

Received: 21.03.2011
Accepted: 28.10.2011

A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
G – Funds Collection

METACOGNITION AND SELF-REGULATION: THE METACOGNITIVE SELF SCALE

Hanna Brycz^(A,B,C,D,E,F,G), Karol Karasiewicz^(A,C,D,F)

Institute of Psychology, University of Gdansk, Gdansk, Poland

Key words: self, behavior, biases

SUMMARY

Background

This paper presents a new understanding of the metacognitive self and a special method for its measure. The aim of the paper was to determine whether a strong metacognitive self affects the process of regulating one's own behavior.

Material/ Methods:

The main study (creating a metacognitive scale) involved a group of 1903 people from 18 to 72 years of age ($M = 27.3$; $SD = 2.1$). The group in question included approximately 860 female participants (45.2%) and 1043 males (54.8%).

Results:

The Metacognitive Self Scale, which measures the ability to recognize biases in one's own behavior, proved to be highly accurate and reliable. The scale was also validated by structural modeling, which revealed five subgroups of biases to be discovered by the observer of one's own behavior. People differ in the level of metacognitive self: 40% of the participants proved to be not very good at perceiving their own biases, but another 40% of the group showed high scores for metacognitive self.

Conclusions:

The Metacognitive Self Scale appeared to be an accurate and reliable questionnaire in this Polish group. Moreover, several studies have shown that a high Metacognitive Self score predicts better self-regulation in many domains of life. In other words, a high level of metacognitive self improves well-being and quality of life.

INTRODUCTION

The main aim of this paper is to provide a new understanding of the metacognitive self, and explore to what extent this metacognitive Self is able to enhance goal oriented motivation.

Metacognition as a special human cognitive construct exists in the psychological literature (Favell, 1979 – metacognition as cognition of one's own cognition; See, Petty & Fabrigar, 2008 – metacognition as cognition of one's own attitudes; Koriat, 2007 – metacognition as awareness of one's own mental states; Efklides, 2008 – metacognition as a cognitive-emotional loop of one's own experiences).

What is metacognitive self?

Metacognitive self serves as a new meaning of self – knowledge as knowledge of one's own biases. Individual differences in metacognitive self can be measured by the Metacognitive Self Scale (Brycz & Karasiewicz, 2011). The scale consists of 40 particular biased behaviors. Each behavior represents one of 40 biases especially extracted from a list of 129 (Brycz, 2004). The extraction process was based on competent judges' evaluations of 129 biases in terms of their self-regulatory features (e.g. an overoptimistic bias helps in goal pursuit), self-knowledge issues, delay of gratification levels, and psychological distance from oneself. All 40 biases fulfill the expectation of high self-regulatory impact on humans, high self-knowledge, a good level of delay of gratification, an keeping psychological distance towards oneself. In other words, a high level of recognition of all 40 biased behaviors in the spectrum of one's own behaviors should help people to regulate themselves, as a cognitive approach (self-knowledge and distance) and a motivational approach (self-regulation, delay of gratification).

In other words, metacognitive skills constitute a particular insight into surrendering to bias in one's own behavior. The research on metacognition perceived in this way has shown a stable effect of asymmetry between an accurate identification of one's own and someone else's deviations from rationality. The accuracy criterion was determined by the biases discovered by psychologists. The 129 biases consisted of various deviations from rationality in common thinking, attributions, decision making or acting. These errors are, in fact, a kind of statistical generalization.

Nevertheless, as seen from the example of a group of observers observing the behavior of others, as well as people demonstrating these behaviors (we know that some errors are made by everyone, for instance, the inclination to confirm one's own hypotheses, known as the *confirmatory bias* [Bar-Tal et al., 1999]), it is very likely that we will discern differences in the accuracy of perceiving one's own and someone else's behavior. Each of the 129 biases was expressed by a sentence presenting a biased behavior; while another sentence was free from this misconception. In this way a questionnaire was compiled, comprising 258 sentences arranged in pairs. Randomly, at one time, sentence "a" contained an error, then an appropriate behavior, while it was juxtaposed with a contradictory sentence "b". The subject's task was to choose the most accurate answer: with

reference to the majority of people (the observer's version) or with reference to themselves (the actor's version). The tests, repeated with many groups of people (already approximately 5000 people, the research group from 2004 involved 2000 people), have always shown asymmetry: a person is right in 80-90% of cases while assessing the errors of others, but loses this aptitude in social psychology while examining themselves (the accuracy of identification was approximately 18%) (Brycz, 2004).

While scrutinizing this disproportion in greater detail, it is difficult not to consider the impact of individual differences, which the test described above is not able to capture. Therefore, we evaluated the 129 deviations from rationality, in terms of how conducive their correct identification is to self regulation, postponing gratification, distance towards the self, self-knowledge, and high moral development. For instance, high moral development confirms that an individual thus endowed knows that there is a set of universal ethical rules, which allow for the assessment of the legitimacy of particular customs and laws; he also has his own social rules, which enable him to differentiate between good and evil; moreover, the researchers postulate a significant relationship between moral thinking and moral behavior (Haidt, 2006). High self-knowledge and the power of the self (according to Higgins, the "ought" self, or "promotion" self; Higgins, 1996), in turn, are conducive to accurate self-schemata as well as accepting and analyzing feedback concerning oneself. In other words, knowledge about the distorting bias of one's own cognition, that is, knowledge about the universal and healthy nature of self-esteem, may be favorable to a better way of existing in social reality (Tesser et al., 2005). Moreover, a high capacity for self-regulation, that is, making plans and carrying them out, as well as self-control, that is, controlling one's own urge-driven nature, brings the human being closer to socially mature behaviors (Moskowitz, 2005). The ability to rationally manage one's own cognitive skills (Baumeister & Vohs, 2004) is important. The unanimity of 30 judges' opinions – students finishing their studies in Psychology – for each of the given measurements, indicated for 129 regularities, has proved statistically significant:

- Gratification: Kendall's $\tau = 0.398$, $df = 49$ $p < 0.001$
- Self-Regulation: Kendall's $\tau = 0.12$, $df = 49$ $p < 0.001$
- Self-Distance: Kendall's $\tau = 0.12$, $df = 49$ $p < 0.001$
- Self-Morality: Kendall's $\tau = 0.07$, $df = 49$ $p < 0.001$
- Self-Knowledge: Kendall's $\tau = 0.10$, $df = 49$ $p < 0.001$

On the basis of the judging results (balances referring to specific measurements have been shown to be positively and fairly strongly correlated), 40 deviations from rationality have been matched; knowledge about their existence in one's own behavior might be favorable to better functioning in social reality. In other words, the selection encompassed 40 items that ranked highest during the judging measurements, which means that the judges unanimously evaluated these 40 tendencies as the most conducive to self-regulation, delaying gratification, self-knowledge, moral development and self-distance. Interestingly, the selected deviations from rationality were usually to the credit of the actor, and, as

is known from previous tests, under these circumstances the best self-evaluation accuracy rates can be obtained (Brycz, 2004). The scale comprising the 40 items selected in such a way was presented to the subjects in the form of episodes, which displayed an error only to the "actor."

After many trials in its final version (Attachment 1), after each task, there is a judgment scale from 0% – "it does not pertain to me at all" - to 100% – "it is entirely pertinent to me" (the scale should be 10 cm long, so that measuring it with a ruler from 0 to the place marked by the subject indicates also a specific % of accuracy; the previously used 14-centimeter scales called for the data conversion from cm to %). Underneath we give examples of the scale positions in the currently used version:

6. I have a tendency to pass more positive than negative judgments about other people (positivity bias – of course, this information was not provided to the surveyed).

0% 100%

20. Commercials shown on television do affect my choices and I buy what they present more frequently (exposition effect).

0% 100%

15. If something or somebody from the outside makes me change my behavior, my opinions related to that behavior change as well (forced compliance).

0% 100%

The Carver and Sheier self-awareness concept (1981) is similar to that of metacognitive self. They argue that shaping accurate self-knowledge takes place in the process of motivated testing of hypotheses concerning oneself while concentrating attention on the aspects of private self. The limit to the accurate perception of oneself in the case of induced situational or permanent self-awareness is constituted by the expectation of fulfillment probability or assessing the risk of an task undertaken (Carver & Sheier, 1981, 1982, 1998). Consequently, this kind of motivation will not occur when the self is endangered, when the discrepancy between self-evaluations and personal standards is too significant or when the abilities to reduce this discrepancy are too small (compare Ney & Gale, 1989; Hull et al., 1988). This kind of risk occurs especially when a person remains in a state of a chronic or situationally induced dispositional public self-awareness focused on tasks, maintaining one's own image in his environment (Hull et al.,

1988). This is probably the result of engaging in this situation one of two strong motives of biased information processing – self-strengthening (Dittes, 1959, cited by Epstein, 1980; Jones & Pittman, 1982) or self-coherence (Jones & Pittman, 1982; Moore & Small, 2007; Sedikides & Gragg, 2008).

Summing up these deliberations upon the concepts of metacognitive self, it is possible to state that it is a continuation of previous theories explicating the process of self-perception. Nevertheless, this concept, as juxtaposed with its predecessors, has a far broader scope because it is not limited solely to getting to know oneself, but also points to the authenticity of the self-cognition processes in shaping the subject's personal maturity by developing personal standards, cognitive processes as well as behavior.

Validation of the Metacognitive Self Scale (MS-40)

The accuracy and reliability of the MS-40 scale has been analyzed on the basis of a group of 1903 people from 18 to 72 years of age ($M = 27.3$; $SD = 2.1$). The group in question included approximately 45.2% ($N = 860$) female participants, whereas the number of men amounted to 1043 (54.8% of the total number of participants). Most of the participants of this validation study had secondary or higher education ($N = 1496$; 78.6% of the total), while only 71 people declared primary or vocational education (3.7% of the total).

Accuracy

The theoretical accuracy of the scale has been tested in many studies (Brycz & Karasiewicz, 2011). We present here only one of them. The MS-40 scale underwent a test of theoretical accuracy which was based on the assumption that the accuracy of self-perception is a factor strongly related to the development of the phenomenon of “average / different from average” (Moore & Small, 2007). If, then, this phenomenon is bound with inadequate self-perception and the MS-40 scale allows for measuring the accuracy of perceiving oneself, then people with better results on this scale will be characterized by a lower level of the illusion that they are exceptional – significantly different from the average.

In order to verify this hypothesis, a test was conducted within a paradigm of social comparisons (cf. Moore & Small, 2007; Epley & Dunning, 2000; Weinstein, 1980). Three groups of 6th- and 7th-semester students at the Elblag University of Humanities and Economics ($N = 69$) were tested. After measuring the accuracy of self-perception, the participants received the DTO3 scale (the name of the scale is constituted by the initials of the English words “Different Than Others”), containing 9 statements forming three scores:

- Competence:
 - 1) Taking into account the average in your group, how would you assess your intelligence?
 - 2) Taking into account the average in your group, what do you think your end-term grade point average will be?

- 3) Taking into account the average in your group, how do you assess yourself as a student, your attitude towards studying?
- Morality:
 - 1) When compared with the average in your group, how often do you cheat during the exams?
 - 2) When compared with the average in your group, how do you assess your honesty?
 - 3) When compared with the average in your group, how often do you depart from the truth?
- Rare occurrences:
 - 1) When compared with the average in your group, how do you assess your own chances to live till you are 100 years old?
 - 2) When compared with the average in your group, how do you assess the probability of breaking up with your partner within the forthcoming year?
 - 3) When compared with the average in your group, how do you assess the probability of winning on the lottery?

The participants' task was to assess themselves using a 10-point scale from -3 – meaning far less than the group's average, through 0 – indicating the average level of the group, to +3 – meaning far more than the group's average chance for the occurrence to happen and the level of each of the enumerated qualities. For the sake of the analysis, the ratio of the social comparisons Self – Others has been calculated on the levels of competence, morality, and exceptionality for each participant by computing average values in the respective scales according to the key (DTO Scale). The results are presented in Table 1.

ANOVA analysis of variance with repeated measurement within the scope of social comparisons indicated that there are significant differences in the scope of comparisons of oneself with others depending upon the measurement of judgment. Self-evaluation in relation to others is highest on the level of morality; next, the participants assessed their own competence higher than the group's average,

Table 1. ANOVA results for the analysis of difference and correlation matrix between specific measurements of the comparisons Self – Others

Measurement	Descriptive statistics		Correlation ratio			Significance of differences			
	M	SD	Com- petence	Morality	Exceptional occurrences	F	df	p	Eta ²
Competence	0.81	0.93	1			854.585	1;68	<0.001	0.683
Morality	1.34	1.18	0.29	1.00					
Exceptional occurrences	-0.39	1.37	0.26	0.23	1				

N=69

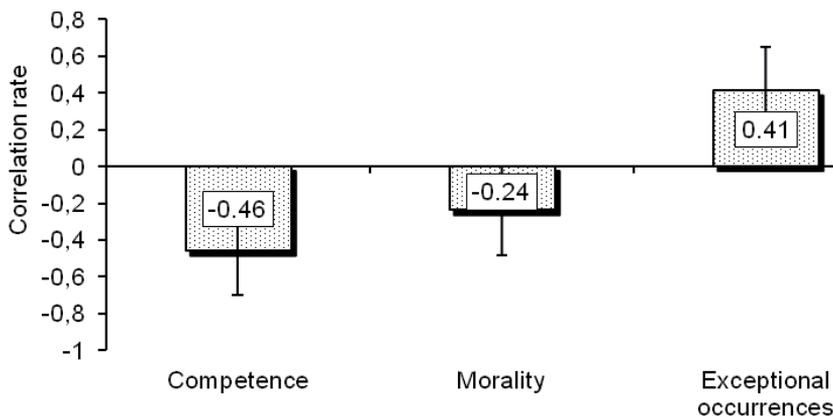


Fig. 1. Correlations of the results of the MS-40 scale and the judgments Self – Others on the levels of competency, morality and exceptional occurrences [See: Brycz & Karsiewicz, 2011, pp.30]

whereas the chance of exceptional occurrences appearing in their lives was estimated below the group's average. All the differences are statistically significant.

The analysis of this test's results demonstrated statistically significant correlations between the results of the MS-40 scale and the judgments Self – Others on the level of competency ($r = -0.46$) and exceptional occurrences ($r = 0.41$). The correlation between the results of morality and the MS-40 scale has proved significant solely on the level of a non-significant tendency ($r = -0.25$; $p = 0.08$), still, this correlation goes into the foreseen direction (see Fig. 1). The results allow for the inference that a higher accuracy of self-perception measured by the use of the MS-40 scale is related to a smaller power of the illusion about being different from the average, more intelligent, less prone to exceptional occurrences, and at the same time (insignificantly) more average in moral self-assessment.

The presented results of theoretical accuracy indicate that the MS-40 scale demonstrates satisfactory correlations with the self-perception accuracy ratings. The scores on the MS-40 scale seem to diminish significantly when identity, i.e. the subjective individuality of a human being, is endangered by social comparisons (Fischer et al., 2008), but at the same time, those scoring high on the MS-40 scale show a lower level of deformations in self-perception when compared with an average representative from their own group. The people scoring higher on the MS-40 scale demonstrate greater resistance to the deformations of self-perception on the level of competence and the threat posed by exceptional occurrences, as well as – on the level of a tendency – their own morality.

Factorial accuracy

To analyze the factorial accuracy of the MS-40 scale, a method of hierarchical cluster analysis with Ward's object linkage method was used on the basis of the Euclidean distance matrix between the variables representing the responses to the items of the MS-40 scale. The method was chosen due to its being adequate

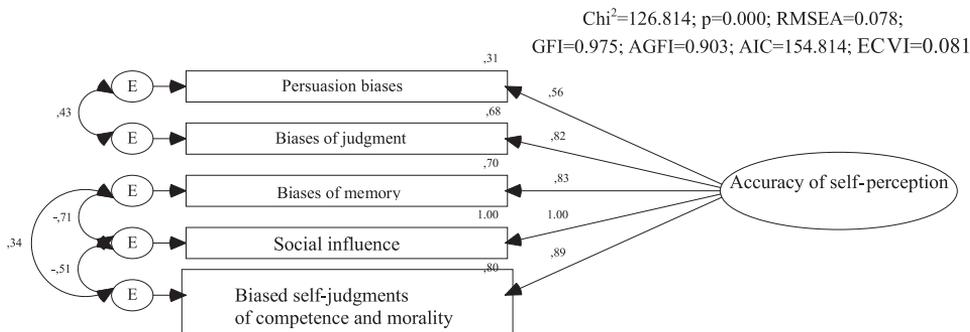


Fig. 2. Confirmatory analysis of the model with assumed mutual correlation of selected residual variances [See: Brycz & Karsiewicz, 2011, pp. 50]

for searching for the spaces common for specific groups (beams) of items included in the questionnaire and semantically close and at the same time possibly materially different from other beams.

Biased self-judgments of competence and morality are reflected by items 1, 2, 12, 14, 23, 26, 36, 37, and 40.

Items 3, 5, 11, 18, 19, 25, 27, 28, 29, 32, 34, 35, and 38 belong to social influence.

Biased memory involves items 6, 7, 8, 9, and 10.

Judgmental biases are covered by items 4, 17, 21, 22, 24, 30, 31, 33, and 39.

Persuasion biases are reflected in items 13, 15, 16 and 20.

The entire Metacognitive Self Scale is attached (Appendix 1) at the end of this article.

A detailed analysis of the results presented in the diagram above leads to the conclusion that the idea of a general competence construct for an accurate self-perception finds its reflection in the presented model. Beam 5, considering the assumptions defined in this model, is twice as weak as the others in respect to self-perception, although it is still a value of high statistical significance ($p = 0.56$). It is extremely interesting that the correlation of the error variance for beams 5 and 4 (irrationality of thinking and judgment, and compliance with persuasion) is moderately positive ($r^2=0.43$). Similarly, the mutual correlation of residual variances of beams 3 and 1 (bias of memory and judgment, and morality-competence conflict) is positive ($r^2=0.34$). The correlation between the specific variances of beam 2 (social impact) with beams 1 and 3 (memory and judgment bias, and morality-competence conflict) is strongly negative (respectively, $r^2=-0.71$ for the correlation with the specific variance of beam 3 and $r^2=-0.54$ for the correlation with the error variance of beam 1). This correlation indicates that the structure of the MS-40 scale may contain two "metadimensions" describing the correlations between the highlighted beams in a more accurate way. Nevertheless, singling

out these measurements would augment the difficulties with the interpretation of the content. Moreover, as is proved by the result of clustering analysis (compare Error: Reference source not found 1), they would probably be characterized by a very broad scope of content, and so they would be of a highly unsatisfactory reliability.

Reliability of the scale

In order to assess the internal coherence of the MS-40 scale as well its specific sub-scales for the results of a validation study, reliability was analyzed utilizing Cronbach’s alpha. The results of the analysis are presented in Table 2.

The results of the internal coherence analysis of the MS-40 scale justify the assumption that both the specific beams of the items from the questionnaire and the general results are reliable and internally coherent scales. The evaluations of α -Cronbach reliability coefficients for the whole validation study are highly satisfactory: the alpha values run between 0.77 and 0.92, with an average correlation between the r items in the range from 0.33 to 0.71.

At the same time, it is worth mentioning that the results of reliability analysis are repeated fairly systematically in specific validation studies. This is especially

Table 2: Summary of reliability analysis by Cronbach’s alpha in a population sample

Validation study	N	Beam 1		Beam 2		Beam 3		Beam 4		Beam 5		Results	
		Alpha	r	Alpha	r								
Total community sample	1903	0.91	0.55	0.91	0.44	0.88	0.61	0.82	0.36	0.77	0.46	0.92	0.73
Gender													
Women	782	0.93	0.60	0.91	0.45	0.89	0.63	0.82	0.37	0.68	0.35	0.92	0.76
Men	1043	0.90	0.50	0.89	0.39	0.88	0.61	0.76	0.28	0.66	0.33	0.90	0.69
Socio-professional group													
Full-time students	161	0.72	0.19	0.78	0.15	0.69	0.25	0.72	0.28	0.83	0.37	0.95	0.83
Part-time students	330	0.95	0.66	0.94	0.53	0.88	0.60	0.84	0.41	0.76	0.33	0.84	0.53
Working non-students	193	0.68	0.27	0.66	0.21	0.66	0.26	0.48	0.10	0.55	0.24	0.71	0.46
Overall population	606	0.92	0.57	0.91	0.43	0.93	0.74	0.81	0.35	0.72	0.39	0.91	0.79
Scale summary													
Number of items	9		13		5		9		4		5		
M	49.55		42.11		51.87		34.05		29.36		41.39		
SD	21.17		18.93		27.9		18.27		19.64		18.57		
Median	48.89		42.31		48		33.33		27.5		41.91		
Skewness	-0.57		-0.38		0.72		0.13		0.88		-0.32		
Peakedness	0.18		0.14		1.79		0.01		1.14		0.25		

true for the reliability analysis separate for both sexes. The only exception is the coherence of beam 5, with the smallest number of items in the whole questionnaire. Reliability indices fall insignificantly below the limit of 0.70, though it is worth noticing that the average correlation between the positions of beams (respectively, $r = 0.35$ in the case of women and $r = 0.33$ in the case of men) is maintained on a high level. Therefore, it can be assumed that the index would reach a highly satisfactory value if the scale were extended by one item.

The analysis of the internal coherency index assessments of specific beams of the MS-40 scale, as well as the general result, prove that the reliability of the measurement is slightly lower in the case of full-time students, as well as adult non-students (professionally active with secondary education, see table 2). It can be said that the construction of the MS-40 scale or its specific items was particularly ambiguous or too complex for the people from these populations. This result is to some extent concurrent with the results of confirmatory factorial analysis described in the previous paragraph, where socio-professional status was a factor that modified the factorial accuracy of the assumed five-factor structure of a Metacognitive Self in a significant way. During future validation studies it would be worthwhile verifying the hypothesis that the level of education or age may determine the ease of answering questions from the MS-40 scale in a significant way.

Stability of the Metacognitive Self Scale (MSS)

The test of absolute stability was based upon verification of the correlation strength between two measurements taken in the same population sample at a specified time interval. The validation study was carried out on three groups of part-time students (N=90) from the Academy of Physical Education and Sport in Gdańsk (N=72), the Gdynia Maritime Academy (N=64), and the Academy of Music in Gdańsk (N=54). The results of the measurement with the MS-40 scale were repeated after 13-16 weeks. The correlation coefficients obtained between the results of both measurements divided into particular beams with isolation of consecutive groups are presented in Table 3.

Table 3: Correlations of the results of the repeated measurement with the MS-40 scale

Scale	Whole community sample (N=190)	Academy of Physical Education and Sport in Gdańsk (N=72)	Gdynia Maritime Academy (N=64)	The Academy of Music (N=54)
Beam 1	0.62**	0.49*	0.78**	0.58**
Beam 2	0.55**	0.54**	0.63**	0.46*
Beam 3	0.23	0.22	0.20	0.21
Beam 4	0.53**	0.46*	0.69**	0.47*
Beam 5	0.45*	0.45*	0.50**	0.40*
Results	0.58**	0.52**	0.69**	0.52**

* $p < 0.05$; ** $p < 0.01$.

Time between the first and repeated tests was 13-16 weeks.

The results of the analysis prove that both the specific beams and the general results of the MS-40 scale are characterized by moderate stability of results over time. The correlation ratios range from 0.45 to 0.78, which demonstrates a certain stability of results over time. The only exception in the MS-40 scale is beam 3, *"The accuracy of perceiving bias in memory and judgement."* Systematically, the time stability ratio in all the tested groups of this beam proved statistically insignificant and exceptionally low. However, this result may be related to educational impact. These students had participated in an introductory course in Psychology, where one of the subjects was an introduction to the basic issues of social psychology, i.e. memory, thinking and bias in social judgments. It is extremely interesting that this influence, if it is to be treated as the reason for such a disturbance of time stability, demonstrated itself only within the scope of the scale whose subject matter was related to memory and positive bias, and was not so explicitly demonstrated in the beams that contained the descriptions of thinking bias mechanisms (e.g. Beam 4, *"Perceiving the irrationality of one's own thinking and judgments."*)

The 3x2 ANOVA was performed for the intergroup major factor (Academy of Physical Education and Sport vs. Maritime Academy vs. the Academy of Music) and the intragroup factor of repeated measurement (pretest-retest) was carried out to verify the hypothesis of stability of measurement results by the use of an item from beam 3 in the MS-40 scale in the tested population. The results of the analysis are presented in Fig. 3.

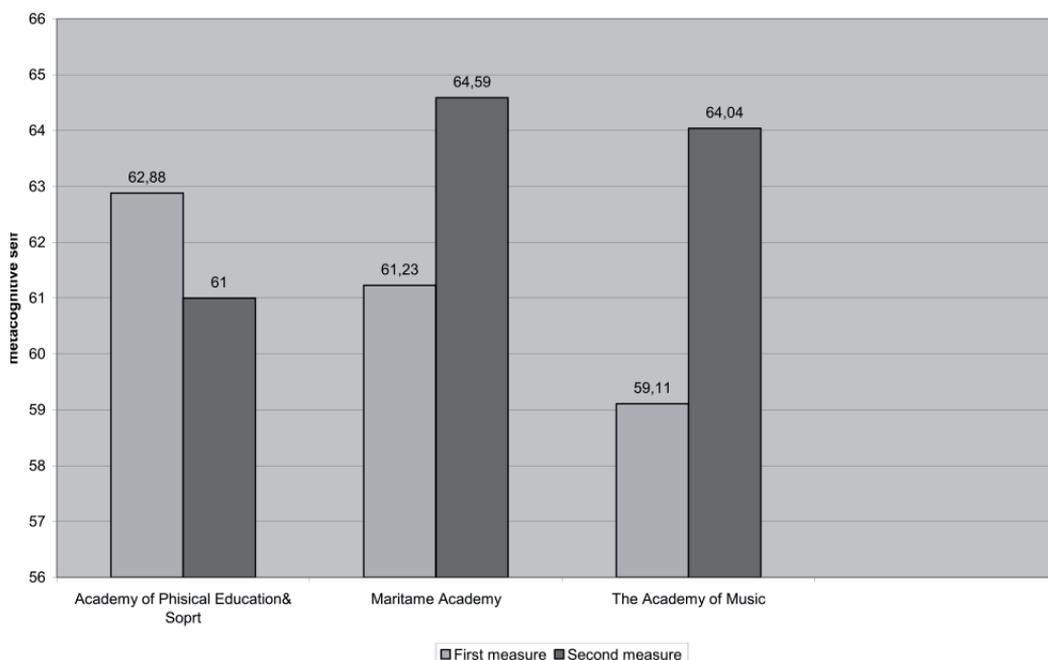


Fig. 3. Averages obtained during the test for the results of stability level in beam 3, "The accuracy of perceiving memory and judging bias."

The results of this analysis prove that the effect of the measurement (pretest-retest) is weak and significant only on the level of statistical bias ($F(1;187)= 2,738$; $p<0.10$; $Eta^2=0.029$). At the same time, the two remaining impact effects, i.e. the major effect ($F<1$) and interaction effect ($F(2;187) = 1.682$; $p<0.20$; $Eta^2 = 0.019$), were not significant. The analysis of simple effects via post-hoc comparisons and the HSD Tukey method indicated that the only significant effect of the measurement (on the level of statistical tendency) is the difference in both measurements in the case of the group of students of the Academy of Music ($t(53)=1.783$; $p<0.10$; $d=0.489$). It can be stated that the hypothesis that results can change in particular beams of the MS-40 scale under the influence of educational activities is poorly justified. Nevertheless, it is possible that this impact was too subtle, because it did not include the presentation of selected bias mechanisms of the psychological existence of a human being. As the test results indicate (Brycz, 2004), in such a case self-defensive mechanisms are activated, serving to maintain one's own high self-esteem.

To summarize the results of the MS-40 scale reliability and accuracy, it can be stated that the scale seems to have an internally coherent structure described by five semantic beams which can be characterized by a relatively good stability result over time. At the same time, it can be assumed that through educational activities or conscious pedagogical and psychological actions, the accuracy of self-perception can be shaped to a certain extent. Nevertheless, this thesis should be approached with particular caution. It is based on the results of a single test based on a quasi-experimental procedure. The shortcomings of this procedure do not allow for a more definite stand, also with regard to the time stability of the MS-40 scale, because of the lack of a reference criterion which might be constituted by the result not loaded by the influence of the educational or protest factor. In order to verify the empirical thesis concerning the stability of the measurement of the accuracy of self-perception and its sensitivity to pedagogical and psychological actions, it seems necessary to conduct research utilizing Solomon's methodology (compare Brzeziński, 1978; 1996; Ferguson et al., 2001).

Several experiments showed the core of relations between metacognitive self and aptitude of motivation to attain the given goal.

Study 1

The aim of this study was based on the hypothesis that there is a close relation between high scores obtained in Metacognitive Self Scale and the attainment of goal. It might be reasonable to suppose that good insight into one's own biases produces better goal completion than in the case of poor self-insight.

Participants

160 undergraduate students from the University of Gdansk, half of them female, participated in the study. The students were assured that the study was anonymous. After completing the task, they were thanked and fully debriefed.

Procedure

The students were told that they were to fill out several questionnaires. They were also assured that they would remain anonymous. After consent was obtained from each student, they indicated their gender, and then filled out the Metacognitive Self Scale and Schwartz' Value Scale. It is easy to predict that achievements are a very important goal for undergraduate students. Do they differ in the level of goal importance according to the level of their metacognitive self?

RESULTS

The regression coefficient obtained with metacognitive self as independent variable and individual importance of value: achievement as dependent variable showed standardized $\beta = 2.90$, $t = 3.39$, $p = 0.000$, $VIF = 1$, $R^2 = 0.1$. Gender did not play any role. Participants with better insight into their biases are more directed to attain goal: achievements than participants who are not able to accurately recognize their biases (weak metacognitive self, see figure 1).

Study 2. Quasi-experimental study

The main aim of the study was to investigate whether people who are highly amenable to temptations (Shah & Kruglanski, 2002) and appear to possess a strong metacognitive self would appreciate achievements more than subjects who reject temptations and exhibit a weak metacognitive self.

Participants

80 undergraduate University of Gdansk students, half of them female, participated in the study. The students were assured that the study was anonymous. After completing the task, they were thanked and fully debriefed.

Procedure

The students filled out a "temptation questionnaire" (Brycz & Karasiewicz, 2011), then they relaxed, and were asked to give demographic data. Two weeks later the participants were divided into two groups: one group consisted of students that were highly amenable to temptations, while the other group was made up of students that reject temptations. Separately within each group relations between metacognitive self and Schwartz values were examined. All the students filled out the two questionnaires: Schwartz's Value Survey and the Metacognitive Self Scale. The two were filled out in random order, and no effect either of recency or primacy appeared.

RESULTS

Students who are highly amenable to temptations also appreciate achievements significantly more ($\beta = 0.40$, $p < 0.04$, $t = 2.30$, $R^2 = 0.16$) than participants who reject temptations ($\beta = 0.32$, $p = 0.06$, $t = 2.00$, $R^2 = 0.09$). The results are more salient when metacognitive self mediates. Students with the strong metacognitive

self who consciously accept temptations strive to attain achievements much more than other groups.

Metacognitive self and awareness of the existence of temptations that might inhibit attaining the goal help to increase the importance of achievements.

DISCUSSION

Metacognitive self, understood as good insight into one's own biases, seems to be an individual trait. Research (many unpublished MA theses written under my supervision) has shown that priming has no impact on metacognitive self. Other studies explain that changes in metacognitive self are possible only when a factor (such as possessing power) has a really long impact on a subject (Ziemiański & Brycz, 2011).

Moreover Karasiewicz (2009) in 5 experiments documented that people with strong metacognitive self are better in attaining goals even when they have experienced an ego depleted by manipulation (Baumeister & Vohs, 2002).

We explore metacognitive self as a very cognitively and emotionally important self construct that allows for better self-regulation.

Moreover, the metacognitive self contains a factor of self-control. Metcalfe et al. (2007) suggested that activation in the anterior insula is related to the feeling of control, whereas less self-control is related to activation in the right inferior parietal cortex (pp. 185). There may be an embedded neurocorrelate associated with Metacognitive Self.

Moreover, Pachalska & MacQueen (2007) and Grochmal-Bach & Pachalska (2004) have point to the neuronal basis of the self in terms of microgenetic theory. Metacognitive self may prove to be useful for further neuropsychological explorations.

CONCLUSION

The Metacognitive Self Scale appeared to be an accurate and reliable questionnaire among Polish groups. Moreover, several studies have shown that a strong metacognitive self allows for better self-regulation in many domains of life. In other words, a strong metacognitive self improves well-being and quality of life (three studies described above).

Moreover, metacognitive self seems to be an individual feature. People differ in their scores on the scale. Interestingly, the typical priming used in social psychology has no impact on the level of metacognitive scale. In other words, it is possible to compare the ability to recognize own's own biases (meaning a metacognitive self that serves regulatory functions) to Dweck's (2000) theory of individual intelligence perception. Ziemiański and Brycz (2011) observed an increasing metacognitive level among people who are in position of power for a long time, as contrasted to those who possess power for a short time. We may develop better insight into our own biases as time passes by; the environment helps us to learn about ourselves and we possess motivation to maintain distance to ourselves. These conditions create a stronger metacognitive self and allow for better self-regulation.

REFERENCES

- Bar-Tal, Y., Raviv, A. & Spitzer, A. (1999). The need and ability to achieve cognitive structuring: individual differences that moderate the effect of stress on information processing. *Journal of Personality and Social Psychology*, 77(1), 33–51.
- Baumeister, R.F. & Vohs, K.D. (2004). *Handbook of self-regulation: research, theory and applications*. New York: Guilford Press.
- Brycz, H. (2004). *Accuracy of Self versus Other perception*. Cracow: Impuls.
- Brycz, H. & Karasiewicz, K. (2011). *Metacognitive Self Scale: interdependence between self-insight into own biases and self regulatory abilities*. Cracow: Impuls.
- Carver, C.S. & Scheier, M.F. (1981). Attention and self-regulation: a control theory approach to human behavior. New York: Springer-Verlag.
- Carver, C.S. & Scheier, M.F. (1982). Control theory: a useful conceptual framework for personality-social, clinical, and health psychology. *Psychological Bulletin*, 92(1), 111–135.
- Carver, C.S. & Scheier, M.F. (1998). *Is behavior controlled or does it emerge? on the self-regulation of behavior*. Cambridge: Cambridge University Press.
- Dweck, C.S. (2000). *Self-theories: their role in motivation, personality and development*. Philadelphia: Psychology Press.
- Efklides, A. (2008). Metacognition: defining its facets and levels of functioning in relation to self-regulation and co-regulation. *European Psychologist*, 13(4), 277–287.
- Epley, N., Dunning, D. (2000). Feeling “holier than thou”: are self-serving assessments produced by errors in self- or social prediction? *Journal of Personality and Social Psychology*, 79, 861–875.
- Epstein, S. (1980). The self-concept: a review and the proposal of an integrated theory of personality. In: E. Staub (ed.), *Personality: basic issues and current research*. New York: Prentice Hall.
- Fischer, P., Greitemeyer, T. & Frey, D. (2008). Self-regulation and selective exposure: the impact of depleted self-regulation resources on confirmatory information processing. *Journal of Personality and Social Psychology*, 94(3), 382–395.
- Flavell, J. (1979). Metacognition and cognitive monitoring: a new area of cognitive developmental inquiry. *American Psychologist*, 34, 906–911.
- Gage, N.L. & Cronbach, L.J. (1955). Conceptual and methodological problems in interpersonal perception. *Psychological Review*, 62, 411–422.
- Grochmal-Bach, B. & Pachalska, M. (2004). *Tożsamość siebie i teoria mikrogenetyczna*. Krakow: WAM
- Haidt, J. (2007). *The happiness hypothesis: finding modern truth in ancient wisdom*. Gdansk: GWP.
- Higgins, E.T. (1996). The “self digest”: self-knowledge serving self-regulatory functions. *Journal of Personality and Social Psychology*, 71(6), 1062–1083.
- Hull, J.G., Van Treuren, R.R., Ashford, S.J., Proppom, P. & Andrus, B.W. (1988). Self-consciousness and the processing of self-relevant information. *Journal of Personality and Social Psychology*, 54(3), 452–465.
- Jones, E.E. & Pittman, T.S. (1982). Toward a general theory of strategic self-presentation. In: J. Suls (ed.), *Psychological perspectives on the self*. Hillsdale, New Jersey: Erlbaum.
- Karasiewicz, K. (2009). Metacognitive self and the directions of self-control. Ph. D (supervisor: Hanna Brycz) Dissertation University of Gdansk.
- Koriat, A. (2007). Metacognition and consciousness. In: P. Zelazo & M. Moscovitch (eds.), *The Cambridge handbook of consciousness* (pp. 289–325). Cambridge, UK: Cambridge University Press.
- Moore, D.A. & Small, D.A. (2007). Error and bias in comparative judgment: on being both better and worse than we think we are. *Journal of Personality and Social Psychology*, 92(6), 972–989.
- Metcalfe, J. & Greene, M. (2007). Metacognition of agency. *Journal of Experimental Psychology: General*, 136(2), 184–199.
- Moskowitz, G. (2005). *Social cognition: understanding self and others*. New York & London: Guilford Press.

-
- Nelson, T.O., Kruglanski, A.W. & Jost, J.T. (1998). Knowing thyself and others: progress in metacognitive social psychology. In: V.Y. Yzerbyt, G. Lories, B. Dardenne & O. Thousand (eds.), *Metacognition: cognitive and social dimensions* (pp. 69–89). Los Angeles: Sage Publications.
- Ney, T. & Gale, A. (1989). *Smoking and human behavior*. Oxford: John Wiley & Sons.
- Pachalska, M. & MacQueen, B.D. (2007). The microgenetic revolution in contemporary neuropsychology and neurolinguistics. In: M. Weber & A. Weekes (eds.), *Whiteheadian approaches to consciousness in psychology, neuropsychiatry and philosophy of mind* (pp. 63-76). Whitehead Psychology Nexus Studies II. Lancaster: Ontos Verlag
- Shah, J. & Kruglanski, A. (2002). Priming against your will: how accessible alternatives affect goal pursuit. *Journal of Experimental Social Psychology*, 38, 316-325.
- Sedikides, C. & Gragg, A.P. (2008). Self-enhancement: food for thought. *Perspectives on Psychological Science*, 3, 102–116.
- See, Y.H.M., Petty, R.E. & Fabrigar, L.R. (2008). Affective and cognitive meta-bases of attitudes: unique effects on information interest and persuasion. *Journal of Personality and Social Psychology*, 93(6), 938–955.
- Tesser, A., Wood, J. & Stapel, D., eds. (2005). *On building, defending and regulating the self: a psychological perspective*. New York: Psychology Press.
- Weinstein, N.D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, 39, 806–820.
- Ziemiański, P. & Brycz, H. (2011). Metacognitive self and power: initial understanding. Public lecture, University of Gdansk.

Address for correspondence:

Prof. zw. dr hab. Hanna Brycz
Institute of Psychology, University of Gdansk
Bażyńskiego 4, 80-309 Gdańsk, Poland
e-mail: psyhb@univ.gda.pl

Appendix 1

Questionnaire MS-40

Below you will find 40 detailed behaviors, thoughts and feelings that may concern you in a certain way. Imagine that such behavior happens to you and mark it on the scale from 0% (it doesn't concern me at all) to 100% (it concerns me totally) indicating to what extent this behavior concerns you – e.g. describes your (even hypothetical) reactions. It's completely up to you where you are going to mark the point on the whole line (please don't use only 0%, or 100%). Please answer the following questions honestly, the survey is completely anonymous and serves scientific purposes.

1. After some time I notice my own mistakes more often and to a lesser degree look for them around me.

0%

100%

2. When an ability is of little importance I always forgive people their mistakes; for example, if the whole party was good, I would judge a hostess positively even though she had burnt the main course.

0%

100%

3. When morality concerns the most important matters I am uncompromising towards people and I will judge a murderer negatively although I know that he once saved the life of a drowning child.

0%

100%

4. I value some personality traits more than others and I have a more positive attitude towards a person who is intelligent than towards a person who is patient.

0%

100%

5. When I am "in the doldrums" I perceive myself and other people in a more realistic way.

0%

100%

6. I tend to judge other people positively rather than negatively.

0%

100%

7. In a situation when my friend failed his university entrance examination I think about him even more positively and warmly than before the failure because I imagine that it is very painful for him.

0%

100%

8. I remember information better when I can relate it to the knowledge I already have.

0%

100%

9. I remember information best when it is contradictory to my current knowledge or consistent with it; the worst information for me to remember is neutral information.

0%

100%

10. I forget information most slowly when it is consistent with my current knowledge.

0%

100%

11. I can recall specific images more easily than sophisticated words.

0%

100%

12. The sight of human flesh (a just murdered person) influences my attitude towards the perpetrator more than, for example, information about a fascist who killed thousands of people during the Second World War.

0%

100%

13. I would visit a doctor for a medical examination more quickly if news were spread that a famous person (e.g. famous actress) has a cancer than if statistics of incidence were published.

0%

100%

14. I think that causes are similar to their effects, and when I realize that some phenomenon is very complicated I think it was brought about by many causes.

0%

100%

15. If something or someone from the outside forces me to change my behavior, my views concerning this behavior also change.

0%

100%

16. The significance of information about another person (for example, that she speaks Spanish perfectly) will fade, and in a certain way will diminish, when I hear more specific information about her, such as that this person watches daily evening films for children, does exercises to stay fit or eats snails.

0%

100%

17. I carry out simple activities more efficiently (such as activities done while working in a factory, daily routine, or other repeated activities, such as house cleaning) in the presence of other people who are also working.

0%

100%

18. I don't like people, phenomena or even dishes which in the past I associated with something unpleasant.

0%

100%

19. I repeat those behaviors for which I am rewarded.

0%

100%

20. TV commercials really influence my choices and I buy advertised products more often.

0%

100%

21. As a child and also later as an adult I have had views on politics, religion or upbringing rather similar to the views of my parents.

0%

100%

22. I play down the significance of information which is contrary to the views important to me. I act this way in order not to feel upset; I always feel upset when something is in opposition to my attitude towards important matters.

0%

100%

23. When I concentrate on myself, as when looking at my reflection in the mirror, I act in the way my beliefs tell me.

0%

100%

24. Sometimes only serious arguments can persuade me to change my views; sometimes the charming appearance of the speaker is enough.

0%

100%

25. Several arguments by the opponent are enough to make me immune to counter-propaganda.

0%

100%

26. The censoring of messages affects me contrary to the intentions of the censor.	0%	100%
27. I learn most new behavior by observing other people's actions and their results.	0%	100%
28. Only the inevitability of the punishment that I need to inflict upon others and not its severity can help eliminate their unwanted behavior.	0%	100%
29. Irregular rewards (e.g. those that sometimes occur after desirable behavior and sometimes not) have more influence on me than regular rewards.	0%	100%
30. In the presence of very strong emotions, I cannot control myself and do not behave rationally.—	0%	100%
31. The more difficult the task I face, the more likely it is that my nervousness will spoil everything.	0%	100%
32. I like people whom I associate with pleasure and I don't like people whom I associate with something unpleasant.	0%	100%
33. If my parents forbade me to contact my girlfriend or boyfriend, it would make the feelings between us stronger.	0%	100%
34. I more readily help people who are similar to me in some way.	0%	100%
35. When there is contradiction between words and body language (gestures, mimics), I base my judgment about another person on facial expression, movements of body or tone of voice, and not on words.	0%	100%
36. If I were a manager who proposes possible ways of solving problem in a friendly way, I would achieve better results than if I only gave commands and orders.	0%	100%
37. When someone gives me a gift, I repay in a similar manner.	0%	100%
38. When I meet a person with whom I must cooperate and who is similar, I will like them at once.	0%	100%
39. My efficiency is more important to me than morality, I can forgive myself mistakes related to morality (e.g. lies) but I can't forgive myself failures (e.g. a gaffe in the presence of other people).	0%	100%
40. Other people's morality is more important to me than their efficiency, I cannot forgive a person who cheated me but I can forgive when someone rides a bike poorly.	0%	100%
	0%	100%

