

Influence of Nonverbal Component on Credibility Assessment in High Stakes Situations

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Abstract

Current state of research on facial cues of deception provided unsatisfying generalizations based on the implementation of outdated technical equipment that was used to collect data. With the help of high-speed cameras and knowledge from computer vision field, we have revisited the topic in a series of experiments aimed to determine the role of stress and cognitive load in detecting cues of deceit. By the means of three experimental modules we were able to collect large sample of data that generated results easy to relate to broader sample. Our experimental plan was uniquely constructed in such way, that it allowed high level of immersion and produced results similar in all aspects to real life behavior. Data was then analyzed using qualitative techniques and interesting observations were made. We were able to establish that although, there is no support for claims about global cues of deception present in each liar testimony, there are groups of cues specific for particular persons. This lead us to conclusion about the existence of individual lie patterns.

Keywords: Cues of deception, interpersonal communication, emotion detection, computer vision.

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Brief history of deceit detection research.

Detecting deceit and deception has long history of being center of attention for investigative psychologist. The scope of its usefulness for the practice of police operations is beyond doubt, and it has great backing in research activity undertaken by the police force itself. The ability to tell if a suspect is lying is crucial to the swift resolve of a case, as well as to the amount of resources that have to be dedicated for it to be successful. From pure economic point of view the faster we can tell someone is not honest in his statements, the less it will cost us to mitigate the expenses that he generated for our system, be it private sector firm or government institution¹. In interpersonal relationships we are always and constantly assessing the credibility of our interlocutor due to the simple fact that acting under false assumptions wastes our resources and makes us unhappy. While doing this, people use various techniques for succeeding, some of them are conscious choices and stem from knowledge or beliefs, some are working automatically and are tied to our cognitive heuristics².

The importance of lie detection was first acknowledged long ago and multitude of research was carried out on the subject in different places and different cultures³. Meta-analysis shows that very few of the actual research outcomes seem to form coherent picture of what exactly is needed to build educated guess about the credibility of someone's statement⁴. In recent years, the topic lost much of its impact due to some problems with study design philosophy. Experiments – as they are the only possible form of accurately measuring the problem, have suffered from too little innovation and too much replication. A general consensus was reached, that it is very hard – or maybe even impossible to rule some part of persons declaration as truthful based solely on nonverbal cues. However, the sheer amount of pressure from institutions that need credibility assessment – such as banks and other commercial services providers, proved to be enough to keep the work going and scientist involved.

Another trend responsible for this state was the rising in willingness to cooperate showed by the police force. Therefore, we undertook our research endeavor in state in which few proven facts exist and there is more to be learned than there is known for certain. We knew that with our resources we could contribute to the field and make impact with well designed research study.

Research study design

In our research endeavor we used technical equipment of highest standards and interdisciplinary team of experts to resolve questions tied to one aspect of assessing credibility of someone statements. We focused on nonverbal cues tied with facial activity that is one of the most commonly referred to group of predictors. This is not new field of study, as much work was done by visionary scientists from different countries.

¹ Gneezy, U. (2005). Deception: the role of consequences. *American Economic Review* 95, s:384–394

² C. M. Hurley, D. J. Griffin, M. A. Stefanone, (2014). Who Told You That? Uncovering the Source of Believed Cues to Deception. *International Journal of Psychological Studies*, 6, 1

³ Bond, C. F., Omar, A., Mahmoud, A., Bonser, R. N. (1990). Lie detection across cultures. *Journal of Nonverbal Behavior*, 14, s:189-204.

⁴ Vrij, A. (2008). *Detecting lies and deceit*. Chichester: John Wiley & Sons Ltd.

However, we had strong impression that a lot of scientific experiments carried out in this field, are not immersive enough to procure the level of stress and cognitive load that is experienced by people in natural conditions. The procedures were simple and elegant but lacked real life feel needed, in our opinion, to produce close to life behavior of tested subjects. With lie detection – as lie is so automatic and natural to all people - the procedure of the experiment is crucial in providing results that can be generalized beyond the laboratory conditions. Also for us the most important part was the ability to scale the level of cognitive overload and stress in different experimental modules.

We felt that previously mentioned paradigm shift signaled by Vrij, Granhag and Porter⁵ is in fact viable research direction that needs to be incorporated in every experimental plan built in this problem horizon. We also determined that we need to make our study modular in order to rise it cross cultural value – some modules are harder to replicate, but the first one can be carried out without any problem in almost any academic environment.

The first two experimental modules were designed as a coherent wholeness. The legend we created was about an alleged person with telepathic skills, that has agreed to be tested in proper scientific laboratory setting. The participants were deceived about their role in the process. They were told, that they will be researchers helpers in first ever attempt to establish the viability of someone's mind reading ability claims. This legend has a few fundamental strengths, worth mentioning at this stage. The first and most important one is the high immersion factor. The new paradigm that we try to promote in our research is based on the assumption that if we want the results to mirror the real behavior of a person, we must create experiments that enforce real life behavior. Although we acknowledge that some students could think that this is some kind of a ruse and the telepath is a fraud, they have concentrated on this so much that true nature of deception remained unknown to them for the whole 2 modules. They were very interested and curious about the whole situation and this genuine attitude contributed to the realistic behavior during experiments.

It needs to be stressed that students taking part in first two modules were from technological fields of study. This gave us skeptics that wanted to see the telepath fail and proves their perspective of what is possible and what isn't. The information they were given was that in order to check the viability of the telepath claims a test from the field of parapsychology needs to be undertaken. The classic measure of telepathic abilities is called Zener Card Test. It is administrated by usage of five different cards. The symbol on the cards show figures: circle, cross, square, star and waves. To check the telepathy, one person looks at the top card and the telepath tries to connect to his mind and perceive the shape. We informed the participants – that they will be researchers helpers, and that the telepath needs a confirmation that a person is thinking about the card that he or she sees, he will ask question about it. To rule out the possibility of telepath attunement to persons reaction, we also told them that based on the instructions only, they will see besides the shown Zener card they will have to tell the truth about telepath choice or they will have to lie to him.

⁵ Vrij, A., Granhag, P.A., Porter, S. (2010). Pitfalls and Opportunities in Nonverbal and Verbal Lie Detection. *Psychological Science in the Public Interest*. 11,3 s:89–121

We modified the original procedure and used the computerized version of the test with this key addition, that was needed for our research goal to be achieved. In this module we also stated that cameras are needed to document the whole thing and to make it clear for the persons that will be reviewing it, that the telepath didn't receive any "help" from researchers or the persons that were helping us. So we used 2 cameras – one pointed at the telepath and one at the student that was being examined. The whole experiment was designed to carry minimal level of stress and cognitive load. The research helper angle provided reduced stress generation as students didn't feel like they were the center of attention and cognitive load was present only during certain type of questions.

There were four general types of possible scenarios for a student to answer to: the first one occurred when telepath has guessed the figure shown on screen visible on to the student on the computer monitor and there was word "truth" beside the figure. Then the student was instructed to truthfully confirm the telepath guess telling him that the figure on the screen is indeed what he guessed. This carried no stress and no cognitive overload whatsoever. In the opposite scenario – when the telepath made a mistake in guessing the figure but the word beside it was still "truth", the participant was instructed to tell the telepath about his mistake and provide him with the right answer. Once again this carried no cognitive overload or stress. The 2 other alternatives scaled those two factors.

If telepath made a mistake but the word beside the figure was "false" the student was instructed to lie by confirming the telepath mistake. In this version some amount of stress could be present as he was in fact lying about a thing he sees before his very eyes. The important thing was that there was no cognitive overload in this example also. The most interesting version of the experimental question was the one when telepath was right but the word beside the figure was "false". Then the participant was instructed not only to lie and tell the telepath was wrong but also to say what figure is on the screen at the moment. Obviously he was supposed to choose quickly one of the Zener cards and say its name but this was designed so it provides only the smallest amount of cognitive overload. Interesting fact is, that although the telepath always used the same sequence of cards during the 10 trials, in the whole group of 111 students no one noticed this and also although the telepath was right always the same amount of times students counted this wrong and didn't notice that for the whole duration of experimental procedure.

The follow up experiment was organized in the second experimental module. We informed our participants that the telepath showed remarkable results of over 75 percent right answers, and that we want to test if he only can guess figures right or does his skills allow him for deeper, more complicated things to be read from subjects mind. In order to check this, we designed a series of questions for each participants and provided them with option of continuing the experiment. If they did, they had a chance to win prizes based on the level of their ability to deceive the telepath. We told them that if they can achieve good results in lying to the telepath, they will be rewarded with electronic prizes. The participation was voluntary, and as we expected when the experiment was formed so the deeper contextual knowledge about the person would put some people off participation. Overall test group was reduced to 63 observations.

The information that participants were supposed to hide from the telepath were general parameters, such as birthplace or mother's name, and more elaborate ones like views about certain moral subjects like capital punishment. Telepath was given a choice of 3 possible choices on each question and had to make an educated guess based on conversation with the participant.

We used the reasoning that the telepath needs the conversation part to invoke the images and thoughts into the subject's mind. This design provided us with few useful states. The main reason behind such construction of this experimental module was the higher immersion than the first one – as we were asking about personal details, albeit non-sensitive but still connected to the self, and thus more involving. Participants had to lie efficiently in order to acquire a high score. This module was harder and involved a lot more of commitment from the research team as all dialogues had to be transcribed and categorized into truth and lies sections. The one thing that we got from this instantly, was the suggestion that there can be something interesting in a way an individual lies. Up to this time part of other researchers' scientific efforts concentrated on finding the common denominator between all lies – our research with two times subjecting the same participants to testing in different modules, shows that an interesting approach would be to look for an individual lie pattern. Something characteristic for a person – almost like a fingerprint, that if recognized and learned could help to determine if he lies or not in a specific situation. We will elaborate more on this subject in the conclusion to this article.

The third experimental module was the toughest one to prepare and carry out. We were able to secure cooperation with the Silesian Police Academy in Katowice to make use of the simulation system implemented in basic training. Each future police officer undergoes rigorous training involving both study of knowledge and physical activity exercises. One of the training forms is a combination of mental and physical exercise called simulation. It can be carried out at any time without any notice from the school staff to provide an element of surprise and raise the level of stress involved in overcoming the task. Strong accent is put on high realism in such simulations as they are the best way to prepare officers for real-life situations that successful and quick solving will be their job in years to come. A plan has taken shape for showing police cadets how it feels to be interrogated. Police School staff were convinced that if they will be in such a situation themselves they will be better at interrogating suspects in the future. The experiment took place during such a simulation. Cadets have been put in a situation where during an important knowledge test one of the faculty members that have been administering the test had to go out for a moment and one that remained started to give the answers to test questions.

Cadets are taught that if something like this occurs – an blunt and obvious breach of police ethics, they are responsible for reporting it to the higher rank officers and overseers. The failure in doing so could result in the most serious of disciplinary action up to removal from the Police Academy altogether. As it can be understood the level of stress in this measurement was very high - although it needs to be said here that police cadets are selected with stress tolerance in mind so this could be the study limiting factor. The research crew was disguised under the pretence of an internal affairs unit delegated to help with solving the case of a better than average test result and possible misconduct related to it. Cadets were interrogated by seasoned police veterans with FBI course experience and many years of fieldwork.

This gave us unique opportunity to register material that is as close to real life situation as possible in controlled conditions. Without a doubt this module was the most empirical generative of all 3 and some crucial observations were undertaken during analysis of this material.

Research material analysis

All the collected data was first looked through in search of some technical flaws and then interoperated in qualitative way by psychologist. The one interesting fact is that even though recordings from module one that had no stress factor and little to non cognitive load, they have proven to contain some obvious examples of cues of cognitive load related to the task of transforming one figure into another in a process of giving the telepath his feedback. This may show that cognitive load has in fact more potential in lie detection than we assumed before. Also it provides support for recent shift in the priorities⁶ during experiments with cues of deception. Second module using same participants, showed some interesting support to the thesis about individual lie pattern.

Although if thinking rational about it, it's not a big surprise. If we assume that people talk differently, have particular preferences in characteristics like poise, walk and even preferred sitting positions, it's hard to understand lack of earlier research about individual lie patterns. Going further into this matter we could hypothesize about some link to such characteristics as temperament or other biological factors. Nevertheless police has received this information with great enthusiasm, as much of the real life usage of nonverbal cues of deception takes part during interrogations of certain people in certain situation about some certain fact. Police doesn't need to have power of universal cues that distinguish all liars from all truthful interrogated people – what they need is to have means of supporting them in answer about the possibility of this particular person is lying or not. The most informative module that gave multitude of leads for further research in this matter was module 3. We were able to establish categories of cues that are different in terms of dynamic, region of origin and easiness of observation.

Popular cue of deception – blinking turned out to have some interesting subtypes, such as reverse blinking – a cue that consist of winding the eye without closing it, we also found a lot of asymmetry examples not only in blinks themselves but changes in eye region. Some of them consist of specific movements of eyebrows – some of which are not possible to carry out voluntarily, some are very fast and short, and some are so small in the movement itself that without the help of high speed cameras they would not be possible to spot at all. The eye region provided us with all that we could hope for in terms of general number of cues as it is often the center of attention of other researchers experiments.

But the real surprise came from the nose and later mouth region. Nose region showed potential for recognizing signs of aggression and irritation. We have few very vivid expressions captured that involve muscles around the nose and cheeks that definitely correlate with periods of stress that could generate anger from the participants.

⁶ Vrij, A. Granhag, P.A. Mann, S. Leal, S. (2011). Outsmarting the Liars: Toward a Cognitive Lie Detection Approach. *Current Directions in Psychological Science*. 20,1, s:28-32

Anger was mostly directed inward or was the reaction to the situation itself and was by no means a form of communication pointed towards interrogator. This is consistent with even the oldest studies on the subject⁷. The last piece of useful observation was the role of mouth region. There were changes to mimic expressions in form of asymmetries, high speed movement of lips and even such bizarre details as lip corner involuntary movements. The mouth region was traditionally considered as being under control of pyramidal system, so it was less interesting to the researchers – our study shows that it cannot be ruled out when experiment is carried out with individual lie patterns in mind.

Conclusion

Although this study is not complete in presentation without the advanced algorithms that give quantitative data a meaningful representations, there are some broad conclusions that can be drawn based only on mentioned before qualitative analysis. First and foremost, comes the assertions that there is a need for more immersive experiments in the field of lie detection. Current endeavors concentrate on huge samples trading quality for quantity. Lie is such intimate activity that without at least basic level of involvement it is very hard to expect experiments to produce valuable data. In many different research areas laboratory experiments are the best way of gathering relevant material, but we think that in lie detection researchers must balance the quantity of the sample with quality of the experimental plan. When designing experiments in this problem horizon, we should always ask ourselves how broad our conclusions will be.

If we really want to ponder about cues of deception in real life interpersonal contact, we need to refrain from experiments that lack such interactions. The second obvious conclusion is the need for proper technical delivery of the research, psychologists alone are lacking in level of expertise involved in proper capturing and analyzing images, variables such as light, static distortions, resolution and other typical challenges can easily be overcome in cooperation with experts from the field of computer vision. At the very end we must name the one big discovery that stems from this study and would not be possible if before mentioned conclusions were not present in our study. Future research should concentrate not only on quantity of the changes – such as blink rate or lip pressure rate, but also on the dynamics of mentioned changes – the speed of a blink – its dynamic profile is what should interest us.

Before our study this was never taken under account as without computer science experts it is not possible to carry out such complicated task as psychologist alone, but the result that you get using such approach by all means justify time and effort needed to build such interdisciplinary team of experts. In the future we will try to concentrate on cognitive load as the main factor in procuring interrogation techniques that help to elicit more facial and behavioral detection cues.

⁷ Ekman, P. (1992). Telling lies. New York: Norton

Such reasoning is in line with current trends in this field of study⁸, and police practitioners find it very interesting and innovative. This creates opportunity for future mutually beneficial projects that enhance public safety and at the same time gives better understanding of basic human skills. It could be argued that in today's world with such great focus on trust in business and role of social capital the reasons and methods that people use people to deceive one another are crucial for all spheres of human functioning beginning with primary education and ending in macroeconomics, healthcare, public safety and general welfare. We hope there our study is a step in right direction on long road to understanding lie as a psychological phenomenon.

⁸ Vrij, A. Granhag, P.A. Mann, S. Leal, S. (2011). Outsmarting the Liars: Toward a Cognitive Lie Detection Approach. *Current Directions in Psychological Science*. 20,1, s:28-32

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