The Impact of Individual Personality Traits on Ability to Recognize Hidden Information

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Abstract—**The article introduces the results of a study exploring the connection of individual characteristics with the ability to recognize hidden information. The study involves 80 psychology students. The subjects of the experiment tried to separate the lies from the truth in specially recorded videos imitating recruitment interviews. The results show that subjects who successfully recognize falsehood, compared to others, demonstrate a low level of neuroticism (F equals 5.488, p is less than 0.05) and high level of intrapersonal emotional quotient (F equals 3.581, p is less than 0.05). The data obtained suggest that the ability to recognize hidden information is associated with a low level of anxiety and high level of self-awareness.**

Keywords—hidden information; individual differences; EQ structure; anxiety level; neuroticism; self-awareness

I. Introduction

Scientific studies aimed at recognition of hidden information have a short but quite rich history. These researches originate from hardware methods or instrumental lie detection. Cesare Lambroso was the first to express the idea of identifying lies according to physiological parameters in the beginning of the 1890s [1].

Developers of instrumental lie detection methods investigated body reactions and physiological systems react to the phenomenon of lies. Studies have been conducted included such methods as EEG, observation of pupil dilation, voice analysis.

A number of modern lie detection researches included thermography analysis of the subjects who spoke the truth or lies. The average accuracy of lie detection using a thermal camera is 70%, but can vary from 70% to 90% depending on lies experimental scenario [2].

Temperature increase in the nose area is connected with more intense sympathetic activation, which is associated with fear, stress, lies, or guilt [3]. The researchers demonstrated that the tip of the nose may be the most appropriate area of study while using this method. If further studies using thermography will state a fact of stable thermal physiological response in the nasal area, this reaction, as the authors write, can be called "the Pinocchio Nose" [4].

Recently, there were conducted a large number of studies using special software. Particularly, CERT system on spontaneous facial activity achieves an accuracy of almost 80% [5]. The system called CASE II can processes 247 microexpressions and achieved a performance of 63.41% in video recordings analysis. [6].

There are a number of studies evaluating lies by voice using the following devices: psychological stress evaluator (PSE), "voice analyzer" Mark 2, psychological stress analyzer (PSA). Recently, Nemesysco company introduced a new solution — Layered Voice Analysis (LVA) software, evaluating voice according to the following characteristics: energy, passion, excitement, anxiety, stress, mental effort, uncertainty and concentration.

II. Problem Statement

Despite the impressive results, the main problem of lie detection on the basis of instrumental methods, is that specialized equipment is needed to detect hidden information, and the cost of such equipment is quite high. As a result, the research area identifying behavioral signals characterizing deception is being actively developed now.

In the early 1970s, Paul Ekman laid the foundation for research focused on the correlation between hidden information and nonverbal behavior. In his writings, he studied the various determinants of nonverbal behavior in recognizing hidden information. He identified and analyzed the main areas enabling us to recognize a lie: facial expression, speech, gestures, and physiological reactions [7].

The literature describes a wide variety of verbal signals, such as talking time and the frequency of oscillations in the narration, or non-verbal, such as the frequency of averting the eyes and blinking. D.M. Egorov in his theoretical analysis identified three main aspects determining the accuracy of deception recognition: characteristics of the conditions and situations in which the recognition process is carried out; the peculiarities of a person's real behavior when he speaks the truth and when he lies; selective activity of denouncer [8].

Due to the direct connection between affective processes in the brain and the complex of facial muscles, a face has long been considered a rich source of valuable information in determining the true emotional state. As P. Ekman researches demonstrate, the accuracy of trained observers' recognition of fear, aversion or sadness is 76%, and when subjects evaluate the audiovisual canal, the accuracy increases to 86.5% [9]. However, for untrained subjects, the average accuracy of lie recognition is 54%, only slightly above the probability level [10]. Women spend more time observing and interpreting non-verbal signals than men and use more signals in the process of recognizing false information [11].

III. RESEARCH QUESTIONS

Paul Ekman believes that in natural environment and without special training, people mostly don't recognize deception well, but there are several categories of people who can achieve 80-90% accuracy in tool-free lie detection [12]. In this regard, the question arises — whether the ability to recognize a lie is correlated with some individual characteristics helping a person to learn this ability more quickly and efficiently.

It is possible that individual differences may facilitate or aggravate observers' ability to differentiate true and false emotional stories, since the speaker's emotions may be perceived by the observer and influence trustworthiness judgment. For example, when evaluating false and fabricated rape transcripts, subjects' openness to experience and neuroticism were positively related to accuracy, while extroversion was related to accuracy negatively [13].

People with highly developed emotional intelligence have an increased ability to perceive and express emotions, in particular, to predict successful emotional reactions during interpersonal communication [14]. If emotional intelligence could reliably provide the ability to detect lies, this would be a valuable attribute of hiring in professions where specialists often encounters lies, such as police officers, parole officers, or judges.

People with high emotional intelligence generally report higher level of subjective well-being than others [15], which indicates that they may be more gullible, as positive mood worsens the precision of estimating messages accuracy [16].

IV. PURPOSE OF STUDY

Since emotional intelligence is not a one-dimensional phenomenon, and has an internal structure, we can assume

that some components of this phenomenon may contribute, and some — interfere with the recognition of hidden information. This assumption was the first hypothesis of this study.

The second hypothesis follows from the assumption that people with a high level of anxiety are more suspicious in the process of interpersonal communication, and the very fact that they constantly expect deception allows them to recognize it better.

V. RESEARCH METHODS

To determine the level of anxiety, we used short Personality Questionnaire by G. Eysenck in testing version by E.R. Slobodskaya, G.G.Knyazev, M.V. Safronova [17]. The emotional intelligence questionnaire (Lyusin, 2009) was used to determine the level of emotional intelligence. 8 videos, created in accordance with special scenario, imitating job interview, with equal participation of men and women, were used as stimulus material. Each video contained two fragments — "false" and "truthful"- arranged in random order. After filling in both Eysenck and Emotional Intelligence questionnaires, the research subjects watched the video and determined in which case the video character told the truth, and in which he lied, and explained the reasons they were guided to identify it. The study involved 80 psychology students (average age = 21.3, SD = 1.8), 62.5% women and 37.5% men.

VI. FINDINGS

Average level of neuroticism, extraversion and emotional intelligence factors are represented in "Table I" and "Table II".

TABLE I.   DESCRIPTIVE STATISTICS FOR EYSENCK QUESTIONNAIRE FACTORS

Factor	Average	Index of Variability
Neuroticism	3,0000	2,30574
Extraversion	4,3875	2,04688
Psychoticism	0,7750	0,94098

TABLE II.   DESCRIPTIVE STATISTICS FOR EMOTIONAL INTELLIGENCE QUESTIONNAIRE

Factor	Average	Index of Variability
Interpersonal emotional intelligence	4,9625	2,27504
Intrapersonal Emotional Intelligence	5,3750	2,25790
Emotional knowledge	5,3875	2,29194

As we could assume all the emotional intelligence factors demonstrate positive correlation with extraversion level and negative correlation with neuroticism level (see "Table III").

TABLE III.   SIGNIFICANT EMOTIONAL CORRELATIONS BETWEEN EMOTIONAL INTELLIGENCE LEVEL, NEUROTICISM AND EXTRAVERSION

	Interpersonal emotional intelligence	Intrapersonal Emotional Intelligence	Emotion modulation	Emotional knowledge
Extraversion	0,449	0,264	0,416	0,289
Neuroticism	-0,314	-0,683	-0,625	-0,446

In accordance with the results unreliable data recognition, all the subjects were divided into two groups: "insightful", who gave more than 70% of correct answers, and "not insightful" — all the rest. "Insightful" turned out to be 23.8%.

One-way analysis of variance demonstrated correlation between the successful hidden information recognizing and neuroticism. As can be seen in "Table IV", the "insightful" subjects have demonstrated lower level of neuroticism than all the rest (F = 5.488, p <0.05). This does not confirm the previously stated hypothesis about correlation between anxiety and lie recognition, confirmed in studies by Peace, K. A., Porter, S., and Almon, D. F. However, the experimental situation in our study was radically different from that used by these researchers. They presented audio recordings of rape, while videos in our study showed a comfortable situation of job interview. Probably, during the interview, anxiety disturbs both the interviewee and the interviewer.

TABLE IV.   AVERAGE LEVEL OF NEUROTICISM AND INTRAPERSONAL EMOTIONAL INTELLIGENCE DEMONSTRATED BY "INSIGHTFUL" AND "NOT INSIGHTFUL" SUBJECTS

	"Insightful"	"Not insightful"
Neuroticism level	1,95	3,33
Intrapersonal emotional intelligence	6,21	5,11

Also it can be noticed from "Table IV" that the "insightful" subjects have higher level intrapersonal emotional intelligence (F = 3.581, p <0.05). These data support our hypothesis that the structure of emotional intelligence will be sensitive to the ability of recognizing lies. However, as might be expected, interpersonal emotional intelligence does not affect it. On the contrary, understanding of one's own emotions helps to recognize somebody else's.

The analysis of the subjects' self-reports allowed us to distinguish two large groups of indicators they were guided by while evaluating the truthfulness of information: external (gestures, facial expressions, posture, gaze, pauses, etc.) and internal (emotionality, nervousness, calmness). The classification criteria by O. A. Gulevich and A. V. Stukalina (Gulevich, Stukalina, 2010) were taken as selection criteria.

The results show that the number of external behavioral indicators, identified by the subjects as attributes of lies, far exceeds the number of internal indicators (Z = -4.093, p = 0.01). However, the "insightful" subjects mention much less external indicators than "not insightful" subjects do (U = 351.5, p <0.01).

VII. CONCLUSION

The study design was based on the assumption that emotional intelligence and anxiety level correlate with the ability to recognize falsehoods. The study results demonstrate this despite the fact that the initial hypotheses were only partially confirmed. Thus, the expected correlation between anxiety and the ability to recognize hidden information proved, in fact, invert. The calmer and more self-possessed the subject was, the more often he gave correct answers. Emotional intelligence is also associated with the ability to recognize hidden information. The connection of the person's confidence in his ability to understand other people's emotions with the detection of lies seemed obvious. In the structure of general emotional intelligence, this kind of confidence is represented by the factor of interpersonal emotional intelligence. However, during the study, such a link was not found. But intrapersonal emotional intelligence, indicating the understanding of one's own emotions, turned out to be connected with the success in recognizing hidden information.

As a result, on the basis of the data obtained, we can conclude that individual traits, both inherent and trainable, affect a person's ability to recognize lies. In this study, only two obvious individual traits used manifested themselves in unobvious way. There's a good likelihood that the ability to recognize false information will prove to correlate with unobvious individual traits, and this fact opens up a prospect for further researches.

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