The features marked with a star (*) are based entirely on material taken straight from standard research (and other Official and Therefore Always Correct) literature. Many of the other articles are genuine, too, but we don’t know which ones.

**Special Section: the 2013 Ig Nobel Prizes**

6  The 23rd First Annual Ig Nobel Prize Ceremony * — Stephen Drew
10  The 2013 Ig Nobel Prize Winners*
14  The Acceptance Speeches*
18  The 24-7 Lectures*
19  LIBRETTO: The Blonsky Device — Marc Abrahams

**Improbable Research Reviews**

4  Improbable Research Review* — Dirk Manley
5  Improbable Medical Review* — Bertha Vanatian

**News & Notes**

IFC  KIM CARTOON: “Detectives Who Are Fish” — Nick Kim
2  AIR Vents (letters from our readers)
3  Editorial Board
26  Ig* Nobel Limericks: Beetles, Cows, Intoxication* — Martin Eiger
26  Teachers’ Guide
27  Subscriptions and eBooks for You and Your Colleagues
28  Puzzling Solutions — Emil Filterbag
28  Index of Special Issues
IBC  Unclassified Ads

**On the Front Cover**
The Ig Nobel Medicine Prize winners deliver their acceptance speech in song. Photo: Mike Benveniste.

**On the Back Cover**
Minordomos (left to right) Chris Deter, Alex Nemiroski, John Armstrong, Eliza Kosoy, Sylvia Rosenberg, and Ben Biggs demonstrate a novel method of performing single-handed applause. Photo: David Holzman.

**Some Coming Events**

See WWW.IMPROBABLE.COM for details of these and other events:

January 2014  ARISIA, Boston, MA, USA
February 2014  AAAS Annual Meeting, Chicago, IL, USA
March 2014  Ig Nobel events in Scandinavia, UK, Ireland
April 2014  Washington, DC, USA
June 2014  ESOF, Copenhagen, Denmark

**E V E R Y  D A Y**

Read something new and improbable every day on the Improbable Research blog, on our web site:

WWW.IMPROBABLE.COM
The Blonsky Device premiered as part of the 23rd First Annual Ig Nobel Prize Ceremony, at Sanders Theater, Harvard University, Cambridge, Massachusetts, on September 12, 2013. Video of the performance can be seen at www.improbable.com/ig/2013/.

Original Cast
Director, conductor, and arranger: Henry Akona
Assistant director: Chelsea Long
Charlotte Blonsky: Maria Ferrante, soprano
George Blonsky: Martin Kelly, tenor
The Zookeeper: Philip Lima, baritone
The Patent Examiner: Miles Rind, bass
Narrator: Karen Hopkin
Blonsky device mechanics: Melissa Franklin, Peaco Todd, Alex Nemiroski
Other scientists, doctors, and engineers: Nobel laureates Dudley Herschbach, Roy Glauber, Eric Maskin, and Frank Wilczek, and all the 2013 Ig Nobel Prize winners, past winners, and 24/7 Lecturers.

With an all-star biomedical orchestra, “The Forces of Nature,” composed of Harvard and MIT physicians and researchers:

- Accordion: Thomas Michel (Harvard Medical School Professor of Medicine)
- Violin: Ted Sharpe (computational biologist at the Broad Institute)
- Cello: David Fisher (Harvard Medical School Professor and Chair of Dermatology)
- Flute: Elizabeth Henske (HMS Professor of Medicine)
- Bassoon: Ben Steinhorn (HMS MD-PhD student)
- Clarinet: Abby Schiff (HMS MD-PhD student)
- Trombone: Chris Ramirez (Harvard College undergrad)
- Percussion: David Gootenberg (HMS MD-PhD student)

Costumes: Catherine Quick Spingler
Props: Eric Workman

ACT 1 — Sunday at the Zoo with George and Charlotte

NARRATOR: This is the story of a married couple named George and Charlotte Blonsky. The Blonskys invented a machine. They called it “an apparatus for facilitating the birth of a child by centrifugal force.” In the year 1965, the Patent Office granted them a patent—patent number 1126423. In the year 1999, George and Charlotte were posthumously awarded an Ig Nobel Prize for their invention. This is the story—with a few extra touches, we admit!—of how the Blonskys got their idea, and of how they MIGHT have used the machine. It all began with a visit to the zoo…

[MUSIC: Gounod’s “Funeral March of a Marionette”]

BOTH: What shall we do? Go to the zoo! Ooh. Ooh.
BOTH: Let’s go to the zoo today! Let’s go to the zoo today!
CHAR: The elephants! The elephants! The elephants!
BOTH: Let’s go to the zoo today! Let’s go to the zoo today!
CHAR: Oh, that’s such a tacky term, you know!
GEO: No, no! Right over there!

[THEY HAVE OPPOSITE OPINIONS ABOUT WHERE THE ELEPHANTS ARE. HOLDING HANDS, EACH TRIES TO PULL THE OTHER IN THE PROPER DIRECTION. THIS RESULTS IN THE PAIR OF THEM SLOWLY ROTATING.]
CHAR: El-e-phants! Let’s see the wonders of nature—the physics and engineering!
GEO: Let’s study the elephants’ well-controlled, en-dear-ing power steering.
GEO: Let’s go see a pachyderm!
CHAR: Oh, that’s such a tacky term, you know!
GEO: No, no! Right over there!
CHAR: No! Right over there!
[CHAR IS BEING VERY PLAYFUL]
GEO: You’re turning me, turning me all around.
You’re making me gasp and blink!
CHAR: Rotation might make you think!
Spinning, spinning, spinning while dancing—I think can be quite entrancing!
Thoughtful, pondering people like to spin!
GEO: Spinning, spinning, spinning.
[GEO ALSO BECOMES PLAYFUL]
GEO: SOME people think spinning is a sin!
CHAR: Sin! They don’t understand how useful and grand some ev’ryday actions can be.
A sin! A sin! A sin! Sin!
CHAR: Hey, elephants— they have sense!
CHAR: El-e-phants!
GEO: Their wisdom can be immense!
CHAR: So maybe we would be dense not to study the elephants.
GEO: Oh, elephants have sense.
Elephants.
[THEY SEE AN ELEPHANT. THE ELEPHANT IS SLOWLY SPINNING. GEORGE AND CHARLOTTE ARE ENTRANCED AND EXCITED AND MYSTIFIED]
CHAR: That elephant over there—the one that’s spinning round and round—but WHY?
CHAR and GEO: That elephant over there is quite astounding, quite confounding!
That elephant over there—good gosh! Good glory! What’s the story?
THE ZOOKEEPER ENTERS
ZOO: Zookeeper here! You can ask me any questions! Folks, I will cheerfully answer all your questions!
GEO and CHAR: Please tell us, sir, why that elephant is spinning?
ZOO: Ah, she is pregnant—beginning to give birth!
CHAR: An elephant giving birth!
ZOO: That’s right.
CHAR: Well, that would explain her girth!
ZOO: That’s right.
CHAR: Peculiar! How uncommon!
What exactly is the phenomenon?
GEO: Rotation at constant speed!
ZOO: That’s right.
GEO: Rotation at constant speed!
ZOO: That’s right.
GEO: Those rotations have anatomical, interesting implications!
ZOO: Pregnant elephants typic’ly spin around.
Yes, pregnant elephants—yes, they go round and round.
CHAR and GEO: Does that force make mom feel kind of quivery?
ZOO: The force, we think, must aid in the delivery.
For the baby elephant, force of course is relevant.
GEO and CHAR: Force is not irrelevant for a baby elephant.
ALL THREE: Of course you need that force, if you’re an elephant.
An elephant needs force.
ALL THREE [PLAYFULLY ACTING AS IF THEY HAVE HUGELY PREGNANT BELLIES]: And so do WE…
GEO: And so do WE…
CHAR: And so do WE…
ZOO: It’s a clever use of force, of course.
CHAR and GEO: The wisdom of elephants!
ZOO: A use I can endorse, of course.
CHAR and GEO: The wisdom of elephants!
CHAR: Strong propelling force to push aside constricting walls that are vaginal!
GEO and ZOO: To force aside the walls!
CHAR: Yes, the wisdom of elephants!
GEO: The wisdom of elephants!
ZOO: Push aside the mighty walls, yes.
CHAR: E-le-phants.
GEO: The wisdom of elephants!
ZOO: Push aside the mighty walls, yes.
CHAR: To push those vaginal walls, they rely on centrifugal force!
GEO: Vaginal walls, push, push!
ZOO: Push! Push! Push! Push!
ZOO: Push! Push!
GEO: Use centrifugal force!
ZOO: Centrifugal force—
GEO: Centrifugal force—
CHAR: Centrifugal force for motherhood!
ZOO: Centrifugal force—
GEO: Centrifugal force—
CHAR: Centrifugal force for motherhood! WE CAN MAKE A MACHINE!
GEO: Force for mother!
ZOO: For… mother!
GEO: A big machine. Help old biddies have kids!
ZOO: A big one! Hope that no one forbids!
GEO: We can make a machiiiiine!
ZOO: Machiiiiine!

Charlotte and George Blonsky (played by Maria Ferrante and Martin Kelly) and the friendly zookeeper (played by Philip Lima) explore the mechanics of how an elephant gives birth. Photo: David Holzman.
CHAR: We can make a machine!
We can make a machine!
ALL: Machine!

**A Special Mini-lecture Before Act 2**

A brief lecture preceded Act 2 of the opera: Harvard professor Daniel Lieberman explained the biomechanical forces involved in human childbirth. Lieberman shared the 2009 Ig Nobel Prize for physics for analytically determining why pregnant women don’t tip over. Here is the text of his lecture:

Why is human childbirth so difficult? Why can’t mothers just exert enough force to expel the baby easily? The evolutionary explanation is that in upright moms who are not quadrupeds the gravitational force of the fetus is counteracted by the floor of the pelvis, which is filled with vital sphincters which you are all using right now. And so pregnant moms need especially strong pelvic floors. Second, human newborns have enormous brains, and as you can see from these numbers [projected on a slide] it’s a very tight fit. Finally, humans evolve extremely wide hips to locomote efficiently so big-brained babies have to enter the pelvis sideways and then turn a ridiculous ninety degrees inside the pelvis. The way that we solve this problem is having intermittent gradual forces. During stage one of labor a mother produces about 8.5 kilopascals of pressure on the fetus’s head, then intermittently once every three minutes. During the second stage of labor those forces rise to about 20 kilopascals. Those forces are not gradual or intermittent. The mom and baby are in trouble. So if any of you are expecting, may the force be with you, not the forces.

**ACT 2— At the Patent Office**

NARRATOR: A year has passed since the Blonskys got their brilliant idea. It’s been a busy year! Charlotte is pregnant. Any day now, she will give birth to their first child. And George and Charlotte have built the first working Blonsky Birthing Device. Their baby will be the first—the very first—to benefit from this emerging technology. Today, George and Charlotte are at the Patent Office. They are trying to get a patent for their invention. But the patent examiner is, well, a bit confused. Let’s see how George and Charlotte deal with that.

**[GEORGE AND CHARLOTTE ARE STANDING OUTSIDE THE DOOR TO THE PATENT OFFICE. CHARLOTTE IS OBVIOUSLY VERY, VERY PREGNANT. WE THE AUDIENCE CAN SEE, IN THE PATENT OFFICE, GIANT REPRODUCTIONS OF DRAWINGS FROM THE REAL BLONSKY PATENT.]**

**[MUSIC: Beethoven pathetique, 1st movement.]**

GEO: The patent office!
CHAR: The patent office!
BOTH: The patent office! The patent office!
BOTH: I just want to mention: I love your invention!
GEO: Hey—it’s YOUR invention!
CHAR: YOUR invention!
BOTH: An invention of love!

**[THEY OPEN THE DOOR AND ENTER THE PATENT OFFICE. THE PATENT CLERK, AN EXTREMELY DISORGANIZED AND Distracted individual, greets them. THE PATENT EXAMINER MISPRONOUNCES THEIR NAME]**

PATENT EXAMINER: The… inventor’s name is CHON-sky? CHon-CHon-CHon-CHon-CHonsky—is it not? CH, CH!

GEO: Not quite. The name, sir, should be BLONsky. The name, sir, should be BLONsky, BLONsky, BLONsky—it’s BLONsky, BLONsky, BLONsky—BLON!

CHAR: BLONsky. The name, sir should be BLONsky, BLONsky, BLONsky!

GEO and PAT: Details are essential in my work.

GEO and PAT: Errors make some people go berserk.

PAT: Errrrrrrrrrrrrrrrrors!

GEO: A tiny error uncorrected might force them to reject…

GEO: …to reject, to reject it.

PAT: Reject, reject it!

PAT: Now, would you please explain your stuff? I tried to read it but it wasn’t clear enough. It wasn’t clear enough.

GEO: It helps a woman birth a child.

PAT: That’s rather wild.

GEO: You put her on a table that is motorized.

PAT: It’s goodly sized?!
GEO: The woman lies down on her back.
PAT: She’s on a rack?!
GEO: And then you rotate her at sixty R-P-M.
PAT: I must condemn—
GEO: And so the child comes flying out— it’s quick and fun!
PAT: I think we’re done.
CHAR: It’s very simple! It’s a simple apparatus for delivery of babies, with a turntable that spins the mother, and ejects the child.

[THEY EXAMINE THE PATENT DRAWINGS—THESE DRAWINGS ARE BIG—THE AUDIENCE CAN SEE AND SAVOR THEM.]

GEO and CHAR: Total safety! No danger! Many safeguards! Many safeguards! Many safeguards! Many safeguards! Boxes with ballast water! Boxes with ballast water!
Butt plates! Wing nuts! Steel gates! Deck butts!
GEO and CHAR: Precise rotation… will cause cessation… of the gestation.
GEO and CHAR: Yes! Oh yes, it will.

[CHARLOTTE AND GEORGE ARE GROWING PANICKY, AND START TO BABBLE]
Oh! …precise rotation… will cause cessation…
Oh! …will cause cessation… of the gestation…
PAT: Round and round, and / up and down and / lost and found and / poor confound- / ed baby.

PAT: Round and round and / up and down and / lost and found and / poor confound- / ed…
GEO: But even still…
PAT: Still…
CHAR: But still…
PAT: But still…
GEO: So full of fear…
CHAR: So full of fear…
PAT: So full of fear…
CHAR and GEO: So full of fear… A mother is so full of fear.
PAT: Fear… A mother is so full of fear.
GEO and CHAR: So full of fear.
PAT: Fear I must reject, I must reject, I must reject… Must reject, I must reject, I must reject…
GEO: Oh, please! Oh, please! Oh, please! Oh, please! Oh, please! Oh, please! Oh!
CHAR: Oh, please! Oh, please! Oh, please! Oh, please!
CHAR and GEO: Precise rotation… will cause cessation… of the gestation…

[CHARLOTTE BURSTS INTO TEARS]
CHAR: My head is spinning! / It’s the beginning! / I think my baby is… / popping out TODAY! HEY!
GEO: My head is spinning! / Is it beginning? / I think our baby is… / popping out TODAY! HEY!
PAT: My head is spinning! / Is it beginning? / Good God, your baby is… / popping out TODAY! HEY!
GEO: HEY! Don’t worry, Charlotte Blonsky! Don’t worry ’bout the
PAT: HEY! Don’t worry, Missus CHON!
CHAR: Blonsky! I worry ’bout the
CHAR: patent! Now let’s move! Oh, babe!
Let’s move!
GEO: patent! Now let’s move! Go, babe! Let’s move!
PAT: Patent I APPROVE! Whoa, babe! APPROVE!
ACT 3— Doubts
Before Launch
[George and Charlotte are playing with a miniature, rough working model of the machine]

NARRATOR: The hour is approaching when Charlotte will give birth—give birth to the Blonskys’ first child—the first child anywhere, ever, to enter the world propelled by centrifugal force. Now, at the last minute, George and Charlotte are having a debate. George is full of doubts. Charlotte is confident and (mostly) unafraid. Charlotte reminds him, diplomatically and happily, that it is she—not he—who will soon be strapped onto the machine, and rotated at high speed, so she can give birth to a bouncing baby.

[MUSIC: Beethoven’s pathetique, 2nd movement]

GEO: It’s a SIN to make a mother spin!
    / Don’t blend her, / Or distend her / new, ready to debut, kin.
CHAR: It’s NO sin to make a mother spin— / Expect her / To eject her / next—and quite fully flexed—kin.
GEO: My dear, / I so fear / when I hear / your ghoulish cheer!
CHAR: To make me spin / Is not a sin.
    / What makes you grimace makes me grin!
You really ought to know that my circulation is a little slow!
GEO: Now, I understand that a mother must have lots of pluck—
CHAR: You must understand that sometimes things get stuck!
GEO: Yes, I understand that things get stuck, that things get stuck, things get stuck.
CHAR: It’s quite sound to spin ma-ma around. To whirl her! To twirl her.
Tradition is no bound’ry. So… use acceleration!
GEO: To ensure no child will be left behind!
CHAR: Circum-propagation!
GEO: To ensure no child will be left behind!
CHAR: So no child will be…
GEO: So no child will be left behi-ind.
CHAR: So no child will be left behi-ind.

George and a very pregnant Charlotte share a moment and a thought. Photo: Mike Benveniste.

They took a physics course. They are didactical. I am an engineer. My thoughts are practical. This kind of force is just not con-tro-ver-si-al. Not con-tro-ver-si-al!! No. It’s in-er-ti-al!

CHAR: Yes, of course! Apply the proper force. Rotate me! Else, irately, [SMILING, JOKING] I would have to go get a divorce!

GEO: What?!
CHAR: Separation anxiety? Shouldn’t we feel some chagrin?
BOTH: Separation anxiety? No! … Let’s… begin! What say we go for a spin!
GEO: What say we go for a spin!
BOTH: Spin! Babe! Spin!

Technical drawing from the Blonsky patent.
ACT 4—Finale

[WE NEVER SEE THE ACTUAL BLONSKY BIRTHING DEVICE—IT IS OFFSTAGE, OR ALTERNATIVELY, BEHIND A PROTECTIVE CURTAIN. WE DO ALWAYS SEE A LARGE DRAWING, TAKEN FROM THE ACTUAL BLONSKY PATENT, AND DISPLAYED IN THIS ACT MUCH AS IT WAS IN THE PATENT OFFICE SCENE.]}

NARRATOR: It’s time. It’s time for Charlotte to become the first person to give birth… using the Blonsky Device to apply centrifugal force. Their new friends, the Zookeeper and the Patent Examiner, are here, helping them. All their other friends, and many of the world’s great scientists, doctors and engineers have gathered to be part of this historic occasion. Around the world, people are watching on live television.

[NARRATOR AND ALL THE CAST MEMBERS WAVE AND SMILE INTO THE TV CAMERAS]

Now let’s join George and Charlotte Blonsky, for the thrilling conclusion to our opera.

[MUSIC: Rossini’s “La Gazza Ladra” [The Thieving Magpie]]

GEO: It’s about time, my dear!
CHAR: It’s about time, my dear! After many, many, many, many months I’m very, very, very, very ready for a change!
GEO: Round about time, my dear!
CHAR: Round about time, my dear!
GEO: Af—ma—, ma—, ma—, ma— months—ve—, ve—, ve—, ve— ready for a change!
CHAR: —ny, —ny, —ny, —ny— I’m —y, —y, —y, —y ready for a change!
GEO: Waiting, and waiting, and waiting uncomfortably!
CHAR: Waiting, and waiting, and waiting uncomfortably!
Anxious and / eager and / no in-be- / tween! I am / bloated and / elephant- / ine! Take me / now! Take me / to the ma- / chine!
GEO: Now, now, now, now, now, now.
[CHAR and GEO EXIT]
ZOO and PAT: Such a delightful machine! Such a delightful machine!
Far from routine! Far from routine!
Kind of a trampoline!
Such a hygenic machine! Such a hygenic machine!
So very clean… do very clean… seemingly so pristine!
We’d better check each detail. We’d better check each detail.
ZOO: Any detail… any detail… any detail… could fail.
PAT: De-tail… de-tail… de-tail… could fail.
[GEO RE-ENTERS]
GEO, ZOO, PAT: We’d better check each detail. We’d better check each detail.
GEO: Any detail… any detail… any detail… could fail.
ZOO and PAT: De-tail… de-tail… de-tail… could fail.
CHAR: —ter —ny, —ny, —ny, —ny—
GEO: Look at it carefully! look at it!
ZOO and PAT: Got to examine it, look at it!
GEO: Look at it carefully! look at it!
PAT: Got to examine it, look at it!
GEO: Look at it carefully! look at it!
ZOO: Got to examine it, look at it!
GEO: Got to examine it, look at it! Carefully look at the anti-friction bearing on the motor shaft.
ZOO: Carefully look at the water-ballast-level gauges, fore and aft.
PAT: Carefully look at the timing mechanism, and the chronograph.
GEO, ZOO, PAT: Take a look at levers listed in the log book!
Take a look at both the safety net and tail hook! Look!
[GEORGES OFF TO CHECK ON THE MACHINE]
ZOO: Look at the bolts in the holes in the base plate.
Check the alignment. Make sure they are tightened enough.
PAT: Look at the factors affecting the spin rate.
That’s your assignment. The ride should be steady, not rough.
ZOO: Check that the bodily orientation’s okay!
PAT: Make sure the mother is strapped in to face the right way—
ZOO: Check the direction the mother will lie on the bed!
PAT: Having her backwards is something I dread!
ZOO and PAT: Where are the feet?
[SKIP A BEAT]
Where is the head?
[ZOO AND PAT STUDY THE BIG PATENT DRAWING, AND GROW REALLY, REALLY, REALLY WORRIED AND AGITATED AS THEY POINT TO THE PART THAT SHOWS THE NET THAT CATCHES THE CHILD]
[GEO RE-ENTERS]
ZOO: Maybe we should… go slow…
GEO: There’s something I should know?
ZOO: Noth— noth—, noth—, noth—, noth—, noth—, noth—, noth—
PAT: —ing, —ing, —ing, —ing, —ing, —ing, —ing, —ing, —ing, —ing. Ev’rything is FINE!
PAT: Ev’rything’s set to go?
GEO: WHAT IS IT I SHOULD KNOW?!
PAT: Noth— noth—, noth—, noth—, noth—, noth—, noth—, noth—, noth—
ZOO: —ing, —ing, —ing, —ing, —ing, —ing, —ing, —ing
Ev’rthing is FINE!
ZOO: Well, you see… well, there is one thing we’re wondering about…
GEO: Tell me! You tell me! ‘Cause I need to KNOW what it’s about!
Anxious and / eager and / no in-be/ tween! I am / coated with / stale nico- / tine! Tell me / now! Tell me / ’bout the ma- / chine!
ZOO and PAT: Gosh! Gosh! Gosh! Gosh!
ZOO and PAT: Such a delightful machine! Such a delightful machine!
GEO: Get to the point! Get to the point!
YOU TELL ME WHAT—TELL ME WHAT DO YOU MEAN?
ZOO and PAT: The tiny NET that we’ve seen… That net is far from routine…
GEO and PAT: That tiny net, that tiny net—it is the strangest part of the machine!
GEO, ZOO, PAT: Baby gets caught by that net. Baby gets caught by that net.
Look at that net. Look at that net.
Maybe it’s adequate. And yet… Baby relies on that net. Baby relies on that net.
That net looks frail… That net could fail!
GEO: That net is something that I might regret!
ZOO and PAT: That net is something that he might re—

[THE MACHINE STARTS UP, TO THEIR SHOCKED SURPRISE]