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Attempts at Detecting Deception Through Evaluation of Non-verbal Symptoms

Since the earliest times, humans have undertaken attempts at finding an efficient method that would allow them to detect deception. The earliest attempts at detecting lies can be found in the works of Hippocrates and Avicenna, and in the descriptions of mediaeval ordeals (Bardach 1964:335). In ancient times, attempts were made to detect deception both by testing a single selected symptom (for example Avicenna described how he used the pulse to discover whether the person was lying or telling the truth), while other methods were based on the analysis of the entire behaviour of the person whose truthfulness was examined.

Following the instructions of the ancient Hindu Vedas, if you observe the behaviour of the subject during an interview, you can discover whether he is telling the truth or lying (Widacki 1981:14–15).

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Beginning with the 19th century, psychology has attempted at a description and scientific explanation of these observations and practical experience, while criminal investigation has tried to use it for its purposes. For example, the Polish manual of forensic technique and tactics from between the two world wars instructs that observation of the facial expressions of the subject during a search should help to discover the hiding place of the objects wanted (Chodkiewicz 1931:196–197).

Nineteenth-century psychology attempted to find the direct symptoms of deception (Munsterberg 1908). An attempt to find unique symptoms of the lie at the level of psychophysiology proved impossible. It was only much later research, conducted at the level of neurophysiology, that kindled hope for the opportunity to identify a lie as such (see below).

Early 20th-century studies focused on examining the physiological correlates of emotions accompanying deception, whose discovery entailed consequences for the deceiver.

Starting with the assumption that emotions encompass the entire organism, it could theoretically be assumed that observation of any section of the organism could allow its discovery. Yet, for practical reasons, the focus was on those physiological correlates of emotions that are easiest to detect and record. This entailed the construction of special equipment allowing the detection and recording of such physiological correlates of emotions (Trovillo 1939: 848–852).

Especially the following physiological correlates of emotions proved relatively easy to detect and record:

- changes in the work of the respiratory system
- changes in the work of the blood circulation system
- changes in the volume of the body organs
- changes in body temperature, changes in skin resistance to electric current (galvanic skin response)

and since the 1930s, also:

- changes in the electrical activity of the brain perceptible in the EEG recording (Widacki 2007: 96).

The research aimed at lie detection and, assuming that the lie has no discrete symptoms, unless its detection involves consequences for the deceiver or does not require an additional intellectual effort, on the psychophysiological level was

based on the examination of the emotions accompanying the fear of detection of the deception. In other words, this research focused on detecting emotion understood as an emotional trace accompanying an attempt at withholding possession of a memory trace of the event. Thus the entire instrumental so-called lie detection technique is based on detecting emotions accompanying withholding of possession of memory traces of the event. The technique of polygraph examination, which is based on developing such a situation through test questions, is based on the fact that the examinee – by denying the fact of having memory traces of the criminal event – develops emotional traces that can be discovered and recorded with the use of a polygraph, a device for recording changes in the course of breathing actions, heart rate, and galvanic skin response, as well as other symptoms.

Parallel to the perfection of the technique of polygraph examinations, research on expressive movements, that is mimic and pantomimic movements, was conducted in psychology. They were examined as an independent phenomenon, and also with the objective of finding in them symptoms of deception or emotions accompanying lying.

The research aimed to discover whether this way allows a definition of not only the strength of emotion but also its tendency (sign) or even its content. Can the emotion of anger be differentiated from the emotion of fear or surprise? One of the first researchers to try to develop a scale for interpreting mimic expression was Robert Sessions Woodworth in the 1950s. He divided emotions into six groups, in which he placed: first, love, joy and delight, in the next two fear and suffering, in the fourth anger and determination, in the fifth, disgust, and in the last, contempt. The division proved useful for research as far as the people examined mistook e.g. the emotions of fear for the neighbouring emotions (anger, surprise) yet never with the emotions that were extreme for the one examined (love, disgust) (Woodworth, Schlosberg 1966: 182–184). Another researcher, Harold H. Schlosberg, believed that Woodworth's six groups could be arranged into a circular plane with two axes inscribed on it. In this case, they were "pleasure – displeasure", and "attention – rejection", with neutrality situated at their intersection. This allowed emotions to be placed on the axes according to their intensity (Woodworth, Schlosberg 1966: 195–197).

Another question whose answer was sought was whether mimic patterns are inborn or acquired. Landis and Fulcher, who researched emotional activity in sighted and blind children, noticed that in the youngest seeing and non-seeing children there was no difference in the expression of emotions, while in older

children the sighted showed progress with age, both in the clarity of their facial expressions and in the number of movements. There were, however, no changes in the blind children (Woodworth, Schlosberg 1966: 200–202). These results were a particular confirmation of the research on maturing. Inborn patterns develop until a certain level and then stop. This study and its similarities to the research on maturing provide arguments supporting the fact that facial expression patterns are inborn.

By the end of the 20th century, research on improving the detection of deception methods with instrumental methods at the psychophysiological level (whose precision and accuracy proved no lesser than in other methods used routinely in criminal investigations) (Widacki, Horvat: 596–600) included attempts to single out specific symptoms of the lie at a neurophysiological level on the grounds of functional examination of the brain, which was allowed by the new technologies of examining functional changes in the brain, and especially by the fMRI (Langleben et al. 2002: 727–732).

Parallel to the above, research on detection of deception based on observation of behavioural changes was conducted.

Research on the behavioural symptoms of insincerity needed first to prove the theses put forth much earlier by Charles Darwin in the book *The Expression of the Emotions in Man and Animals* (1872) about the existence of universal supra-cultural patterns of expression of emotions. Thanks to numerous studies by Paula Ekman on facial expressions, it was successfully corroborated that indeed, besides those determined by culture, there are also universal, supra-cultural patterns of facial expression of emotion, with the supra-cultural patterns being primary (Ekman 1973). In the course of the research, Ekman managed to distinguish approximately 50 types of smile.

Further research on facial electromyography (EMG) proved that it differentiates positive emotions from negative ones well, that is it identifies the tendency (sign) of the emotions. Positive emotions are accompanied by increased tension of the zygomaticus major muscle (the muscle responsible for raising the corners of the mouth), rather than the muscle responsible for frowning the brows (Strelau, Doliński 2010: 670). Negative emotions were accompanied by a reverse pattern. In line with Ekman's studies, only approximately 10% of those examined are capable of intentional lowering of the corners of the mouth in a way that does not involve the chin muscle. On the other hand, when subjected to an appropriate emotion, the same people are capable of

moving the corners of their mouths down without any impediment, with no need to use the chin muscle (Ekman 1997: 84). Another discovery of Ekman's accompanying the research on facial expression was the discovery of micro-expressions. This refers to a very short lasting facial expression (usually difficult to notice) that is characteristic of the experienced emotion. It is the expression actually experienced in an emotional state, and appears on the face without the person experiencing the state being aware of it (Ekman 1997: 85). Expressions of emotions are to a great extent universal for all people, which has been proved in a wide array of studies (including Ekman and Friesen's on expression of emotions by members of the Fore tribe) (Strelau, Doliński 2010: 554). It is otherwise in cases when people intentionally want to show their current emotional state.

Researchers also devoted plenty of attention to observation of the movements of the human body, including so-called **emblematic gestures**. The emblematic gestures are the culturally approved signs which express meanings very precisely. Unlike other signs, they can replace words. Good examples of such gestures are moving the head up and down being a sign of acceptance, a thumb lifted up meaning that "everything is all right", and the middle finger, which means "be off". It is to be remembered that these signs may mean something entirely different in a different cultural realm. A good example here is the moving of the head up and down, which in most countries means acceptance and agreement, yet for example in Bulgaria is an expression of opposition. Another example of cultural collision of meanings in case of emblematic signs can be the sign given by a hitchhiker – an outstretched hand with the thumb pointing up, which in Greece is considered offensive, much like showing the middle finger in Poland (Pease 2001: 11–15). It is estimated that there are currently approximately 60 types of emblematic gestures in use in the US. We should, however, remember that these signs undergo continuous modifications and changes, and that they are as much alive as spoken language, which continuously changes, evolves, and borrows certain phrases from other languages. Besides the emblems, Ekman and Friesen (Ekman, Friesen 1969: 49–98) distinguish **regulators** (e.g. the slight nodding of the head to maintain a conversation), **emblems** (expressions including the raising of the brows to show surprise: the only means of expression quoted here that has supra-cultural dimension), **adaptors** (body manipulations connected to the touching of one's own body, e.g. rubbing the eyes), and **illustrators**, that is illustrative gestures. The last group is worth consideration, as their presence in the expression of the human body is nearly as common as that of the emblems. The task of the illustrators is illustration of the words spoken out,

and emphasising them during the speech. The goal of the illustration is to explain to another human notions that may be difficult to explain in words. It was discovered that people are more likely to illustrate when they lack a word or must explain something complicated, e.g. describe a zigzag or explain to a foreigner how to reach the train station; in such situations, illustrators appear more often. These gestures turn up more intensively in situations where the person is highly involved in sharing information, which means that an increase in illustrations denotes an increase in the emotions in the speaker. Illustrators are a good hint in lie detection. The first case of decreased gesticulation may be the fact of the lack of emotional involvement in what is being said, another may be the fact of lack of interest, or the presence of boredom or sadness. It may also be so that the person simulating excitement forgets about the illustrative gestures accompanying speech or performs them with a delay towards what is being said. Moreover, people gesticulate less when they do not know what to say and consider every word. If the lying person has not fine-tuned their “role play”, they will be cautious in gesticulation, to allow a focus on not letting others pick up on their inaccuracies. If the lie is accompanied by a powerful emotion, e.g. fear, then even a well-prepared liar may find it a problem to express his statements in a manner raising no suspicions. This is caused by the fact that the effort connected with hiding away powerful emotions would disturb their process of formulating their verbal expression (Ekman 1997: 96–100).

Researchers examining the usefulness of observation of behavioural changes in the capacity of the method allowing the evaluation of truthfulness of expression encountered the same problem that a few decades ago was faced by Woodworth: namely, which emotions are basic and which are derivative? The list of the former was defined by Ekman, who counted among them fear, anger, sadness, joy, disgust and surprise (originally, instead of surprise, there was the startle reaction, yet this was changed after research (Ekman, Friesen, Simons 1985: 1416–1426), as the startle reaction was considered a specific affective state).

The list of basic emotions defined by Ekman is practically recognised by other researchers, while it is a subject of controversy which emotions are derivative and what they are like. Progress in this matter was achieved by Kemper, who assumes that derivative emotions are the basic emotions, yet turning up in specific situations. Thus, for example, the sense of guilt is the fear that originates when the subject is in danger of punishment for a behaviour remaining at variance with accepted standards of a given society. Shame, in turn, is anger focused on oneself, pride is the joy that a subject feels having proved valuable in society, etc. (Strelau, Doliński 2010: 558)

Another symptom used to detect lying is observation of eye movement and the so-called pupillary reflex while answering questions. Life experience has proved that eyes allow us to diagnose various emotions. It has been defined that the eye contact maintained by a person who lies is more limited than in persons telling the truth (Leathers 2007: 310). More frequent blinking of the eyes and dilation of pupils is identified as a symptom of lying. Frequent turning of the eyes away from the person with whom the liar speaks is also considered a symptom of a lie (Zukerman, DePaulo, Rosenthal 1981: 3–59). A method of interpreting turning the eyes away from the interlocutor was developed in a book by J.N. Gordon and W.L. Fleish, who believe that it is based on neurological findings. The authors claim that turning the eyes to the left top-hand corner (looking from the listener) by the subject interviewed means fabrication. They explain this by the fact that the left hemisphere of the human brain is responsible for imagination, and hence the eyes are directed that way. Eyes directed also up yet to the right mean that the person is recollecting past events. This is caused by the fact that the right hemisphere is responsible for memory. Turning the eyes left (at the level of the ear) makes the author believe that the speaker is either making up or adding information that they have never heard, yet when they turn their eyes to the right at the same level, it means that they recollect the words which they have heard. This is based on the same rule as the previous description, that is the division of tasks between the hemispheres of the human brain. If a person only looks upward, it is to signify that such a person is already very tired with the interview. This position of the eyes is also called “eyes turned to God”. In such a situation it is assumed that the subject senses the fear and hopelessness of their position. In turn, eyes looking down mean that the person is confused and cannot recall any significant information. Eyes turned down and right signify recollection of highly emotional experiences, while those turned down and left mean that the person is speaking to themselves. The last position of the eyes remaining, i.e. looking straight ahead, takes place when the person focuses to visualise memories (Gordon, Fleisher 2002: 113–117).

Evaluation of the movement of eyeballs as a source of information on lying is very strongly criticised in literature. In their joint work, Aldert Vrij and Shara Lochun (Vrij 2000: 36) noticed that there are no scientific grounds to confirm the efficiency of this technique of lie detection or to describe its scientific grounds. Even despite that, the method is recommended in a variety of expert works. Notice, however, that the entire technique of observing the eyes is based on the practical experience of police and persecution officers, and should not be discarded at the outset, but rather thoroughly researched. The result of such

a study would finally solve the controversy over its usefulness and efficiency in lie detection.

Aldert Vrij (Vrij 2000: 209–215) divides lie detection methods according to the symptoms they are based on, namely: **non-verbal** (stammering, facial expressions of emotions, rigidity, slower pace of speech, frequent pauses while speaking, intrusion of sounds (Leathers 2007: 306–307)), **verbal** (e.g. indirect answers, incredible answers, lack of detail) and **physiological** (including increased blood pressure, quickened pulse).

In practical use today are a number of methods for detecting deception on the grounds of evaluation of verbal and non-verbal criteria. The best known of these include BAI (Behavioural Analysis Interview), based on the evaluation of the way of answering the questions asked (McManus 2008), and CBCA (Criteria Based Content Analysis), based on analysis of the contents of the testimonies by testing the logical structure of the expression, number of details quoted, etc. (Vrij 2000: 112–117). Today the most popular technique for measuring the truth of verbal testimonies is SVA (Statement Validity Assessment) (Vrij 2000: 109–128). Used to evaluate the credibility of children's testimonies, this technique is based on analysis of the content of testimony.

Vrij assessed efficiency of lie detection on the grounds of non-verbal methods. He analysed the results of nearly 40 studies by various authors from 1982–1999 concerning the accuracy of lie detection based on extra-verbal symptoms. Even though higher than their statistical probability as a rule, the accuracy is not relatively high, and varied between the studies from 31% to 64% (Vrij 2000: 94–95); it is beyond doubt lower than that achieved in both experimental and practical polygraph examinations.

Therefore, according to Vrij, the method of assessing deception on the grounds of non-verbal symptoms is certainly not as efficient as some authors, and especially Ekman, believe.

Vrij explains this by the fact that people differ from another in personality type, which may be material in non-verbal expression. This may be the reason why it does not make sense to look for universal behavioural symptoms of the lie, but only for symptoms typical of individual personality types (Vrij 2000: 49).

It must be noted that in polygraph examination, such individual differences in the personality of the subjects are usually insignificant, as no influence of

any type of an undisturbed personality on the reactions to test questions in polygraph examinations has been detected, and even people with behaviour disorders of antisocial types (psychopaths) are well suited for polygraphic examinations (Lykken 1957: 6–10; Raskin, Barland, Podlesny 1978).

It is worth mentioning here that the only researcher to recommend the non-verbal method of lie detection is Ekman, who assures that the efficiency of the method is at the level of 86%, yet if one takes into account the inconclusive results, its efficiency drops down to just 61% (Vrij 2000: 213).

There are interesting studies connected to the use of non-verbal lie indicators. They are the results of Polish studies conducted by Joanna Ulatowska. She tested three groups (students, Polish Internal Security Agency (ABW) officers, and prisoners serving short and long sentences) to discover which of these groups detects lies in the non-verbal method best (Ulatowska 2009: 411–428), observing facial expressions and behaviour. The analysis of the results of the research proved that there are significant statistic differences between the results achieved by students and criminals sentenced for the first time – both those who lied: $t(41) = 2.35$; $p < 0.005$, and those who did not: $t(56) = 4.11$; $p < 0.001$. Moreover, the differences between the results achieved by criminals convicted for the first time evaluated as non-lying and the lying repeated offenders proved significant: $t(56) = -2.9$; $p < 0.005$, as did those between the non-lying prisoners sentenced for the first time and the non-lying repeated offenders: $t(59) = 2.7$; $p < 0.05$.

The result of the study proved that prisoners serving short sentences were best at lie detection, and students did worse. The author believes that the reason for the above is most probably the environment in which the given group functions, being to a great extent decisive for the skill. Thus, the prisoners who found themselves in prison for the first time must be more vigilant to lies, as deception in their milieu may result in severe consequences. Ulatowska's studies prove that it is possible to learn certain non-verbal symptoms of the lie even subconsciously.

The ABW officers came second, detecting the lie better than the students, yet worse than prisoners sentenced for the first time. This proves that officers in special services are not sufficiently well prepared to recognise emotions on the grounds of observing non-verbal symptoms. This belief is also corroborated by the fact that the latest publication on recognising deception on the grounds of non-verbal expressions presented in an expert magazine, published by the

Internal Security Agency, is limited to elementary information only, makes no reference to any research or own experience, and is based on just three American works, none of them recent, translated into Polish (Galak 2009: 100–104). Yet also older research by foreign authors (Kohnken 1986: 1–17) proves that police officers detect lies on the grounds of behavioural symptoms at a level not higher than statistical probability.

It seems that it would be appropriate to test whether there are indeed specific non-verbal symptoms of emotions typical of individual personality types. Encouraging in this matter are the results of research obtained by Exline, Thibaut, Hickey, and Gumbert in 1970 showing that people with high results on the Mach scale maintain eye contact longer than those who scored low on the Mach scale. On the other hand, the studies by Knapp, Hart, and Denis of 1974 and by O’Hair, Cody, and McLaughlin of 1981 did not prove behavioural differences between people who achieved high and low scores on the Mach scale (Vrij 2000: 49).

Lie detection based on the evaluation of behavioural (non-verbal) symptoms could be successfully used in a number of situations, if the method could be improved.

First: in investigations, as an independent method that could be applied in situations when the polygraph cannot be used (as is the case with BAI, CBCA, and SVA). It would have no direct significance as evidence, but would facilitate the interrogation by focusing on the weak points in the statements of the subject.

Another application for the method is its auxiliary use in polygraph examination, where some authors consider the evaluation of the behaviour of the subject as an auxiliary premise for diagnosis (Widacki 1982: 81–82). The importance of those additional premises has been considered from the earliest use of polygraph examinations (Reid, Arther 1953; Horvath 1975: 210), when it was believed to be of fairly large importance.

With the improvements in the technique of polygraph examinations, and especially since numerical methods were introduced into general use in the evaluation of polygrams, the evaluation of the behaviour of the subject has lost some of its significance, turning into just an auxiliary, secondary premise for diagnosing (Widacki 1982: 81; *Standard...* 2007: 74).

It will be possible to use efficiently behavioural methods for detecting deception – once a diagnostic value higher than current has successfully been achieved – e.g. in job interviews, and in assessment of partner credibility in business and political negotiations.

The results of the research conducted so far are encouraging, yet still far from the expectations. We may consider that a study in the diagnostic value of individual (verbal and non-verbal) symptoms mentioned above in various groups, divided according to the criterion of personality traits, would be material. What seems especially interesting is the examining of potential behavioural differences in symptoms of lying in extroverts and introverts, and also in emotionally stable and unstable (neurotics). The hypothesis that such differences may exist seems justified from the point of view of theory.

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