Dissecting the Coin Trick that Fooled Einstein

Roberto Nava, Kiana Pourhashemi, Mayra Sainz, Ramiro Uribe

University of California Merced, WRI 10

Abstract

Magicians often perform tricks that fool the smartest of people into thinking or acting a certain way, but in reality magic tricks are simply illusions. The illusion, "The Coin Trick that Fooled Albert Einstein" has the ability to deceive anyone into believing a magician can raise that person's total change to equal two dollars and thirty-five cents every time. Although the subject's reaction might vary, the trick should be successful in fooling people because hardly anyone carries more than two dollar of change in their pocket. To prove this magic trick can manipulate a person into doing a command as long as two dollars and eighty-five cents are used each time, four researchers performed the trick twenty-five times on students from the University of California in Merced. Each researcher recorded the amount of change the subject had and each individual's reaction to being fooled.

Introduction

After days of searching the internet for experiment ideas, we decided to search *Scam School*'s YouTube channel and see how they performed the magic trick, "The Coin Trick that Fooled Einstein." *Scam School* is a show that not only teaches its audience how to perform a trick, the host also reveals the secrets behind the illusion. When we watched the host of *Scam School,* Brian Brushwood perform the trick at a bar and manipulate a Olympic gold medalist into buying him a free drink we decided we wanted to learn how to perform the trick. Like, Brushwood we wanted to manipulate people into buying us food or non-alcoholic beverages. If the trick does in fact work each time, it could be taught to others. College students would benefit the most from this experiment because they would be able to manipulate people into buying them food or drinks, even giving up a seat in a crowded place.

How the Trick is Performed

According to *Scam School,* the proper way to perform the magic trick requires the magician to have two dollars and eighty-five cents composed of ten quarters, two dimes, two nickels and five pennies. The magician would approach someone and ask if they are willing to participate in the magic trick. If the volunteer agrees, the magician will escort them to the nearest table and ask the subject to take out any loose change the person may have. The magician will ask the subject to conceal the amount of change he or she has from the magician, even if the person does not have any change. The magician will then ask the person to rattle the coins he or she has and the magician will act as if he or she knows that amount of change the person has solely by listening.

After hearing the coins rattle, the magician must say, "I have as much as you have, plus two extra quarters, and enough extra left over to raise your total to two dollars and thirty-five

cents". The subject might ask the magician how this is possible and the magician will say

through super sonic hearing. The magician will then ask the person to place all the change he or

she possesses on the table. While the magician places an equal amount of cents as the person

placed on the table, the magician will say, "I have as much as you have". Next, the magician will

place two quarters and say, "plus two extra quarters." The magician will place the remaining

amount of coins and after counting them the total should add up to two dollars and thirty-five

cents (Discovery Communications, 2009).

Once we learned how to performing the trick we were more mesmerized than when we

watched Brian Brushwood perform it. It was strange that we knew *how* to do the trick but we did

not know *why* it worked. According to *Scam School*, the trick works each time because of social

engineering, which is the art of manipulating people into performing an action (Social-Engineer).

When performing the trick, the magician deceives others by telling them an algebraic equation

without using mathematical terms. The phrase "I have the exact amount you have, plus two

quarters and enough extra left over to raise your total to two dollars and thirty-five cents" fools

people because it's a long statement. Neurologists have discovered that many magic tricks work

because people have short attention spans. Magicians usually take advantage of this human

weakness by creating visual illusions (Powerll, 2008). This coin trick differentiates from those

magic tricks because this illusion is auditory instead of visual.

The Algebra

The special phrase that makes the magic coin trick successful originated from the

equation "2.85 - x - .50 = 2.35-x" (Discovery Communications, 2009). The total amount of

change (in coins) the magician has is "2.85". The phrase "I have just as much as you have" is

substituted for "x" which is the amount of coins the magician has, which is equal to the amount

the participant has. The participant's total change is "x" because the magician does not know (and is not required to know) how much change an individual has. The phrase, "plus two extra quarter" represents the ".50" in the equation. When you subtract "2.85" from "x" and ".50" the equation equals "2.35". When a magician says the phrase "...and enough left over to raise your total to two dollars and thirty-five cents" instead of stating the original algebraic equation it becomes easy to fool others. The last phrase goes along with "2.35-x" because no matter how much the participant has, "x", the amount left over would always be raised to two dollars and thirty-five cents because it was already taken away when the magician stated the first phrase. As long as the magician says those three phrases and always has two dollars and eighty-five cent in his or her pocket, the coin trick will be successful at deceiving any subject who has less than two dollars and eighty-five cents worth of change.

Change in the Initial Amount

The experiment could also be changed if the initial amount the magician started out with is different, in this case only two phrases would be altered. For example, if the magician has four dollars in change, then the last phrase will become "...and enough extra left over to raise your total to three dollars and fifty cents". The equation used to figure this out is "a-x-b=(a-b)-y" when "x=y". The variable "a" is the starting amount of the magician, "x" is still the amount the magician has which is equal to the amount the participant has, "y", and "b" is the amount of change the magician has extra. Regardless of the numbers chosen to represent the variables in the algebraic equation, the coin trick should be able to fool anyone.

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Materials and Method

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A pencil and several sheets of paper were used to record data as the experiment was being conducted. We all needed access to a computer with an excel program to transfer the data

we collected. Having one large data set was more convenient since it allowed all four researchers to share his or her findings with the team. Each of us needed to have two dollars and eighty-five cents of change (composed of ten quarters, two dimes, two nickels and five pennies) in order to properly conduct the experiment. A table was needed in order for each researcher to display the coins in a manner that would not confuse the participants. The subjects were all students from the University of California in Merced. The experiment was conducted in location with a high concentration of potential participants, such as the university's dorm buildings, dining center, and library. We also used a camera to take a picture of the experiment being performed, but for privacy concerns, no participant was photographed. The research team decided to divide the work and conduct the experiment separately. Each researcher conducted the experiment on twenty-five individuals.

Researcher, Kiana Pourhashemi conducted her part of the experiment throughout the day on residents of Tenaya Hall, since this is where she resides. She conducted the trick according to *Scam School's* instructions (refer to "How the Trick is Performed"). She emphasized that she should not know how much change the participant had in his or her pocket and that the bet could continue even if the person had no change. The majority of her participants actually didn't have any change on them, but they were still in awe at the fact that the three phrases worked. When the participants would follow through with their part of the bet by standing up to leave his or her seat, Pourhashemi would tell them about the experiment and let them keep their seat.

Researcher Mayra Sainz performed the experiment during the afternoon throughout the dorms in Tuolumne Hall and the dining center, since it is nearest to the place she resides. Since she is shy she approached people who she already knew, and asked them if they were willing to make a bet. She would tell each person, "I bet you a dollar that I have the exact amount you

have, plus two quarters and enough extra left over to raise your total to two dollars and thirty-five cents". Sometimes people would say they did have change on them or a dollar to bet on, to which Sainz would say, "it's ok, the trick will still work if you don't have change and you can pay me later". If an individual accepted to be part of the experiment the person would be escorted to the nearest table. Afterward, Sainz would tell the individuals to take out any amount of cents the person had and she would slowly say, "I have the exact amount you have, plus two quarters and enough extra left over to raise your total to two dollars and thirty-five cents". Then she would ask the participant to conceal the amount of change and rattle it in his or her palm. Sainz would tell the subject that the magic trick was possible because of supersonic hearing. The subject was then instructed to place the change on the table, and researcher, Sainz, would show them that she has the exact amount of change as the individual does, plus two extra quarters. Researcher Sainz would then make the individual's total amount equal two dollars and thirty-five cents and record how much change the individual had to start with. Sometimes individuals would have a puzzled look on their faces; therefore, Sainz had to repeat the phrase several times to make the person understand. Every individual who the experiment was tested on was shocked by the results and wanted to learn how to perform the trick. Researcher Sainz would tell them that a magician never reveals her secrets and she would collect her winnings. At first researcher Sainz was going to donate the twenty-five dollars to charity, but then she got a ticket from the university's CAT COPS for a parking violation, therefore she used that money to pay for it.

Researcher Roberto Nava conducted his experiment using the same methods as his team mates except his subjects were told, "I bet you that if I have the exact amount you have, plus two quarters and enough extra left over to raise your total to two dollars and thirty-five cents you have to buy me a drink from the university's Lantern Cafe". He asked members from the Energy

Service Corps Club to take part in the experiment before club meetings and special club events.

Although all the club members were willing to make the bet, researcher Nava did not limit

himself to them, he also asked people in the library. Once in the library he asked several

individuals but only three accepted his bet because the majority of the people were busy, so they

turned him down. After winning the bet researcher Nava didn't want to annoy his peers;

therefore, he only accepted drinks from his friends.

Researcher Ramiro Uribe performed his experiment on classmates in the library's third

floor. He used the same method as his fellow researchers, by saying "I bet you a meal from the

university's dining center that I have the exact amount you have, plus two quarters and enough

extra left over to raise your total to two dollars and thirty-five cents". Like his teammates he was

successful each time, but he only allowed one person to actually buy him a meal. All the

participants were friendly and cooperative, except one. A certain individual, who will remain

anonymous, was confused and angry he had lost the bet. The subject said, "how in the world did

you get more coins...did you cheat?" to which researcher Uribe replied, "it's a simple trick, and

no I did not cheat." The individual wanted researcher Uribe to repeat the trick, but this time the

individual changed the amount of coins he had. Researcher Uribe was more amused than

annoyed with the subject, so he complied and was able to win the bet once more. Since the

individual was a sore loser, it made winning a free meal from that person even better.

Results

The experiment proved that "The Magic Trick That Fooled Einstein" is an effective

illusion because all four researchers were able to gain something by fooling other individuals.

Researcher Kiana Pourhashemi wanted a seat in Tenaya Hall's Lounge, researcher Mayra Sainz

wanted a dollar, researcher Roberto Nava wanted a drink and researcher Ramiro Uribe wanted

food. Therefore, we were all able to get what we wanted from 25 individuals by telling the

participant "I have the exact amount you have, plus two quarters and enough extra left over to

raise your total to two dollars and thirty-five cents".

Discussion

Our research had some limitations; for example, the person conducting the coin trick

could have incorrectly performed the trick, which might have affected the end results. Although

having one hundred participants is a suitable number for the purpose of this experiment,

increasing the number of individuals would have been beneficial because the amount of loose

change a person possessed would have largely varied. The location of the experiment was

significant because if the experiment was conducted at a person's home or a laundromat, the

chances of a person having more than two dollars and eighty-five cents is higher and could lead

to the trick failing. In the future, scientists' can continue this research by changing the type of bet

made and with whom the bet is made with. Perhaps, adults will be more willing to make bets

compared to college students because adults tend to be more financially stable.

Conclusion

Scam School hypothesized that the coin trick will work each time as long as the

performer followed a specific set of instructions, and our research proved *Scam School* is correct

(Discovery Communications, 2009). *Scam School* attributed the trick's success to the algebraic

equation "2.85-x-.50=2.35-x", but in reality this is not the only factor that caused the trick to be

successful (Revision3, 2013). We were able to conclude that in public most people carry less

than two dollars in change, not a single person in our experiment had more than two dollars and

eighty-five worth of change. Another factor that contributed to the experiment's success was the

type of bet we made, we knew we had to be reasonable because people gamble based on their

chances of winning (Slovic, 2012). Our team did not test if making a high stakes bet would

change the experiment's outcome since none of us wanted to risk losing something valuable. In

order to properly manipulate people we decide to bet something of less value, such as a dollar

bill.

Appendix A

Performing the Coin Trick

Figure 1

This image shows researcher Sainz's closed fist which contains ten quarters, two dime, and five pennies. The penny and the dime belong to an individual.

Figure 2

This image shows the individuals' original amount of coins and the researcher proving she has the equal amount of change as the individual.

Figure 3

This image shows the individuals' original amount of coins and an equal amount of change as the individual. The researcher proves she has two extra quarters.

Figure 4

This image shows the individuals' original amount of coins, an equal amount of change as the individual, plus two extra quarters. The researcher has enough coins left over to equal two dollars and thirty-five cents

Appendix B

Data Set

Subject's Name	Subject's Total Amount of Change	Location	Successful or Failure
Nancy	0.15	Tuolumne Hall	Success
Christi	0.3	Tuolumne Hall	Success
Annie	0.22	Tuolumne Hall	Success
Camille	0.06	Tuolumne Hall	Success
Viviana	1	Tuolumne Hall	Success
Shanika	0.54	Tuolumne Hall	Success
Emerald	0.85	Tuolumne Hall	Success
Mika	0.25	Tuolumne Hall	Success
Mayra	0.12	Tuolumne Hall	Success
Aryam	1	In-n-Out Restaurant	Success
Oscar	0.61	In-n-Out Restaurant	Success
Laura	0.32	In-n-Out Restaurant	Success
Alonzo	0.05	In-n-Out Restaurant	Success
Paty	0.01	In-n-Out Restaurant	Success
Empris	0.33	In-n-Out Restaurant	Success
Vincent	0.75	Tuolumne Hall	Success
Anthony	0.16	Tuolumne Hall	Success
Troy	0.04	Tuolumne Hall	Success
Nancy	0.07	Tuolumne Hall	Success
Erica	0.65	UC Merced's Dining Center	Success
Jack	0.1	UC Merced's Dining Center	Success
Lenny	1.25	UC Merced's Dining Center	Success
Jasmine	0.71	UC Merced's Dining Center	Success
Jazmin	1.1	UC Merced's Dining Center	Success
Courtney	0.16	Mariposa Hall's study lounge	Success
Sam O.	2.05	Tenaya Lounge	Success
Jemi	2	Tenaya Lounge	Success
Karen	0	Dorms	Success
Mary	0.15	Tenaya Lounge	Success
Candace	0	Tenaya Lounge	Success
Patrick	2	Tenaya Lounge	Success
Kristen	2	Tenaya Lounge	Success
Anthony	1	Tenaya Lounge	Success
Adam	0.5	Tenaya Lounge	Success
Josh	.26	Tenaya Lounge	Success

Xavier	1.05	Tenaya Lounge	Success
David	2	Tenaya Lounge	Success
Vicky	0.05	Tenaya Lounge	Success
Vi	0	Tenaya Lounge	Success
Anne	0	Tenaya Lounge	Success
Sonia	0	Tenaya Lounge	Success
Shelby	0	Tenaya Lounge	Success
Brittany	1.22	Tenaya Lounge	Success
Judy	0.25	Tenaya Lounge	Success
Yasmin	0	Tenaya Lounge	Success
Tamana	0	Tenaya Lounge	Success
Tiana	0	Tenaya Lounge	Success
Briana	0	Tenaya Lounge	Success
Samantha	0	CatQuad	Success
Sologne	0.25	Tenaya Lounge	Success
Jessie	0	Library 2floor	Success
Mai	0.29	COB 3 floor	Success
Kim	0.1	COB 3 floor	Success
Suzan	0	COB 3 floor	Success
Nickel	0.36	Out library	Success
Nickhom	0.25	COB 3 floor	Success
Carlos	0.23	New gym	Success
Juan	0	New gym	Success
Kevin	0.4	New gym	Success
Nrom	0.76	lantern	Success
Mayra	1.03	lantern	Success
Keith	2.01	lantern	Success
Corie	0.38	lantern	Success
Natalia	0.68	lantern	Success
Samuel	0.82	lantern	Success
Shereef	1.8	lantern	Success
Vara	0.1	DC	Success
Willim	0	DC	Success
David	0.08	DC	Success
Rachel	0.06	lantern	Success
Yasmin	0.73	Library 2floor	Success
Marcelo	0	outside	Success
Serena	0	outside	Success
Mai	0.69	Library 2floor	Success
Gerardo	0	Library	Success
Edwin	0.25	Library 2floor	Success

Donald	0.85	Library 3floor	Success
Shelah	0.6	Library 3floor	Success
Reyna	0.3	Library 3floor	Success
David	0.2	Library 3floor	Success
Jose	0.15	Library 3floor	Success
Viviana	0.25	Library 3floor	Success
Addison	0.73	Library 3floor	Success
Andres	0.54	Library 3floor	Success
Ivan	0.05	Library 3floor	Success
Roberto	0.5	Library 3floor	Success
Carlos	0.42	Library 3floor	Success
Justin	0.11	Library 3floor	Success
Ramon	0.17	Library 3floor	Success
Kaeli	0.25	Library 3floor	Success
Erik	0.53	Library 3floor	Success
Maria	2	Library 3floor	Success
Carmen	0.35	Library 3floor	Success
Karen C.	0	Library 3floor	Success
Susana	0.1	Library 3floor	Success
Pedro	0.21	Library 3floor	Success
John	1	Library 3floor	Success
Anthony	0.41	Library 3floor	Success
Jacob	0.28	Library 3floor	Success
Alejandra	0.55	Library 3floor	Success

**For privacy issues, the participants' last names were not incorporated into our data. The experiment was performed on each individual only once.

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