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## EMOTIONAL CONTEXT OF THE ACCURATE AND INACCURATE METACOGNITIVE MONITORING LEVELS

**Purpose.** The aim of the paper is to identify what emotions arise after obtaining information about the correct or incorrect estimations of the performance in a short knowledge test. To do this a short pilot experimental research was conducted outlining some peculiarities of the accurate and inaccurate metacognitive monitoring levels in university students' learning activity.

**Methods and procedure.** The theoretical and comparative practical methods of studying the accurate and inaccurate metacognitive monitoring levels of university students have been used in the study. The participants ( $n = 77$ ,  $M_{age} = 17.62$ ) answered knowledge information questions of three types (multiple-choice, open-answer, and 'Yes'/'No') set up both in Ukrainian and in English and performed prospective and retrospective metacognitive judgements of learning. Calibration procedure helped to define average indicators of both the illusion of knowing and the illusion of not knowing, as well as adequate levels of metacognitive monitoring. After the announcement of the correct answers the participants noted their emotions that arose when the answer were correct / incorrect.

**Results.** The results showed the occurrence of emotions with positive and negative affect both in the accurate (the adequate level) and inaccurate metacognitive monitoring levels (the illusions of knowing and not knowing). According to the data, in total, the examples of the emotional status of the highest frequency were mainly with the positive affect. The illusion of not knowing was expressed by 5 main samples of emotional status of negative affect ('disappointed', 'surprised', 'offended', 'inattentive', and 'sad'), 8 samples of emotions of positive affect, though the value of them was not very high in almost all the cases ('normal', 'good', 'glad', 'calm', 'nice', 'proud', 'satisfied', and 'unsurprised'), and 2 of neutral affect as well. Students with the adequate level of their RCJs showed only positive and neutral emotions of different value.

**Conclusions.** The current results continue to expand an investigation of metacognitive monitoring reliability factors. Still the presented ideas serve more as a framework for future study and their pure implications still need thorough further researches.

**Keywords:** accurate metacognitive monitoring; inaccurate metacognitive monitoring; the illusion of knowing (the IK); the illusion of not knowing (the INK); emotions; metacognitive monitoring; university students.

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## ЕМОЦІЙНИЙ КОНТЕКСТ РІВНІВ ТОЧНОСТІ ТА НЕТОЧНОСТІ МЕТАКОГНІТИВНОГО МОНІТОРИНГУ

**Мета статті** – виявити, які емоції виникають після отримання інформації про правильні чи неправильні оцінки результатів у короткому тесті знань. Для цього було проведено пілотне експериментальне дослідження, яке окреслило деякі особливості рівнів точності та неточності метакогнітивного моніторингу в навчальній діяльності студентів. Результати засвідчили наявність емоцій із позитивним і негативним забарвленням як в ілюзіях знання і незнання, так і на адекватному рівні метакогнітивного моніторингу. Згідно з даними, приклади емоційного стану найвищої частоти були переважно з позитивним афектом. Ілюзію незнання виражали 5 основних прикладів емоційного стану негативного афекту («розчарований», «здивований», «ображений», «неуважений» і «сумний»), 8 прикладів емоцій позитивного афекту, хоча майже в усіх випадках їх значення були не дуже високими («нормально», «добре», «радий», «спокійний», «приємний», «гордий», «задоволений» і «не здивований»), а також два приклади нейтрального вираження. Студенти з адекватним рівнем своїх RCJ суджень показали лише позитивні та нейтральні емоції. Подані ідеї служать основою для майбутнього дослідження, і їх результати все ще потребують подальших інтерпретацій.

**Ключові слова:** точний метакогнітивний моніторинг; неточний метакогнітивний моніторинг; ілюзія знання; ілюзія незнання; емоції; метакогнітивний моніторинг; студенти.

**Formulation of the problem.** The notion of the accurate and inaccurate metacognitive monitoring resulting in such errors as the illusions of knowing and not knowing is quite new and still controversial. The psychological

literature provides a range of examples of the illusions of knowing and not knowing resulting in failures and frustrations. When monitoring is deficient, students may experience the illusion of knowing and may even stop studying prematurely (and later be surprised having received lower grades). Moreover, they might choose or write down an answer that is clearly wrong (even though they might ‘know’ the correct answer, but either do not know that they know it or do not try hard enough to look for it) [11, etc.]. J. Metcalfe [13] calls such overconfidence ‘cognitive optimism’. D. Griffin and A. Tversky [8] state that overconfidence – like optimism – is adaptive because it makes people feel good and moves them to do things that they would not have done otherwise. Therefore, poor performers are doubly cursed: they do not know and do not know that they do not know as the skills needed to produce correct responses are virtually identical to those needed to evaluate the accuracy of one’s responses [7; 16; 1; 2; 3].

Thus, the problem of emotional context of the illusions of knowing and not knowing is still insufficiently studied in Ukrainian and foreign psychology. Some rare studies aim to identify what emotions arise in case of correct / incorrect metacognitive monitoring judgments.

**An analysis of recent researches and publications.** Relatively little is known about the subject of the illusions in terms of emotional context. There are some studies about emotions and their impact on the learning process [9; 12, etc.]. Thus, according to E. Hicks and J. Hicks [9], feeling of emotion is important and finding way to improve the feeling is even more important. Among some rare examples, the study of an affective model of interplay between emotions and learning is a noteworthy finding. B. Kort, R. Reilly, and R. Picard [12] proffer a novel model to conceptualize the impact of emotions upon learning. The researchers are convinced that there exists interplay of emotions and learning, and that this interaction is of a very complex nature. Though, the psychological literature is lacking studies of the emotional context of the illusions of knowing and not knowing, as well as the adequate levels of metacognitive monitoring.

Consequently, the **the aim** of the current research is centered in a precise theoretical framework of the emotions in the illusions of knowing and not knowing in metacognitive monitoring. In particular, we aim to study the phenomena of the illusions of knowing and not knowing in terms of identifying what emotions arise after obtaining information about the correct or incorrect estimations of the performance in a short knowledge test. A pilot experimental research was conducted outlining some peculiarities of the illusions of knowing and not knowing in university students’ learning activity and finding out how it feels like for students to be right/wrong. Moreover, we also aimed to outline some possible ways certain emotions can lead to.

#### **Presentation of the material.**

##### **Method**

**Participants.** The 77 respondents (53 female and 24 male students,  $M_{age} = 17.62$ ,  $SD = .66$ ) were university students of the International Relations Department (the National University of Ostroh Academy, Ukraine) who voluntarily and anonymously participated in this study for free. The sample consisted of Ukrainian students only.

**Materials.** To study the illusions of knowing and not knowing in metacognitive monitoring of the learning activity of university students we chose six questions of different types – multiple-choice, open-answer, and ‘Yes’/‘No’ questions – serving as a stimuli material needed to be answered. A questionnaire consisted of the samples of knowledge information questions. The questions consisted of three types of questions about F. Roosevelt (“What was F. D. Roosevelt?”), U. Khayyam (“What was Ghiyath al-Din Abu’l-Fath Umar ibn Ibrahim Al-Nisaburi al-Khayyami?”), and the capital of Australia (“What is the capital of Australia?”). The questions were set up in Ukrainian (three for every student). Three more questions consisted of grammar and vocabulary information based on the already learned material in the English language university courses according to the specialty at the International Relations Department (International Relations, Country Studies, and History). These were multiple-choice questions only (three for every student) randomly taken from the English language course books of the participants and were set up in English. The choice of the types of questions depended on our previous findings [4], which showed that the illusion of knowing can depend on the task type. Previous results highlighted that overconfidence occurs mainly in multiple-choice questions [4]. Consequently, in this current study we decided to overlook if it works the same way when the participants need to cope with different knowledge information questions.

**Procedure and design.** The participants were asked to answer all the given questions. Moreover, they performed prospective and retrospective metacognitive judgments of learning about confidence (JOLs and RCJs) as well as both prospective and retrospective judgments about the number of correct answers (aJOLs and aRCJs). With the help of calibration procedure we defined average indicators of the illusion of knowing (overconfidence) and the illusion of not knowing (underconfidence).

In general, the experiment consisted of such phases: Future Performance Effectiveness Evaluation Phase, Task Performance Phase, Task Performance Effectiveness Evaluation Phase, and Emotion Evaluation Phase. Thus, during the Future Performance Effectiveness Evaluation Phase students measured their confidence in the correctness of questions answering. They predicted their future effectiveness on the test (general JOL questions: “Do you think you will perform the test well?” – ‘Yes’/‘No’ answers) as well as performed prospective judgments

about the number of correct answers (“How many questions will you answer correctly?”) (aJOLs). With the help of a scale from min (0) (absolutely unconfident) to max (100) (absolutely confident) participants performed prospective metacognitive judgments of learning about confidence (“Can you show your confidence that you will perform well?”). Afterwards, during the Task Performance Phase, they answered the proposed questions.

The Task Performance Effectiveness Evaluation Phase served to evaluate the levels of correctness of tasks performing. After each question students were asked whether they answered correctly (RCJs: “Did you answer correctly?” – ‘Yes’/‘No’ answers), and with the help of the measuring scale from min (0) to max (100) they performed retrospective metacognitive judgments of learning about confidence (“Can you show your confidence that you answered the question correctly?”). At the end of the test students measured their performance effectiveness of the whole test making general RCJs (“Did you answer correctly?” – ‘Yes’/‘No’ answers) and (“Can you show your confidence that you performed the test well?”), as well as their aRCJs (“How many questions did you answer correctly?”).

Having coped with the tasks, they returned their answer sheets to the instructor. Afterwards the correct answers were announced. The participants were asked about their emotions that arose when it appeared that their answers were correct or incorrect. They were asked to write down if they answered correctly or not (“Did you answer the question correctly?” – ‘Yes’/‘No’ answers) and depending on that to note their emotions in a written form (“What does it feel like to be right?” (if the participant’s answer was correct) and “What does it feel like to be wrong?” (if the participant’s answer was incorrect) (Emotion Evaluation Phase).

**Analysis.** All the received data were processed by computer programs *Excel* and *IBM SPSS Statistics 20*. Data were processed by means of such mathematical and statistical methods as *O/U* index and calibration index.

Metacognitive monitoring errors – the illusion of knowing as overconfidence and the illusion of not knowing as underconfidence – were determined as the difference between subjective evaluation of the accuracy of retrieval (metacognitive judgements rating) and the observed reproduction (relative share of results according to total number of tasks). The larger the difference is, the higher is the illusion of knowing, and vice versa [15; 4, etc.]. As well as in our previous study [15] we used a three-level scale from -1 to +1: from -1 to -.14 – the level of underestimation or lack of self-knowledge (the illusion of not knowing); from -.15 to +.14 – the adequate level of monitoring accuracy (the illusion of knowing is negligible or absent); from +.15 to +1 – the level of overconfidence in knowledge (the illusion of knowing) [15].

The emotional status of the illusions of knowing and not knowing were grouped similarly to the TCX model scale for emotions proposed by C. Chatzopoulos and M. Weber [6]. The scale to measure the emotional status consisted of positive and negative affects ranging from +3 to -3 and involved values from +3 to +.5 (positive affect), from -.4 to +.4 (neutral affect), and from -.5 to -3 (negative affect). The scores were assumed to show the emotional flow of the participants in their illusion of knowing (the IK), illusion of not knowing (the INK), and the adequate levels.

### Results

**The IK, the INK, and the adequate levels.** In general, the results of the experiment showed that 46.7% of the participants committed errors in JOLs, and the majority of them (37.6%) showed overconfidence in judgments (the IK). 74% of the students committed metacognitive monitoring errors in their aJOLs: 50.6% of the participants were overconfident ( $M = .29$ ,  $SD = .14$ ) (the diversity rate of the IK ranged from .16 to .66); 23.4% showed underconfidence ( $M = -.24$ ,  $SD = .09$ ) (the diversity rate of the INK ranged from -.5 to -.16); and 26% proved to have adequate level of their knowledge (the diversity rate was 0). The number of the students who showed metacognitive monitoring errors in their RCJs and aRCJs was not significantly different.

The highest results of the IK ranging from +.15 to +1 (shown by 44.1% of the participants) appeared in multiple-choice questions set up in Ukrainian ( $M = .54$ ,  $SD = .25$ ), whereas the results of the RCJs in ‘Yes’/‘No’ questions (34.5% of the participants) ( $M = .50$ ,  $SD = .23$ ) and in open-answer questions (31.6%) ( $M = .59$ ,  $SD = .29$ ) were approximately the same. In the questions set up in English the highest results of the IK showed 57.1% of the participants ( $M = .48$ ,  $SD = .24$ ).

The results of the INK most frequently were shown by the students in their RCJs of ‘Yes’/‘No’ questions (32.2% of the participants) ( $M = -1$ ,  $SD = .23$ ), whereas in multiple-choice questions these were only 8.8% of the participants ( $M = -.87$ ,  $SD = .17$ ) and in open-answer questions – 25% ( $M = -.85$ ,  $SD = .18$ ). In the questions set up in English these were 24.7% of the students who showed the INK in their RCJs ( $M = -.69$ ,  $SD = .19$ ). The rates of the results of the INK ranged from -1 to -.16.

47.1% of the participants showed adequate levels of their RCJs in multiple-choice questions ( $M = .02$ ,  $SD = .03$ ), whereas in open-answer questions these were 43.4% ( $M = .01$ ,  $SD = .02$ ) and in ‘Yes’/‘No’ questions – 33.3% ( $M = -.01$ ,  $SD = .02$ ). In the RCJs of the multiple-choice questions set up in English 18.2% of the participants showed their adequate level of metacognitive monitoring ( $M = .04$ ,  $SD = .05$ ). These results were the lowest among the results of the IK and the INK. In general, the rates of the adequate level ranged from -.12 to +.14.

Average results of the IK, the INK, and the adequate levels in metacognitive monitoring are shown in Table 1.

Table 1

## Average results of the IK, the INK, and the adequate levels in metacognitive monitoring

Types of questions	The IK			Adequate level			The INK		
	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%
	All								
Knowledge information multiple-choice questions (in Ukrainian)	.54	.25	44.1	.02	.03	47.1	-.87	.17	8.8
Knowledge information ‘Yes’/‘No’ questions (in Ukrainian)	.50	.23	34.5	-.01	.02	33.3	-1	.23	32.2
Knowledge information open-answer questions (in Ukrainian)	.59	.29	31.6	.01	.02	43.4	-.85	.18	25
Knowledge information multiple-choice questions (in English)	.48	.24	57.1	.04	.05	18.2	-.69	.19	24.7

**The IK, the INK, and the adequate levels: gender differences.** According to gender differences, the IK was shown in the RCJs in knowledge information questions set up in Ukrainian by the majority of the female participants. Thus, 80% of the females showed the IK in their RCJs of multiple-choice questions ( $M = .54$ ,  $SD = .23$ ). In ‘Yes’/‘No’ questions these were 76.6% of the female participants ( $M = .51$ ,  $SD = .22$ ) and in open-answer questions – 75% of the females ( $M = .57$ ,  $SD = .28$ ). The results of the IK shown by the males were significantly lower. In the RCJs of knowledge information multiple-choice questions set up in English these were only 20% of the male participants ( $M = .53$ ,  $SD = .29$ ), and these proved to be the lowest results of the IK among the male students. 23.3% of the males showed the IK in their RCJs of ‘Yes’/‘No’ questions ( $M = .48$ ,  $SD = .25$ ), and 25% – in the results of the RCJs of open-answer questions ( $M = .64$ ,  $SD = .29$ ).

The highest results of the INK appeared in the female RCJs of open-answer knowledge information questions set up in Ukrainian (89.5% of the participants) ( $M = -.88$ ,  $SD = .14$ ), whereas the lowest results were shown by 64.3% of the female participants in their RCJs of ‘Yes’/‘No’ questions ( $M = -1$ ,  $SD = .21$ ). Male participants (35.7%) showed their INK in the RCJs of ‘Yes’/‘No’ questions ( $M = -1$ ,  $SD = .26$ ) and these results were the highest ones.

The highest results of the adequate levels of the RCJs of multiple-choice questions were shown by 65.6% of the female participants ( $M = .23$ ,  $SD = .03$ ), whereas the males tended more to show their adequate levels of the RCJs in ‘Yes’/‘No’ questions (the results of 55.2% of the male participants equaled 0).

In multiple-choice questions set up in English the vast majority of the female participants – 77.2% – showed the INK ( $M = -.70$ ,  $SD = .2$ ), whereas the IK was shown by 67.4% of the students ( $M = .45$ ,  $SD = .18$ ). The males tended more to the adequate levels of their RCJs (38.1% of the students) ( $M = .03$ ,  $SD = .04$ ).

Average results of all three levels in metacognitive monitoring according to gender differences are shown in Table 2.

Table 2

## Average results of the IK, the INK, and the adequate levels in metacognitive monitoring according to gender differences

Types of questions	The IK			Adequate level			The INK		
	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%
	Females								
Knowledge information multiple-choice questions (in Ukrainian)	.54	.23	80	.23	.03	65.6	-.9	.04	83.3
Knowledge information ‘Yes’/‘No’ questions (in Ukrainian)	.51	.22	76.6	-.01	.03	44.8	-1	.21	64.3
Knowledge information open-answer questions (in Ukrainian)	.57	.28	75	.02	.03	60.6	-.88	.14	89.5
Knowledge information multiple-choice questions (in English)	.45	.18	67.4	.53	.05	61.9	-.70	.2	77.2
Males									
Knowledge information multiple-choice questions (in Ukrainian)	.53	.29	20	.02	.03	34.4	-.05	0	16.6
Knowledge information ‘Yes’/‘No’ questions (in Ukrainian)	.48	.25	23.3	0	0	55.2	-1	.26	35.7
Knowledge information open-answer questions (in Ukrainian)	.64	.29	25	.01	.02	39.4	-.56	.22	10.5
Knowledge information multiple-choice questions (in English)	.55	.31	32.6	.03	.04	38.1	-.67	.21	22.8

**Emotional status results.** The participants' emotions expressed in a written form after they received the correct answers to the proposed questions were divided into positive and negative differential emotions scale with the flow from 3 (the highest level of the positive flow) to -3 (the highest level of the negative flow). The estimation of emotional arousal was the highest – 5. The Table 3 shows the most frequent examples of the emotional status scale.

Table 3

<b>Emotional status scale</b>				
<b>Value</b>	<b>Affect</b>	<b>Emotional Status (Emotion)</b>	<b>Total %</b>	<b>Estimation of emotional arousal</b>
3	Positive	Proud (pride)	3.7	max = 5
		Happy (happiness)	1.3	
		Genious (awareness)	.2	
		Knowing/Aware (awareness)	.4	
		Curious (awareness)	.6	
		Marvelous (contentment)	.4	
		Wonderful (contentment)	3.4	
		Super (contentment)	4.5	
		Unbelievably (contentment)	.2	
		Perfectly (contentment)	.2	
		Ideally (contentment)	.2	
		Great (contentment)	.2	
		Awesome (contentment)	.2	
2	Positive	Delighted (happiness)	1.5	
		Agitated (happiness)	.2	
		Funnily (happiness)	.6	
		Joyfully (happiness)	.2	
		Optimistic (happiness)	.2	
		Confident (confidence)	.8	
		Self-confident (confidence)	.4	
		Unsurprised (contentment)	1.1	
		Very well (contentment)	.8	
		Cool (contentment)	.4	
		Will learn (promising)	.8	
1	Positive	Glad (happiness)	8.6	
		Pleased (happiness)	.4	
		Satisfied (happiness)	.3	
		Need to learn (awareness)	.6	
		Good (contentment)	5.8	
		Nice (contentment)	.8	
.5	Neutral	Not bad (contentment)	.2	
		Calm (calmness)	2.2	
		Adequate (calmness)	.2	
0	Neutral	Normal (calmness)	7.6	
		Neutral (no emotion)	5.8	
-5	Negative	Indifferent (no emotion)	3.4	
		Confused (confusion)	1.5	
-1	Negative	Hesitating (confusion)	.4	
		Doubtful (confusion)	.4	
		Sad (sadness)	4.7	
-2	Negative	Moody (sadness)	.2	
		Underconfident (confidence)	.8	
		Inattentive (attentiveness)	.6	
		Dissatisfied (dissatisfaction)	.6	
		Unpleased (dissatisfaction)	.4	
		Bad (contentment)	1.1	
		Not good (contentment)	1.1	
		Disappointed (disappointment)	5.4	
Wonderingly (wonder)	.2			
-2	Negative	Surprised (wonder)	4.1	
		Offended (offence)	.4	
		Unconfident (confidence)	1.1	
		Self-unconfident (confidence)	.2	
		Not proper knowledge (awareness)	.6	
		Didn't know (awareness)	.2	
		Angry (anger)	.4	
		Irritated (anger)	.2	

<b>-1</b>	<b>Negative</b>	Ashamed (shame)	.8	
		Not proud (shame)	.2	
		Depressed (sadness)	.2	
		Desperate (sadness)	.4	
		Unhappy (happiness)	.4	
		Shocked (wonder)	.6	
		Stupid (awareness)	.6	
		Wounded (offence)	.2	
		Stubborn (stubbornness)	1.5	
		Not wonderful (contentment)	.2	
		Totally disappointed (disappointment)	.2	

In particular, in open-answer questions with the results the participants with the IK tended more towards positive emotions, though this percentage was not very high – 26% of the participants told that they felt ‘super’ (13%) and ‘normal’ (13%), 17.4% were ‘satisfied’ (8.7%) and ‘confident’ (8.7%), and the vast majority tended to feel ‘happy’, ‘confused’, ‘stubborn’, ‘bad/not good’, ‘glad’, ‘neutral’, ‘surprised’, ‘unsatisfied’, ‘good’, ‘sad’, and ‘unconfident’ (4.3% each). In ‘Yes’/‘No’ questions 17.2% of the participants felt ‘good’, 13.8% – ‘confident’, 12.8% – ‘ashamed’ and ‘sad’ (6.9% each), and all the rest – 3.4% each – ‘normal’, ‘disappointed’, ‘stubborn’, ‘neutral’, ‘agitated’, ‘unconfident’, ‘funnily’, ‘confused’, ‘inattentive’, etc. In multiple-choice questions set up in Ukrainian 14.3% of the participants with the IK were ‘disappointed’, 10.7% felt ‘normal’, 28.4% (7.1% each) – ‘glad’, ‘satisfied’, ‘neutral’, etc., and all the rest (3.6% each) said that they felt ‘very well’, ‘funnily’, ‘self-confident’, ‘proud’, ‘stupid’, ‘happy’, ‘not pleased’, ‘indifferent’, ‘surprised’, ‘delighted’, and ‘adequate’, etc. In multiple-choice questions set up in English the participants with the IK felt ‘normal’ (10.4%), ‘glad’ (9.7%), ‘sad’ (9%), ‘disappointed’ (5.2%), ‘confident’ (4.5%), ‘neutral’ (4.5%), ‘indifferent’ (3.7%), ‘proud’ (3%), ‘stubborn’ (3%), ‘surprised’ (3%), ‘good’ (3%), ‘calm’ (2.2%), ‘satisfied’ (2.2%), ‘delighted’ (2.2%), ‘confused’ (2.2%), ‘super’ (2.2%), ‘bad’ (2.2%), ‘ashamed’ (1.5%), ‘unhappy’ (1.5%), etc.

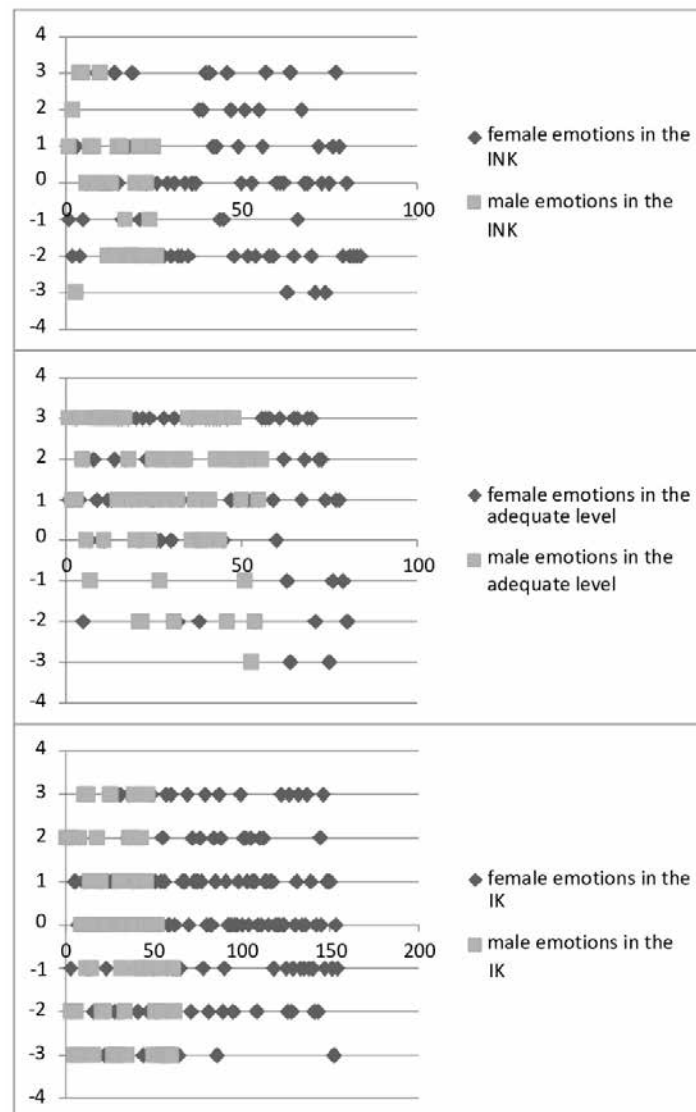
The examples of the emotional status of the participants with the INK were diverse as well. Thus, in open-answer questions 30% of the participants expressed their ‘disappointment’, 20% felt ‘normal’, 10% were ‘surprised’ and 10% – ‘neutral’, all the rest – 5% each – said that they felt ‘stupid’, ‘funnily’, ‘curious’, ‘indifferent’, ‘unsurprised’, and even still ‘confident’. In ‘Yes’/‘No’ questions the majority of the students felt ‘neutral’ (11.1%) and ‘good’ (11.1%), ‘glad’ (7.4%), as well as ‘calm’ (7.4%). In multiple-choice questions set up in Ukrainian the participants with the INK appeared to feel ‘disappointed’, ‘nice’, ‘neutral’, ‘offended’, ‘indifferent’, ‘inattentive’, etc. (14.3% each). In comparison, in the questions of the same kind set up in English 12.7% of the participants felt ‘surprised’, 9.1% – ‘calm’, 7.3% – ‘disappointed’, 5.4% – ‘sad’, 5.4% – ‘satisfied’, 5.4% – ‘neutral’, and 5.4% – ‘calm’, etc., whereas 3.6% of each felt ‘proud’, ‘normal’, ‘wonderful’, ‘very well’, ‘indifferent’, ‘bad/not good’, and all the rest – 1.8% each – ‘confused’, ‘good’, ‘stubborn’, ‘confident’, ‘shocked’, ‘self-unconfident’/‘underconfident’, ‘neutral’, ‘totally disappointed’, etc.

The emotional status examples of the adequate level results were as follows. Thus, in open-answer questions the majority of the participants – 19.3% each – said that they felt ‘confident’ and even ‘super’, 16.1% proved to be ‘glad’, 6.5% each tended to be ‘proud’, ‘delighted’, ‘satisfied’, and ‘neutral’, and all the other answers ranged from ‘wonderful’, ‘good’, ‘normal’, ‘indifferent’ to ‘surprised’, etc. (3.2% each). In ‘Yes’/‘No’ questions of the adequate levels of the RCJs the participants answered in such ways: 17.2% felt ‘glad’, 13.8% – ‘wonderful’, 10.3% – ‘confident’, 6.9% each – ‘good’, ‘neutral’, ‘proud’, and ‘knowing/aware’, 3.4% each – ‘marvelous’, ‘wonderingly’, ‘happy’, ‘pleased’, ‘nice’, ‘calm’, ‘normal’, ‘indifferent’, and even ‘not good’. The participants with the adequate levels of general knowledge information multiple-choice questions felt ‘confident’ (21.8%), ‘wonderful’ (12.5%), ‘super’ (9.4%), as well as ‘indifferent’ (9.4%), ‘neutral’ (6.2%), and ‘glad’ (6.2%), and 3.1% of each participant tended to show that they felt ‘proud’, ‘nice’, ‘normal’, ‘unsurprised’, ‘curious’, ‘good’, ‘not good’, ‘sad’, and even ‘disappointed’, etc. In multiple-choice questions set up in English the majority of the participants felt ‘confident’ (18%), ‘super’ (10.3%), ‘glad’ (10.3%), and ‘good’ (10.3%), ‘happy’ (5.1%), and ‘proud’ (5.1%).

The emotional status of the gender differences in the IK, the INK, and the adequate levels is shown in Figure 1.

**Discussion.** The paper continues outlining the range of investigations of the illusions of knowing and not knowing in metacognitive monitoring of the learning activity of university students. It provides a framework of the illusions with an aim to allocate the range of emotions that arise after obtaining information about correct/incorrect estimations of the performance in a short knowledge test.

The results of the pilot study showed that the illusion of knowing was common for 44.7% of the participants in their RCJs of general knowledge multiple-choice questions, and the illusion of not knowing appeared in 32.2% of the participants of ‘Yes’/‘No’ questions. These data slightly correlate with our previous findings [1] that highlighted that the illusion of knowing can depend on task type. The results serve as significant proof that the accurate metacognitive monitoring is strongly influenced by the type of questions. In this context we expand the investigation of the peculiarities of metacognitive monitoring.



**Figure 1. The emotional status of the gender differences in the IK, the INK, and the adequate levels**

According to the data, in total, the examples of the emotional status of the highest frequency were mainly with the positive affect. Thus, 8.6% of the participants claimed that they felt ‘glad’, 8% – ‘confident’, 7.6% – ‘normal’, 5.8% each – ‘neutral’ and ‘good’, 5.4% – ‘disappointed’, 4.7% – ‘sad’, 4.5% – ‘super’, 4.1% – ‘surprised’, 3.7% – ‘proud’, 3.4% each – ‘wonderful’ and ‘indifferent’, 2.2% – ‘calm’, 1.5% each – ‘delighted’, ‘confused’, and ‘stubborn’, 1.3% – ‘happy’, 1.1% each – ‘unsurprised’, ‘bad’, ‘not good’, and ‘unconfident’. All the other results didn’t approach 1%. In particular, the illusion of knowing mainly resulted in positive affects (‘super’, ‘normal’, ‘satisfied’, ‘confident’, ‘good’, ‘glad’, ‘wonderful’, ‘proud’, etc.), whereas negative (‘ashamed’, ‘sad’, ‘disappointed’, ‘stubborn’, and ‘surprised’) and neutral (‘neutral’ and ‘indifferent’) ones also appeared. The illusion of not knowing was expressed by 5 main samples of emotional status of negative affect (‘disappointed’, ‘surprised’, ‘offended’, ‘inattentive’, and ‘sad’), 8 samples of emotions of positive affect, though the value of them was not very high in almost all the cases (‘normal’, ‘good’, ‘glad’, ‘calm’, ‘nice’, ‘proud’, ‘satisfied’, and ‘unsurprised’), and 2 of neutral affect. Students with the adequate level of their RCJs showed only positive and neutral emotions of different value.

Significantly, the results of this pilot study can demonstrate that students are able to discriminate between their feelings that arise in known and unknown information. As D. Moore and D. Cain [14] supposed, doing well should leave people thinking that they did better than others, and doing poorly should leave them thinking that they did worse than others. But it is still not clear enough whether, as J. Klayman et al. [10] sounded, the most confident people are also the most overconfident and whether this confidence leads the students to complete ignorance and excessive arrogance. As might have been expected, our findings are quite contradictory and the results serve more as a framework for future investigations.

According to the results, the range of participants' judgments with the illusion of knowing was not purely of positive affect, and it should be found out whether the judgments denoting shame, sadness, disappointment, and stubbornness, etc. can/cannot directly lead students to their ignorance and arrogance while learning. Thus, the question remains whether the emotions of disappointment, surprise, offence, attentiveness, and sadness, expressed by the participants with the illusion of knowing, can stimulate them in their further learning and achievements, or vice versa, will lead them to stagnation in their development. And emotions of what affect – positive or negative – in the illusion of not knowing can serve as helpers in learning?

One more thing is about the genuine nature of neutrality and indifference. Or, in other words, what can positive, negative, and neutral emotions lead to? Our study showed that the feelings of being right/wrong may be the same, but is it the same meaning implied in these emotions? Consequently, the pilot study fails to account for the supposition whether there is any difference between feelings of being right/wrong and of knowing/not knowing? Currently we can only assume that acceptance and recognition of these ideas might have powerful implications for students' ability to solve problems while learning, to experience their own personal development, as well as to build flexibility for ignorance and arrogance.

Nevertheless, taking into account the range of emotions of positive and negative affects, the thought provoking thing remains whether these emotions were addressed to the pure knowledge condition of the participants while answering (knowing or not knowing), or these were the expressions of the dis/satisfaction of their human nature in general. Moreover, the impact of the emotional nature also should be taken into account, as the examples of emotional status cannot be regarded as something absolutely accurate, because different people feel different about emotions even when they are using similar words [9; 5].

The findings of our research also highlight just how important the emotional status of the participants with their illusions of knowing and not knowing is. Thus, these findings point to the necessity of thorough investigation of the emotional impact on the learning activity of university students, as well as of the decoding of its meaning. Importantly, according to B. Kort, R. Reilly, and R. Picard [12], what the teachers fail to teach their students is that all these findings associated with various levels of failure are normal parts of learning and that they can be actually helpful signals for 'how' to learn better, judging also from the impact of the emotions students usually express. One more thing that should be taken into account in some of the future investigations is what the examples of the emotional status will be if the students are given the definite range of emotions they should choose. Further studies which take these into account need to be undertaken.

**Conclusions and some further implications.** The research studies the phenomena of the illusions of knowing and not knowing in terms of investigating the emotional flow of university students about the correct or incorrect estimations of the performance in a short knowledge test. To do this a pilot experimental research was conducted outlining some peculiarities of the illusions of knowing and not knowing in university students' learning activity. The results showed the occurrence of emotions with positive and negative affect both in the illusions of knowing and not knowing, as well as in the adequate levels.

The presented ideas serve more as a framework for future research and conceptualization than as an explanation for the results. Nevertheless, these current results continue to expand an investigation of metacognitive monitoring reliability factors, and despite some limitations, we hope our work could be the basis for future studies of metacognitive monitoring optimization of the learning activity of university students.

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