Why scientists say simple cup-and-ball is the best magic trick of all

- Researchers analyse audience reactions to clips of Penn & Teller performing the trick
- They find that facial expressions and other misdirections illusionists use are not crucial to the success of the trick
- New findings shed light on how and by how much people can be misdirected

By Charles Q. Choi, INSIDE SCIENCE NEWS SERVICE

PUBLISHED: 13:04 EST, 12 February 2013 | UPDATED: 14:09 EST, 12 February 2013

Scientists analysing how magicians Penn & Teller perform one of the oldest known illusions now reveal that some aspects of the magic trick are even more effective at manipulating audiences than the magicians predicted.

These findings not only shed light on basic processes such as cognition, but could help advance the art of magic, researchers suggested.

In recent years, neuroscientists have increasingly been analysing magicians' performances to gain insights on the human mind.

Scroll down for video
Raymond Teller of the illusionist duo Penn & Teller performs the cup and ball trick: Scientists have revealed that some aspects of the trick are even more effective at manipulating audiences than magicians predicted.

“We realized that magicians were among the best people at manipulating attention and awareness, far better than scientists,” said cognitive neuroscientist Stephen Macknik, director of the laboratory of behavioural neurobiology at the Barrow Neurological Institute in Phoenix, Arizona.

“So we’ve been poaching their techniques, bringing them back to the labs to increase our rate of discovery.”

More...

- How the wrong kind of praise could HARM your children: It's better to applaud efforts than tell them 'you're great', study reveals
- Your dog really does understand you... They're more likely to steal food if they think you can't see, research reveals
- Sales of last-minute goods at the checkout are falling... because we're too busy looking at our phones in the queue to notice them

The latest magic trick Macknik and his colleagues investigated is the classic cups and balls illusion. Examples ascribed to ancient Roman conjurers date back to 3BC, and some claim it goes back further to ancient Egypt.

The illusion nowadays commonly involves three upside-down cups and three balls, Magicians can make the balls seemingly jump from cup to cup, disappear from one cup and appear in another, turn into other items and so on. (The modern swindler's version is the shell game.)

To learn more about this illusion, the researchers enlisted the aid of the famous duo Penn & Teller. Seven volunteers watched 10-12-second-long video clips of Teller performing the illusion in front of a NOVA scienceNOW TV crew at the duo's theatre in Las Vegas.

The balls in the illusion are typically brightly coloured, while the cups are usually opaque. Penn & Teller practice a version with three opaque and then three transparent cups.

‘It’s a great act, and the trick still works even with transparent cups, because they’re just that good — people still can’t follow all the movements and see how the trick is done,’ Macknik said.

‘I’ve seen them do this trick for more than 20 years,’ said vision scientist Flip Phillips at Skidmore College, in Saratoga Springs, N.Y.
"The best part of the whole routine is that, despite the fact that they are telling you what they are doing — they're showing you what they're doing — you're still amazed because you just can't fight the deception."

Teller devised this variation while fiddling with an empty water glass and wadded-up paper napkins for balls at a Midwestern diner. He turned the glass upside down and put a paper ball on top, then tilted the glass so that the ball fell into his other hand.

The falling ball was so compelling that it drew his own attention away from his other hand, which was deftly and secretly loading a second ball under the glass.

Teller found that the sleight happened so quickly he himself did not realise he had loaded the cup. He surmised he missed it because the falling ball captured his attention.

In the experiments, the volunteers reported when they saw balls get removed from, or placed under, cups by pressing buttons. The researchers also used cameras pointed at the eyes of the volunteers to track their gazes.

The researchers found that while the falling ball did draw audience attention, other aspects of the trick were actually stronger at making the illusion work. For instance, audiences were fooled more often when the magician attempted to drop a ball that was stuck to a cup.

'A lot of times the intuitions we have about the way things work aren't the way things work,' said Phillips, who did not take part in this research.

'This isn't to put down Teller — Teller's intuition is good. There is research we did on a famous sleight of hand known as the French drop where Teller's intuition on how to sell the trick is perfectly correct.'

Misdirection: In the experiments, the volunteers reported when they saw balls get removed from, or placed under, cups by pressing buttons. The researchers also used cameras to track the gazes of the volunteers.

In addition, magicians often say that success with illusions depends on how well they can use gazes and faces to manipulate where audiences look, Macknik explained. The researchers tested this idea by hiding Teller's face on the video clips with a black rectangle, and found doing so apparently did not affect the illusion.

'We're showing a discovery that magicians missed because they relied on their intuition, and their intuition was wrong,' Macknik said.

These findings support recent studies, including one from Macknik and his colleagues, which hinted that the facial expressions and other social cues magicians think are crucial to illusions may not actually be essential.

'A huge amount of training in magic is that social cues matter,' Macknik said. 'We're starting to wonder if social cues help with any magic tricks. Future research is warranted to look at the effects of social cues in illusions … we'd like to see an effect where they really matter.'

These new findings shed light on how and by how much people can be misdirected, which could help magicians improve their art.

Macknik and his colleagues Hector Rieiro and Susana Martinez-Conde detailed their findings online Feb. 12 in the inaugural issue of the journal PeerJ.

Now watch a video of Penn & Teller performing the cup and ball trick
For a truly fantastic variation on the cups and balls go to YouTube and watch Paul Daniels Chop Cup routine. The perfect combination of pacing, routining, humour and sleight of hand.

- Rich, London, United Kingdom, 13/2/2013 15:30

Report abuse
I like the upright cabinet where the middle comes out trick myself. I'd love to know

- bERNARD mATTHEWS, Norfolk, United Kingdom, 13/2/2013 12:43

Report abuse
how they do that one.

- Alan Brown, Chesterfield, United Kingdom, 13/2/2013 10:01

Report abuse
“Why scientists say simple cup-and-ball is the best magic trick of all?” Because they

- OMG, My couch Over here, 13/2/2013 09:56

Report abuse
never seen real magic.

- James O, Macclesfield, 13/2/2013 06:13

Report abuse
those balls were disappearing.

- Resident, somewhere in America, 13/2/2013 04:33

Report abuse
I can do a couple of cup and ball tricks but I much prefer rope tricks. When people watch cup and ball tricks they usually are trying to figure it out and have the reaction of how did you do that. But when you do a rope trick right their reaction is HOW DID YOU DO THAT.

- Caleb, Augusta Ga, 13/2/2013 00:54

Report abuse
Paul Daniels' chop cup routine is the best ever. Worth a watch.

- Chris, Leeds UK, 12/2/2013 23:33

Report abuse
I once saw a magician in a hotel in Majorca. He was surrounded on all sides by holidaymakers. He showed a box sleeve, and pulled the inner box out for everyone to see. Then he filled it with tissue, put it back into the sleeve and set fire to the tissue. He pulled the box out and a real, live white duck with a black dicky-bow flew out. How the hell was this done? The duck spent the rest of the show walking around, taking crisps off the children.

- Oldcogger, Birmingham, United Kingdom, 12/2/2013 23:01

Report abuse
You live you die end of . And all the clowns inbetween are after your dosh.

- Robinson Crusoe, Somewhere Out There., 12/2/2013 20:48

Report abuse
The views expressed in the contents above are those of our users and do not necessarily reflect the views of MailOnline.

We are no longer accepting comments on this article.

- Today's headlines
- Most Read
vehicles in the path of flowing lava

- Heavy metal moshers move just like molecules! Physicists reveal music fans in mosh pit follow same 'logic' as 2D gas particles
- Blind Paralympian becomes real-life bionic man after receiving incredible new implant to restore his sight
- The jaw-dropping moment a Brazilian stepped outside and found it was raining SPIDERS
- Ever wanted to be a rock star? The astonishing interactive website that lets you get on stage with Beck
- Sony set to reveal next generation PS4 games console tonight as battle for the must-have Christmas gadget kicks off
- When your heart stops beating, you'll keep tweeting: Controversial app that updates your Twitter feed from beyond the grave
- Scientists borrow technique used by astronomers to find distant galaxies to identify cancerous tumours
- Is this the world's first pornography? The incredibly explicit images carved in north-west China 4,000 years ago
- 4G winners announced: All major networks take a slice of superfast mobile spectrum... but pay £1bn less than government hoped
- How Christianity stopped Anglo-Saxon England eating horsemeat: Church officials claimed it was 'pagan' food
- New McLaren supercar will do 230mph, reach 60mph in under three seconds... but produce less pollution than a Honda Accord
- Violent images in movies, TV or computer games CAN act as triggers for aggression, says new report
- The revolutionary new design for airline seats that could make economy just as luxurious as first class
- Ancient impact of a gargantuan asteroid in southern Australia changed the face of the world forever, study reveals
- Scientists trace the boozing gene: Taste for drink 'originated 10million years ago in common ancestor of humans and chimps'

MORE HEADLINES

- The revolutionary new design for airline seats that could make economy just as luxurious as first class
- Sony set to reveal next generation PS4 games console tonight as battle for the must-have Christmas gadget kicks off
- When your heart stops beating, you'll keep tweeting: Controversial app that updates your Twitter feed from beyond the grave
- Incredible close-up pictures of snowflakes taken on a photographer's balcony using a simple DIY camera kit
- Doodling in mid-air: The £30 '3D printer' pen that can create complex sculptures from plastic wire
- Ancient impact of a gargantuan asteroid in southern Australia changed the face of the world forever, study reveals
- Details of Samsung's new Galaxy phone leaked - and it's set to launch 'within weeks'
- Unlikely friends: The red squirrel could make a comeback in the English countryside thanks to pine martens
- The "Robocop" headset that lets police see through walls and identify suspects just by LOOKING at them
- A very modern male of the sea: The Cardinal Fish is left to look after the babies for weeks on end - in his MOUTH
- Blind Paralympian becomes real-life bionic man after receiving incredible new implant to restore his sight
- Microchip implant in eyes of nine blind people helps them to see again
- 4G winners announced: All major networks take a slice of superfast mobile spectrum... but pay £1bn less than government hoped
- How a dolphin missing its mother will call for her by name: Animal mimics whistle to try and trigger a reunion
- Google gives first glimpse of how its interactive glasses will work - but still won't say when you'll be able to buy them (or how much they will cost)
- Bubble bursting at speed of light will end our universe - so we won't even see it coming
- Scientists borrow technique used by astronomers to find distant galaxies to identify cancerous tumours
- That really is a caffeine boost: The record setting car powered by coffee
- Apple admits Facebook hackers also attacked ITS machines in major cybersecurity alert

Femail Today

- Painting the carpet black: Taylor Swift leads the glamor at the Brit Awards in plunging gown alongside Jessie J and Emeli Sande in their own LBDs
  Taylor Swift

- Showing Harry what he's missing? Taylor Swift dazzles on the red carpet in a black gown with thigh high sheer panels at Brit Awards
  Wore an Elie Saab gown

- Andie MacDowell, 54, is a far cry from her L'Oréal campaign self as she steps out looking weary and make-up free
  Been a spokesperson for L'Oréal since 1985

- Miranda and Orlando

- Miranda Kerr and Orlando Bloom show off their matching perfect physiques... as they spend the day on the beach with Flynn Family hit Malibu beach
Shayk-ing things up! Irina parades her killer tan and incredible curves as she sizzles in a stunning new bikini shoot for Beach Bunny.

Gearing up for spring

I only told her to choke to death! Alec Baldwin denies racist attack on photographer but admits shouting abuse. Photographer claims he yelled racial epithets.

Hayden

Rekindling the flame! Hayden Panettiere receives a tender kiss from ex-boyfriend Wladimir Klitschko two months after splitting with her ex.

Kate

Plastic or perfect? Kate is just Diana Lite, a simpering and prissy princess, says JULIE BURCHILL... but A.N. WILSON argues that she is a textbook royal

The Girl Is Mine! Prince Jackson holds hands with his sweetheart as he celebrates new job with Entertainment Tonight.

A special correspondent

JOANNE BECKHAM

What would Victoria say? David Beckham's sister Joanne almost spills out of her eye-popping dress as she leaves a nightclub looking worse for wear

'Devotion, honesty and independent finances': Goldie Hawn on her secret to 30 years of happiness with Kurt Russell... and why they never married

New diet? A bulkier-looking Rob Kardashian clutches onto a healthy lunch after he reveals he has gained 40lbs since Rita Ora split.

Heartbreak weight gain

Call center worker, 31, who was dumped at the altar for being too fat loses 98lbs in less than a year... And now she wants her fiancé back! Dumped for her weight

'They're just horrible!' Brandi Glanville takes aim at Real Housewives co-stars in vulgar C-word rant on Howard Stern. She didn't hold back.

Robin Roberts

The Obamas welcome back Robin Roberts as she returns to Good Morning America 174 days after she left for life-saving bone marrow transplant
• Is Miley Cyrus smoking marijuana? Star insists she ‘doesn’t have Instagram’ after picture goes viral. Snap of a woman covered in smoke cloud.

• ‘It’s an accurate depiction of our time together’: Clive Davis stands by his Kelly Clarkson comments... after singer accuses him of ‘misinformation’

• Feline sexy: Former Pussycat Doll Kimberly Wyatt shows off her incredible figure and flexibility as she withstands the elements for a skincare campaign.

• An early two year anniversary gift for Eddie? LeAnn Rimes drops $3 million on a new love nest mansion in the Hidden Hills. Too late for Valentine’s...!

• When in France! Ever-chic Victoria Beckham takes in the sights of Paris with daughter Harper. The youngster is already so well traveled.

• ‘I love him’: Chelsea Handler opens up about her on and off again hotelier boyfriend Andre Balazs. Chelsea Handler is head over heels in love.

• Getting Rasta frills in thrills! Rihanna shows off her tattooed derriere as she dons bikini in pan-African colors and smokes a suspicious cigarette.

• They’re DEFINITELY never getting back together! BRITs 2013 organizers on high alert to keep Taylor Swift and Harry Styles apart. Battle of the exes.

• Whirlwind trip! Hilary Duff cuts a stylish figure as she jets out of London after spending less than 48 hours there. Arrived at Heathrow airport to jet back home. Jon Millward.

• The average female porn star? A California-born brunette with a size 34B bra named Nikki. Analysis into 10,000 profiles on the Internet.

• Singer Dido opens up about the struggle to lose her baby weight. She still hasn’t lost all the weight, after giving birth to her son Stanley in July of 2011.
That money could have come in handy! Lindsay Lohan 'turns down $200k to host a party in Dubai because she thinks she is worth half a million'

All-American girl! Kourtney Kardashian flies the flag as she steps out in striking red shirt and star-spangled shoes in Calabasas, California

And for my next trick: Kendra Wilkinson flashes her fantastic figure as she practices her high diving flips. Making her debut on Splash next month

Charlize Theron looks overdressed in skintight leather trousers for trip to the gym... as she fully unveils her cropped blonde hair for first time. Gone back to blonde

'The Philippines must be half-empty - you're all working in Britain': Gaffe-prone Duke of Edinburgh cracks a nurse joke at hospital ceremony

The Duchess of Cambridge tops shortlist for 2013 Celebrity Mom of the Year title... even though her baby isn't due for FIVE months in her native Britain

You could have done better! Julianne Moore fails to do justice to Elizabeth Taylor’s $6.1M emerald and diamond necklace in coral cocktail dress

'It takes a lot of focus': Marissa Mayer on juggling time for her baby son Macallister with ‘fun’ new role as Yahoo! CEO. She's a working mom

That's one way of selling underwear! French lingerie brand Valege launches ad campaign featuring bouncing BOOBS. Thinking outside the box

The enlightened one! Raunchy Nicki Minaj treats her fans to a cheeky bikini snap as she does a Buddha pose. Not modest about her voluptuous curves

'I'm going to be a big half sister': Ireland Baldwin opens up her excitement as father Alec and wife announce their baby joy. Mom is Kim Basinger
Exploring her wild side! Bethenny Frankel blows kisses to a koala as she visits Australian zoo.
Newly single star went to meet the wild life in Sydney, Australia.

Playing her cards right! Pregnant Jessica Simpson ‘plans to name her new baby Ace’.
The singer is around four months pregnant with her second child.

‘And the award for unsexiest actress goes to...’ Kristen Stewart tops poll of stars men would least like to get their teeth stuck into.
SJP came second.

Fatherly support! Will Smith takes a back seat as son Trey spins the decks at a Vanity Fair party.
They’re a family of musical and acting talent.

Selena Gomez flashes some serious flesh in sharp suit with plunging neckline... as she dwarfs Vanessa Hudgens at Spring Breakers premiere.

Off-duty beauty: Diane Kruger shows off her flawless skin and stunning good looks as she goes make-up free for lunch date.
Star in West Hollywood.
Molly Sims.

Swing low, sweet son: Molly Sims cherishes time with her baby Brooks during park play date.
The mother and actress was in Beverly Hills.

Photo of breast cancer survivor’s tattooed chest is shared by thousands after Facebook’s attempts to ban it.
After double mastectomy.

Life’s a beach! Halle Berry treats her cute daughter Nahla to a fun-filled evening at the pier.
Actress blended into the crowd in Santa Monica.
Ali Larter.

Off-duty beauty: A flawless Ali Larter goes make-up free as she heads out on a shopping spree.
in the rain.
Actress let her natural beauty shine through.

Time for bed? Mel B’s baby daughter can’t keep her eyes open after dinner in Beverly Hills.
They only moved back to LA last week.
Aren't you sweet enough already? Rose McGowan licks a giant green lollipop as she heads to hair salon in all-white ensemble in West Hollywood.

Still going strong: Freida Pinto and Dev Patel can't keep their hands off each other at Vanity Fair event... even after four years together Met as co-stars

Rachel Weisz gets glamorous for Oz premiere in Japan... but can't be parted from her furry white coat. Might shun the Oscars to promote her new film Justin Bieber.

Selena who? Justin Bieber parties up a storm at THREE London nightclubs... and leaves with two mystery ladies in tow. Well, he is single now.

'Not my fault': Dazed and Confused star Jason London pleads not guilty to drunken Arizonian brawl. The 40-year-old actor was also badly injured.

Dripping in jewels: Drew Barrymore and Naomi Watts dazzle at Bulgari event honoring Elizabeth Taylor. Liz had a flair for choosing fine jewels.

What a little cutie! Kimberly Stewart's daughter Delilah keeps a trip to the grocery store lighthearted as she pulls a series of pouts. Baby girl was amused.

Charlotte York would be shocked! Kristin Davis takes the plunge in low-cut dress to attend Battle for the Elephants premiere. Showed off sexy side.

A gold prediction? Leggy Anne Hathaway slips into metallic dress at the Costume Designers Guild Awards just days before she learns her Oscars fate.

Masculine chic! Julianne Hough pulls off an androgynous trouser suit as she continues Safe Haven promo trip with Josh Duhamel. Co-stars in London.

Kim Kardashian gives the first glimpse of her baby bump in a bikini photoshoot as she opens up about her easy pregnancy. No morning sickness.
'A victory for the animals': Morrissey convinces concert venue to shut down McDonalds - and sell only vegetarian food - for Los Angeles show

Count Barton: Mischa does her best to spook by sporting Gothic style make-up as she heads to LFW closing party. The 27-year-old opted to go vampire chic.

Taylor Armstrong denies she 'misplaced' her daughter Kennedy... but admits she was tipsy during a call which alarmed her Real Housewives co-stars.

Wait for me! Paris Hilton charges ahead to go shopping... as injured boyfriend River Viapleri struggles to keep up on his crutches behind her. The stores couldn't wait.

Keeping on Top of the trends! Amber Heard and her sister Whitney shop up a storm at brand new Top Shop store in Los Angeles. Braved the rain in LA. Cat Deeley in gold.

Golden girl! Cat Deeley shimmers in metallic gown and shows off her new blonder hairdo at Costume Designers Guild Awards. At Beverly Hilton Hotel.

Freshening up her act for new friend Dave? Britney Spears dons trendy studded coat and wedge high tops as she knocks back a box of breath mints. Rihanna.

Rihanna unveils ad campaign for her hot new River Island collection starring Jourdan Dunn and Charlotte Free. Her range in London.

Baby it's cold outside! Sarah Jessica Parker's cute twins Marion and Tabitha step out in their favorite matching plaid parkas. Family in New York.

On the prowl! Rosie Huntington-Whiteley turns the sidewalk into her catwalk with leopard print accessories and fringe boots. Landed at LAX.

Bare-faced and beautiful: Amy Smart goes make-up free for lunch in Los Angeles. The actress showed off her natural beauty for a casual day out.
GADGET REVIEWS

This week Daily Mail Games put our swift-swiping fingers to the test and got stuck in to Lady Shotgun's Buddha Finger. And it's brilliant, if slightly frantic, fun.

- Comments (-)
- Videos

In the current headphone market, quality sound is not enough. Consumers want both fashion and function, and that's where the iLuv headphones come in.

- Comments (-)

Beauty, brawn and a blistering sound quality. Tritton's latest, fully licenced, exclusive Xbox 360 headset is a joy to behold from the moment you begin unboxing.

- Comments (-)

Boasting the latest in design and tech, the Ear Force headphones from Turtle Beach claim to offer the definitive audio experience for gaming. And they don't disappoint.

- Comments (-)

Raw, undistorted power. That's what Atomic Floyd claim their latest creation, the PowerJax, has in spades. And thankfully, they're every bit as monstrous as expected.

- Comments (-)

With their aggressive styling, thunderous bass and unflinchingly in-your-face packaging, there is nothing subtle about VIBE's BlackDeath headphones.

- Comments (-)

Quality sound usually comes at a price. But while RHA's SA950is won't win any beauty awards, their audio output blows away similarly-priced opposition.

- Comments (-)

Michael Hanlon
MSSD has introduced a new range of accessories exclusively for iPhone5.

www.MassiveDynamicsCorp.com

Jillian Michaels Diet
Join the Biggest Loser Trainer Jillian Michaels and Love the Weight!

Search For Your Domain
Find Your Domain Today. Com Website Registration $3.99 Includes Privacy

GoDaddy.com

Yee Voted to let your Health Care Decisions be made by The Government. Vote Powell.

advocatesaz.org

Popular searches in sciencetech:
- Daily Mail Facebook
- Daily Mail Science Twitter
- Daily Mail Google+
- Michael Hanlon's Science blog

Published by Associated Newspapers Ltd
Part of the Daily Mail, The Mail on Sunday & Metro Media Group