think these will fit you, Reggie...

**Reggie.** Coo

**Dennis.** Alright, fine.

**Guy Raz.** So you mentioned that that team of engineers at MIT made a computer model to predict when oobleck would turn from a liquid to a solid but, what are they planning to do with that information!

**Mindy.** Oh! Well, they're hoping that their research can help the world with all sorts of things. Like potholes. You know, those big giant gaping holes that form in roads and we run them over with our cars and motor pickles!



**Guy Raz.** Huh, so these engineers are thinking that filling potholes with oobleck might help to fix them!?

**Mindy.** Yeah, it wouldn't be the craziest idea anyone's ever had!

**Dennis.** Guy! Mindy! Look!

**Guy Raz.** What? What in the..

**Dennis.** Reggie's wearing my rollerblades and skating across the pool of oobleck...which I call the poobleck.

**Guy Raz.** Wow...such grace! Such form, Reggie!

**Mindy.** Beautiful Reg, just beautiful. Like a majestic eagle floating on a sea of non-newtonian fluid.

**Reggie.** Coo

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