Micro-expressions and Lying - A Study of the Lying Abilities of People Who Can Naturally

Read Micro-expressions

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[1] This study was conducted in 2017 when the author was a high school student.

Abstract

Whether or not people who are better at reading facial expressions to tell when others are lying are also better at lying themselves was studied. Forty-five students from different grades at a mid-sized secondary school located near Vancouver participated. Each student was asked to take a brief survey asking their name, family state, gender, grade, and class. Each one then wrote down a simple lie or truth they thought of on the back of the survey. Without stating whether each one was a lie or the truth to the rest of the participants each student then read out their lie or truth. Each of the other participants then wrote down the participants name and whether they thought it was the truth or a lie. After the survey was taken and each participant read out their lies/truths the number of times they accurately predicted whether another student was lying or telling the truth was counted and turned into a percent. Then the number of times each other participant predicted incorrectly whether their answer was a lie or the truth was also counted and converted into a percent. It was found that there was no real link between one's ability to tell when others are lying or telling the truth and one's ability to deceive others as even one participant who scored 100% at reading others lies and truths only scored 37% at deceiving the other participants.

Background

Lies are an important part of modern society. According to at least one source, a lie is told in 60% of conversations (Serota, Levine, & Docan-Morgan, 2021), and at least one lie is told every 10 minutes. Lies, although sometimes regrettable if not immoral, are occasionally a necessary part of our social machinery. The purpose of this experiment will be to identify individuals who are skilled in detecting lies, in addition to those who are skilled in lying itself. The focus will be on each individual's ability to read micro expressions. Micro expressions are involuntary expressions made by everyone for up to 500 ms that reveal the raw emotion that person is experiencing at the time. As these expressions are so fleeting, they can be incredibly hard to read even when someone is aware of what they are looking for. Previous studies have shown, however, that about 0.4% of the population is able to read these expressions with an accuracy rate of 90% or higher. These people are known as "wizards" in the world of psychology due to their extraordinary natural abilities. This experiment will test individuals to see if they fall into the 0.4% category of "wizards" and how a person's ability to read microexpressions affects their ability to lie to others or suppress micro expressions. One classic way of doing this - and the one I will employ - is through one on one encounters. In these encounters, one person will tell a lie and a truth, followed by another aiming to determine which statement is the truth and which is the lie.

This experiment will be conducted in a slightly different manner than its predecessors. Several volunteers will be placed in a room. Half of the participants will tell a convincing lie and the other half will state whether they believe each person is telling the truth or is lying. The

information will be collected and it will be decided who is superior at telling a falsehood from the truth as well as who is better at deceiving an audience. Participants will also fill in a sheet stating age, gender, and family state (optionally) so as to discern potential reasons for wizardry concerning microexpressions.

Review of Literature

In 2004, O'Sullivan and Ekman studied the lie detection abilities of 12,000 individuals from a wide variety of ages, genders, and backgrounds. They found that about 29 of these individuals (or 0.4%) scored dramatically higher than the rest of the participants. These individuals scored 90% or higher on a test that statistically should have resulted in constant scores of around 50%. The test comprised several segments designed to test one's ability to tell whether a person is telling the truth or not based on micro expressions. This was done primarily through standardized video footage of different people telling emotionally charged lies or truths that would result in them displaying one of the seven core micro expressions when they repeated it. 12,000 people were then asked to watch the footage and state whether they believed each was the truth or a falsehood. The 29 participants that scored exponentially higher than the others were then categorized as lie detection "Wizards". Although the other test scores should have averaged out to about 50% O'Sullivan and Eckman found that their scores averaged out to about 54%. This discrepancy was unexplained but it is generally considered to have been the result of the variety of settings participants took the test in (these ranged from their own homes to laboratories). O'Sullivan and Eckman had a research model that indicated that out of the 12,000

around 70 should be able to classify as wizards. This model was as follows: 12,000 x P= number of wizards. P was then found to equal .00583 resulting in the 70 wizards projection. The test did find significantly fewer wizards than expected which is still unexplained but is once again commonly put up the the variety of settings the test was taken in. The number P was found to represent was claimed mainly from statistics from coin flipping models and research models. When put into the standard equation this information states that in a standard coin flipping study there should be just under 15 participants classified as "wizards". The research model, on the other hand, yielded vastly different results. This variation between the two studies was to be expected as people tend to react differently to video segments than to the flipping of a coin. In the research model x was found to be 0.0270, y was 0.1701, z was 0.0553, and p was 0.00583. This data meant that in a research study there should be around 70 wizards. As O'Sullivan and Eckman's study only presented 29, a significant and unexpected variation that is still largely unexplained.

In 1969, Ekman and Friesen conducted a study to discover what aspects of body language were more productive in gauging a person's emotions. They gathered 120 short films of interviews with 40 female patients at a mental institution over the course of their hospitalization. The authors had 18 participants view a version of the films that only showed the facial area of the patient while 28 others viewed footage that only showed the neck and below based off the footage each participant was asked to check words from Gough's Adjective Check List of 300 words that they believed were applicable to that person. The truthful answer was then revealed and the percentages of correct answers for each version of the films were recorded. The results found were as follows: Sensitive 83% 36%, Tense 44% 82%, Anxious 89% 100%, Friendly 50%

14%, Excitable 22% 79%, Emotional 89% 82%, Cooperative 50% 14%, High strung 39% 75%, Confused 72% 82%, Self-punishing 50% 2%, Fearful 33% 68%, Defensive 72% 71%, Hurried 0% 61%, Worrying 50% 68%, Changeable 39% 61%, Dissatisfied 56% 57%, Awkward 33% 61%, Despondent 56% 50%, Complaining 11% 54%, Touchy 28% 54%, Affected 33% 54%, Restless 6% 50%, Impulsive 17% 50%, Impatient 0% 50%, Rigid 17% 50% (Note that words from the list that were never chosen by the patient were not included in this data). From this study it can be gathered that, overall, the view of only the body is more successful at gauging emotions overall, but facial expressions tend to predict particular emotions, such as sensitivity, much more accurately.

Pfister, Li, Zhao, and Pietik ̈ainen (2011) worked with a piece of computer software designed to recognize micro expressions at 25 fps frame-rate segment of video. They used SMIC, a program designed to identify micro expressions at high fps, and downsized it and applied it to 25fps footage. SMIC typically functions at around 100 fps this reduced to 25fps by removing every 4th frame. The accuracy rate of SMIC when reading micro expressions increased with the modified footage from 74.3% to 78.9%. This was probably due to a lower number of frames resulting in a smaller net image requirement for the program. The program had fewer frames to work with, and it had to collect fewer frames to diagnose a micro expression. The program's ability to apply the micro expressions to tell if a person was lying or not actually decreased, however, from 71.4% to 64.9%. This variance was largely unexpected based on the first results and is still mostly unexplained, although it could be due to anything from the participants themselves, to the number of participants in the study. Regardless of the issue, this data does show that, while computer software is getting incredibly accurate in the reading of

micro expressions, it is still years away from having any practical application in law enforcement or other fields. It is worth noting that the increased accuracy of the programs ability to read general micro expressions should be more accurate given a higher fps but the lower fps means it is more likely to diagnose a microexpression based off its limited resources. This also means it is quite common for a 100 fps piece of footage to leave the program undecided on a micro expression due to contradictory frames. The actual application of these micro expressions to telling if a person is lying or not could also vary between people meaning that different expressions on different people could mean that they are lying. This makes it difficult to program a computer to detect a lie based on facial expressions when factors such as vocal tones, body language, personality, and circumstances are important pieces of information.

Although none of the above studies closely match mine, they do provide some insight into how effective micro expressions really are in lie detection. They also show, through statistics, how impressive a score in the "wizard" category is. With that information in mind it should be easy in my own study to uncover any participants who do fall into that category. While the first study discusses more on the requirements to be considered a "wizard". The second study gives more information on the accuracy of micro expressions versus body language alone. This information leads me to believe that to maintain focus on facial expressions in my study I must make sure participants cannot see the body of whoever is speaking and tarnish the results. Finally, the last study talks more about how the ability to read micro expressions does not necessarily guarantee accuracy in lie detection. This means that there are other factors at play in cases of "wizardry" such as vocal patterns and body language.

Methods

I conducted my study at a mid-sized secondary school near Vancouver. I visited a class from each grade to procure volunteers. I worked with one class from each grade level so as to gather data from a variety of age groups. In each class about ten or fewer students who were willing to participate were given a piece of paper with the following questions on it. Name (optional), family state (optional), grade, gender, and class. Below these questions were nine spaces in which participants were to state if they felt each of the other nine participants were lying or telling the truth. Each participant then wrote on a piece of paper what they were going to say and whether it was the truth or a lie. Each person then stood in front of the small group where each person could clearly see their face and read out what they had written. Once everyone had spoken they handed in their forms and what their lie/truth had been. Once the data was collected I counted the number of times each person answered correctly or incorrectly using the statement sheets as a key. The numbers were then converted to a percent and the success rate each person had in deceiving the audience was compared to the percentage of times they themselves were correct in telling if the other participants were lying or telling the truth. This information was then used to tell if people who are better at lying are also better at telling if others are lying.

Data

Grade 8 Males:	Grade 8 Females
Reading: 100% Deceiving: 37% (Parents together)	Reading: 87% Deceiving: 25% (Parents together)
Reading: 62% Deceiving: 0% (Parents together)	Reading: 75% Deceiving: 50% (Parents together)
Reading: 75% Deceiving: 75%	Reading: 62% Deceiving: 0% (Parents together)
Reading: 75% Deceiving: 0% (Parents together)	Reading: 75% Deceiving: 50% (Parents together)
	Reading: 50% Deceiving: 0% (Parents separate)

Grade 9 Males	Grade 9 Females
Reading: 44% Deceiving: 11% (Parents together)	Reading: 55% Deceiving: 11% (Parents Separate)

Reading: 66% Deceiving: 66% (Parents together)	Reading: 55% Deceiving: 66% (Parents together)
Reading: 33% Deceiving: 88%	Reading: 66% Deceiving: 66% (Parents together)
Reading: 55% Deceiving: 33% (Parents Separate)	Reading: 33% Deceiving: 22% (Parents together)
Reading: 0% Deceiving: 66% (Parents together)	Reading: 66% Deceiving: 55%

Grade 10 Males	Grade 10 Females
Reading: 66% Deceiving: 55% (Parents separate)	Reading: 66% Deceiving: 55%
Reading: 77% Deceiving: 11% (Parents together)	Reading: 44% Deceiving: 44% (Parents together)
Reading: 55% Deceiving: 33%	Reading: 55% Deceiving: 88%
Reading: 55% Deceiving: 33% (Parents separate)	Reading: 77% Deceiving: 33%
Reading 44% Deceiving: 33%	Reading: 44% Deceiving: 11% (Parents

	together)

Grade 11 Males	Grade 11 Females
Reading: 50% Deceiving: 62%	
Reading: 50% Deceiving: 50% (Parents together)	
Reading: 50% Deceiving: 87% (Parents together)	
Reading: 75% Deceiving: 25% (Parents together)	
Reading: 62% Deceiving: 87% (Parents separate)	
Reading: 37% Deceiving: 37% (Parents together)	
Reading: 37% Deceiving: 0% (Parents separate)	
Reading: 50% Deceiving: 12%	
Reading: 87% Deceiving: 37%	

Grade 12 Males	Grade 12 Females
Reading: 50% Deceiving: 0% (Parents together)	Reading: 83% Deceiving: 0% (Parents together)
Reading: 83% Deceiving: 0% (Parents separate)	Reading: 83% Deceiving: 66% (Parents together)
	Reading: 66% Deceiving: 50% (Parents together)
	Reading: 66% Deceiving: 33% (Parents together)
	Reading: 66% Deceiving: 33% (Parents separate)

Overall Male Averages	Overall Female Averages
Reading: 57.52% Deceiving: 37.52%	Reading: 63.7% Deceiving: 37.9%

Highest Male Score Overall	Highest Female Score overall
Grade 8: Reading: 100% Deceiving: 37%	Grade 8: Reading: 87% Deceiving: 25%

(Parents together)	(Parents together)

Grade 8 Males Average	Grade 8 Female Average
Reading: 78% Deceiving: 55.75%	Reading: 69.8% Deceiving: 25%

Grade 9 Males Average	Grade 9 Females Average
Reading: 39.6 Deceiving: 52.8%	Reading: 55% Deceiving: 44%

Grade 10 Males Average	Grade 10 Females Average
Reading: 59.5% Deceiving: 33%	Reading: 57.2% Deceiving: 46.2%

Grade 11 Males Average	Grade 11 Females Average
Reading: 55.3% Deceiving: 44.1%	

Grade 12 Males Average	Grade 12 Females Average
Reading: 66.5% Deceiving: 0%	Reading: 72.8% Deceiving: 36.4%

Discussion

The most notable result is that a grade eight male scored 100% on the reading portion of the exam. He was the only participant out of 45 who achieved a score that would place him in the category of "wizardry". The next noteworthy result is that the grade eights - both male and female - had significantly better performance than older participants (with the exception of the grade 12 females who scored roughly 3% higher with an average of 72.8%). It is worth noting, however, that the grade 12's tested knew one another much better having spent five years together. The grade 12's tested comprised only seven students, whereas there were nine grade 8s. The grade 8 males also achieved the highest average score in the deception category with a deception rate of 52.8% (about three percent higher than any other group). The highest deception score in the female category went to the grade 10 group with an average deception rate of 46.2%. From these results it is clear that the males in almost all cases are superior at both reading and deceiving. With the notable exceptions of the grade 12 males overall average, the grade 10 males deceiving, and the grade nine males reading, (in each of these cases scores were so low in the male category it resulted in lower reading and deceiving averages overall for males than females). Overall, there is no convincing evidence that people who are better at reading facial expressions are also better at lying. The prime example of this is the grade 8 "wizard" who scored 100% on the reading portion but only 37% on the deception portion. It is also worth noting that whether the participants' parents were together or separated seemed to have almost no impact on the results. There is typically a large success gap between the reading and deceiving,

with both success rates averaging out to about 37% for both males and females. While the

reading averages for males comes to about 57.52% and 63.7% for females.

Conclusion

Overall, the data gathered shows that there seems to be almost no relation between one's

ability to read facial expressions and one's ability to deceive an audience. The test did show that

primarily younger students are superior at both reading facial expressions and lying. It also

showed that, overall females are better at reading facial expressions and deceiving, however

males still had a higher success rate in individual grades.

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