Are Deliberative People More Consistent in Decision Making?

Róbert Hanák

Slovak Academy of Sciences
Department of Experimental Psychology
Dúbravská cesta 9, Bratislava, 841 03, Slovakia

ABSTRACT

The preference for intuition and deliberation scale (PID) as a cognitive style measure was used to investigate whether more deliberative participants (identified by self-report PID inventory) would also show higher motivation to properly and normatively solve a task designed to measure their inconsistency and discrimination to details (CWS Index). 161 (103 women) managers and administrative workers were asked to evaluate 21 fictional job candidates. The decision task was designed so that participants could work according to their preferences – everyone had enough time to analyse the logic behind the task. Significant differences were found among all four groups (deliberative, intuitive, both below median, both above median) in levels of inconsistency. Totally consistent respondents were significantly more likely to be from the deliberative and mixed (high in deliberation and in intuition) groups.

Keywords: thinking dispositions, cognitive style, Preference for Intuition and Deliberation, PID, CWS index, motivation, consistency

ARE THINKING DISPOSITIONS MANIFEST IN THE DECISION OUTCOME?

Stanovich (2011) integrated various aspects of human thinking into a tripartite model of human mind. In this model, human thinking is divided into two types of processing. The Type 1 (Autonomous Mind) is evolutionary older and its activation is mandatory after encountering a problem. It consists of several subsytems (TASS, The Autonomous Set of Systems), which work quickly, in parallel, without intensive cognitive effort and are often associated with heuristics (Stanovich 2008, Kahneman, 2011). Relying on heuristics could be ecologically very useful in saving effort, time and cognitive capacity (Gigerenzer, 2007). On the other hand these heuristics in many (well documented) cases, tasks or problems produce non-optimal or irrational responses. There are many documented biases in the JDM literature caused by this way of thinking (Kahneman, 2011), also often referred to as miserly processing (Stanovich, 2011)

Stanovich (2008, 2011) not only sees the Autonomous mind as a set of systems, but he also differentiates Type 2 processes, responsible for our rational thinking, into two broad categories – the Algorithmic mind and the Reflective mind. The Algorithmic Mind reflects the cognitive abilities of a person and could be measured by intelligence tests. Higher cognitive abilities (intelligence) explain a large proportion of the successful solving of various logical, mathematical or “real” life tasks, problems and complex human behavior, but they fail to explain all (Pacini,

https://openaccess.cms-conferences.org/#/publications/book/978-1-4951-2095-4

Epstein, 1999; Bruine de Bruin, Parker, Fischhoff, 2007; Kokis, Macpherson, Toplak, West, Stanovich, 2002). On the other hand, the Reflective mind consists of individual differences in thinking disposition. Often labelled as cognitive styles, some measure the functioning of the Reflective mind. In contrast with the Algorithmic mind reflecting computation power and performance, cognitive styles concern "beliefs, belief structure, attitudes toward forming and changing beliefs, goals and goals hierarchy (Stanovich, 2011, 35). Therefore, individual differences in rational (defined as optimal, normative) thinking are caused by both: individual differences in cognitive ability (intelligence) and individual differences in thinking disposition (cognitive styles). They are, in general, independent of each other and correlate only weakly (Ku, Ho, 2010, Bruine de Bruin, Parker, Fischhoff, 2007; Kokis, Macpherson, Toplak, West, Stanovich, 2002). Comparing their relative attribution to rational (optimal, normative) output of decision processes, thinking dispositions are probably more important than cognitive ability, which is only engaged when need. As Perkins and Ritchhart (2004, p. 352) explain: "How good a thinker are you? It must be answered as much in terms of people's attitudes, motivations, commitments and habits of mind as in terms of their cognitive ability".

Among many cognitive styles, Stanovich (2011) is concerned mostly with his own Actively Open-Minded Thinking (Toplak, West, Stanovich, 2011) and Master Rationality Motive (2008), but he also uses others: Need for cognition, Need for closure, Superstitious thinking, and Dogmatism. They are self-report inventories measuring a person's willingness to think deeply, consider various aspects of problems and arguments and general motivation to engage in thinking. The Open-Minded Thinking Scale and Need for Cognition Scale have been proved as predictors for various tasks (Stanovich, West, 1998, Sirota, 2008, Toplak et. al., 2013). All of these scales are constructed on the premise that only effortful thinking – deliberation – is crucial for rational output. Intuition is viewed as the opposite of rationality; it is connected with irrational thinking, and is seen as a cause for failure in rational thinking, so it has no place in these inventories. However, many other researchers examine rationality together with intuition, not as opposing poles, but as two (Hammond, 1996, Epstein, 2003) or more (Dewberry, Juanchich, Narendran, 2013) separate dimensions where intuition is not viewed only in negative way (Glöckner, Witteman, 2010; Čavojová, 2013a, 2013b).

This view is reflected in other cognitive style inventories, to name just a few: Rational Expierential Inventory (REI, Epstein, Pacini, Denes-Raj, Heier, 1996, Pacini, Epstein, 1999), Preference for Intuition and Deliberation (PID, Betsch, 2004); General Decision Making Style Scale (GDMS, Scott, Bruce, 1995). The REI showed the highest internal reliability in comparison with other scales (for review see Koele, Dietvorst, 2010; Hanák, 2013a, 2013b). PID also works well across cultural backgrounds (Witteman, 2009, Richetin, Perugini, Adjali, Hurling 2007). Both GDMS and PID also have appropriate levels of Cronbach´s alpha. REI and PID were tested in Slovak population (Hanák, Čavojová, Ballová Mikušková, 2012) and results showed their good psychometric properties (Ballová Mikušková, Hanák, Čavojová, 2014). Each of these inventories measure both rationality/deliberation and also intuition/experientiality dimensions.

The predictive validity of these and other cognitive style measures for various logical, mathematical, probabilistic reasoning and other tasks were investigated and found mostly positive results (Amstrong, Cools, Sadler- Smith, 2012, Cools, Amstrong, a Sadler- Smith, 2010, Hanák, 2013). However, there are only a few studies (e.g. Newstead, 2013) examining whether self-reported statements from cognitive style inventories are manifest connected with motivational measures. Thinking dispositions (cognitive styles) could be "translated" into specific traits closely connected with critical thinking. As such, they should be manifest in real processes and steps when solving tasks and problems. Perkins et al. (1993) introduced seven traits based on several sources of literature. They are:

1. The disposition to be broad and adventurous.
2. The disposition toward wondering, problem finding and investigating.
3. The disposition to build explanations and understanding.
4. The disposition to make plans and be strategic.
5. The disposition to be intellectually careful.
6. The disposition to seek and evaluate reasons.
7. The disposition to be metacognitive.

If we carefully and diligently apply these seven traits in combination with cognitive ability in decision process, our final decision is bound to be rational (optimal, normative). They also present motivation to solve problem. The PID cognitive style measure has nine questions in deliberative scale which fulfill these seven traits well.

PID deliberation scale (translation into English according to Betsch, 2008)

1. Before making a decision I think them through.
2. Before making decision I usually think about goals I want to achieve.
3. I consider myself.
4. I prefer making detailed plans rather than leaving things to chance.
5. I am a perfectionist.
6. I think about a decision particularly carefully if I have to justify it.
7. When I have a problem I first analyze the facts and details before I decide.
8. I think before I act.
9. I think more about my plans and goals than other people do.

Analysis of Perkins's seven traits reveals that most of them embody an intrinsic motivation to do the "job" properly and come to the best possible (normative) solution of all those available. If we offer participants a task where they have two ways to solve it, one much easier (but normatively incorrect) and one more difficult (but normatively correct), we expect that those who view themselves as deliberative should choose to resist miserly processing (cognitive laziness) and therefore, be more normatively correct.

Therefore, our aim was to examine whether more deliberative participants would act accordingly in a task designed to measure motivation for figuring out hidden principle and thus manifest high levels of consistence.

STUDY: ASSESSING MANAGERIAL STUDENTS' MOTIVATION FOR OPTIMAL OUTPUT THROUGH COGNITIVE STYLES

Participants

161 Slovak managers and administrative workers (mean age 31.5 years, SD = 9.4) participated in our study, 103 were female. All were external students of the School of Economics and Management of Public Administration in Bratislava and were in the second year of their bachelor degree. They participated for extra credit, without financial incentive. Data were collected in 2012 from respondents living in Bratislava's metropolitan area (Slovak capital). No exclusion criteria or any restriction, except age over 18, for participants were implemented. During lectures participants obtained an MS Excel file that they were asked to complete according to the presented instructions and send back via email to the teacher within one month.

Measures

Preference for Intuition and Deliberation (PID, Betsch, 2004) is a relatively new inventory designed for measuring affective intuition, defined as being based on implicit knowledge and also as a basic mode of decision making (Betsch, Kunz, 2008). This mode uses mostly affect as a decision criterion (high preference for intuition relates to Type 1 processes and reliance on instant impressions and emotions). Deliberation is defined as decision making using explicit evaluation, rules of deciding, beliefs and reasons (high preference for deliberation relates to trusting Type 2 processes). PID consists of 18 items; 9 for PID-Intuition (e.g. "I listen carefully to my deepest feelings.") and 9 for PID-Deliberation (e.g. "Before making decisions I usually think about the goals I want to achieve."). Participants indicate their agreement with these statements on a 5-point Likert scale with 1 meaning "totally disagree" and 5 "totally agree". According to recommended method (Betsh, Ianello 2010) of median split, we identified four types: pure intuitive (scoring above MDN = 30.0 in preference for intuition and below MDN = 35 in preference for deliberation), pure deliberative (vice versa), mixed (scoring above MDN in both preferences) and indifferent (scoring below MDN in both preferences). The mean for deliberation M = 33.56 showed a higher preference for rationality than for intuition M = 30.17. In this study, the internal consistency by Cronbach's alpha for PID-D was measured as .795 and for PID-I as .744, which is an acceptable level and in accordance with Slovak population (n = 750) where was 0.827 for PID.D and 0.738 for PID-I (Ballová Mikušková et al., 2014). Levels of Cronbach´s alpha in this study are comparable to other cross- cultural backgrounds, where Betsch (2004) found .77

for PID intuition and .79 for PID deliberation for 2132 Dutch participants. Richetin, Perugini, Adjali, Hurling (2007) found in a sample of 299 British students lower levels .62 for PID intuiton and .77 PID deliberation. The best results for internal consistency was found by Witteman et al. (2009) who found .87 for PID Intuition and .85 for PID deliberation in a group of 405 Dutch students.

CWS index task (modified)

Motivation for best achievement and willingness to think thoroughly about the principles and logic behind a task was measured by a separate task based on the logic of CWS index (Shanteau, 2001, 2003). This index measures the consistency and discrimination of people by presenting them with many stimuli, some of which are identical, and measuring the ability of participants to detect differences and consistencies among stimuli. In original use of CWS index people are not allowed to know principle behind the index and do not have a time to figure it out (Weiss, Shanteau, 2003). In this work we used it exactly in opposite way and gave people a lot of time to figure it out.

The basic task was to evaluate 21 job applicants for a specific job post. All job applicants were described in one or two sentences by four cues (cognitive tests, years of experience, peer review and assessment centre). For each cue an applicant could have a positive or negative attribute. For example, for cognitive test the negative option was as follows *"The applicant achieved and average score in cognitive tests and in some tests even a below average score."* and the positive was *"The applicant achieved a highly above average score in cognitive tests."* Positive values were coded as 1 and negative values as 2. The 21 fictional job applicants were mathematically generated as all possible combinations of 1 and 2 in four cues, which made 16 combinations. Five job applicants were included twice, but participants were not informed about this fact and the applicants were labelled with different names. These 5 applicants were used for the consistency measure. Respondents were only asked to evaluate job applicants without any other instruction. For each job applicant they could assign 0 to 100 points and they could assign the same points to different candidates if they wanted. Discrimination was measured as the variance among the scores of all 21 job applicants. Applicants were different, therefore the higher variance among them, the better the participant's ability to discriminate the details and demonstrate them in their decision making. Inconsistency was measured by the variance between two applicants who with identical attributes but labelled by different names. Here variance should be minimal or zero. The procedure was as follows.

Participants had one month to fill in the task as it was part of the home assignment given during a management course. The task was designed to (indirectly) measure motivation for achieving the optimal solution. Participants received an email with an MS Excel file with 21 tables containing all 21 job applicants. Participants could spend time learning the rules and principles of the task and thus assess the job applicants in a mathematically optimal way and reach a high or absolute level of consistency. However, they needed internal motivation and desire to do this, because they were only asked to evaluate job applicants and not to figure out the principle behind the task. Solving the problem was not very difficult, but this process could be time-consuming and participants needed to work systematically, seek truth, calculate, make notes, be thorough, have the final aim in mind and compare the attributes of fictional applicants. We expected that these characteristics would be reflected in a higher score of deliberation in PID. Looking at Perkins et. al. (1993) dispositional traits in our introduction, respondents surely needed to apply almost all of them, especially disposition numbers: 1, 2,3,4,5 and partially 6 and 7, to come to the best solution (especially when not asked to do so). It would be very unlikely to reach a high score in this task purely by chance.

The opposite behaviour could be considered as indicative of miserly processing. Miserly processing is assumed to lead to mistakes because people are not expected to be able to hold in their working memory all the required combinations and facts for completing this task. PID-Intuition measures affective intuitive behaviour and we expected that those who scored high in PID-I would make their decision without deeper analysis, therefore demonstrating high levels of inconsistency.

This task was not very demanding in terms of cognitive ability (algorithmic mind) especially for college students. Rather, it reflected the principal characteristic of the Reflective mind, i.e. motivation for rational integration and overriding people´s propensity for miserly processing. Therefore, we assumed that differences in consistency scores would be caused by differences in motivation for deliberative thinking or in other words abstaining from Autonomous mind rather than differences in cognitive ability.

Results

Mean discrimination to details was 428.7 (SD = 277.24) and mean inconsistency was 124.71 (SD = 210.97). Discrimination (Table 1) and inconsistency (Table 2) scores were compared between the four groups according to their PID score (*intuitive, deliberative, mixed* – both above median and *indifferent* – both below median).

Table 1. Descriptive statistics for deliberation across thinking disposition groups

Group	Mean	Standard Deviation
Intuitive (intuition above MDN)	485.77	365.23
Deliberative (deliberation above MDN)	433.79	225
Mixed (both above MDN)	402.37	271.79
Indifferent (both below MDN)	396.52	249.16

There were no significant differences in ability to discriminate details between all groups: F (3,157) = .844; p = .472. Comparing only the intuitive group to the deliberative or mixed groups also showed no significant differences. Also, the ability to discriminate details does not correlate with PID deliberation scale (motivation to solve problems), r = -.075, p = .326.

In inconsistency score, we expected that this scale to measure motivation to solve problems, therefore when solving a task where motivation plays a key role, there should be differences. Inconsistency scores ranged widely from 0 to 1370. The results for inconsistency across the four thinking dispositions groups in are in Table 2. The data were not normally distributed, Kolmogorov-Smirnov test showed not normally distributed data for each group, and therefore nonparametric tests were used. A Kruskal – Wallis test showed significant differences among all four groups (H (3) = 9.05, p = 0.029). Those in the intuitive group demonstrated a three times higher level of inconsistency compared to the deliberative group and where two times higher level compared to mixed group (both above). These three groups were investigated. Therefore, as a follow-up Mann –Withney tests were applied with Bonferroni correction, so all results are reported with 0.0167 significance. Difference between group deliberative and intuitive was not significant after Bonferroni correction (U = 411, n = 69, p = 0.032), but with medium effect size r = -0.258. Group with mixed score (above median in deliberation and also in intuition) compared to intuitive group differed significantly (U = 620, n = 85, p = 0.016, r = -0.261).

Table 2. Descriptive statistics for inconsistency (raw score) across thinking disposition groups

Group	Mean	Standard Deviation
Intuitive (intuition above MDN)	184.04	244.11
Deliberative (deliberation above MDN)	61.46	61.71
Mixed (both above MDN)	88.87	169.06
Indifferent (both below MDN)	137.78	257.33

Achieving total consistency required participants to find all five duplicate fictional applicants and to assign the same points to each of the pair. Doing this randomly was highly improbable. In fact, it suggests that these Cross-Cultural Decision Making (2019)

participants discovered the hidden principle behind the task and acted accordingly. There were 15 (9.3%) respondents who did this. We were interested in which group, according to PID (intutitive, deliberative, mixed, and indifferent) they belonged to. We found that only two of them were in the deliberative group, two were from the intuitive group, and one from the indifferent group (low in deliberation and intuition), and eight were from the mixed group (high intuitive, high deliberative). The remaining two had median levels of PID score, and were therefore excluded from analysis. Differences between groups on achieving total consistency is very close to significance χ^2 = 7.66, df = 3; p = .054 where Phi was .218 at p = .054.

Achieving total consistency was the optimal and best possible output, but we decided to also investigate those who were very close to it. These respondents also tried hard and made very small mistakes. We defined the most motivated and least prone to miserly processing as those who were under 10th percentile in inconsistency (2.5 points and less). There were 20 respondents, 3 were excluded for PID due to their mean score being equal to that which was used for dividing participants into groups. We found that four of them were in the deliberative group, two were from the intuitive group, and one from the indifferent group (low in deliberation and intuition), and ten were from the mixed group (high intuitive, high deliberative). We found significant differences between PID groups in the number of respondents achieving high consistency χ^2 = 10.34, df = 3; p = .016 where Phi was .253 at p = .016.

Table 3. Number of respondents of total and 10th percentile group of consistency across thinking disposition groups

Group	Number of the respondents in total consistency	Number of the respondents in 10th percentile
Intuitive (intuition above MDN)	2	2
Deliberative (deliberation above MDN)	2	4
Mixed (both above MDN)	8	10
Indifferent (both below MDN)	1	1
Excluded (median levels of PID score)	2	3
Total	15	20

For further regression analyses we used a logarithmic transformation of the inconsistency score. Regression analysis showed that the PID intuitive score was a non-significant predictor for inconsistency. Only one (*I am a very intuitive person*) from nine questions correlated significantly (r = -.154, *p* = .021) with logarithmic transformation of the inconsistency score. It could be used as a predictor, close to significance where the standardized = -.147, *t* (174) = -1.97, *p* = .051, but explaining in fact almost no variance R^2 = .016, *F* (1, 174) = 3.86, *p* = .051.

However, the PID cumulative deliberative score was found to predict inconsistency with a small effect (= -.235, *t* (174) = -3.17, *p* = .002), explaining only very small part of variance R^2 = .05, *F* (1, 174) = 10.08, *p* = .002. Investigating individual items from the PID deliberative scale as predictors, only two items were significant: *I am a perfectionist* (where the standardized = -.245, *t* (174) = -2.92, *p* = .004), and *I think before I act* (where the standardized = -.192, *t* (174) = -2.03, *p* = .044). From 9 self-reported statements in PID deliberative scale (Table 4), two could be used as predictors (number: 5 and 8), another 3 correlate significantly with resistance to miserly processing (number: 1, 3, 7), and two were close to significance (2, 9). Only question number 4 was highly insignificant.

Table 4. PID deliberative scale questions and their relationship to inconsistency score

Item n number	PID deliberative scale items	Correlation coefficient with logarithm inconsistency	Sigma (2 tailed)
1	Before making a decision I think them through	-.123	.052

2	Before making decision I usually think about goals I want to achieve	-.105	.084
3	I consider myself	-.145	.028
4	I prefer making detailed plans rather than leaving things to chance	-.041	.296
5	I am a perfectionist	-.23	.001
6	I think about a decision particularly carefully if I have to justify it.	-.097	.101
7	When I have a problem I first analyze the facts and details before I decide	-.214	.002
8	I think before I act	-.244	.001
9	I think more about my plans and goals than other people do.	-.107	.079

CONCLUSIONS

The PID deliberation scale, as a cognitive style measure, confirmed Betsch's (2004, 2008) claims that it could be used also as a tool for measuring motivation to solve tasks or problems. Although PID deliberation does not predict correct solving of many different logical and cognitive tasks (Betsch, Renkewitz, Betsch, Ulshofer, 2010; Čavojová, Ballová Mikušková, Hanák, 2013) as expected (Betsch, 2004), it seems at least to measure the motivation to do so. Therefore, thinking disposition as measured by the PID deliberation scale could be used as a predictor for abstaining from miserly processing (cognitive laziness), thus measuring some kind of motivation to do "the job" properly and engage in thinking. Specific questions differ in their predictive validity where *I am perfectionist* and *I think before I act* perform the best. Three other scale items significantly correlated with lower levels of inconsistency but without predictive validity. The PID intuition scale was also investigated, but it has no predictive validity as a scale and only one item from nine, *I am a very intuitive person*, used as predictor was significant. It is important to note that this question is correlated and predicts same direction as all items from deliberative scale. The respondents who self-reported themselves as *very intuitive person* showed ability to behave in very rational and motivated way.

In the introduction we pointed to research tradition in cognitive styles, where intuition is not view as opposite scale of rationality or deliberation. Therefore Intuition is not view only in negative way, its attribution could be under specific conditions beneficial (Ballová Mikušková, 2013). This is in line with our own findings where we conclude that the PID intuition scale is not the opposite of the PID deliberation scale in measuring motivation to solve problems. We found the mixed group (scoring above the mean in both intuition and deliberation) dominated those achieving total consistency, being four times more likely than the other groups to figure out the principle behind the task (that the fictional applicants were identical) and fully apply it to their decision making. Little lowering criteria to get more but still highly performing respondents in terms of figuring out principle behind task we found even stronger support for our claims. The results were almost the same in the group of high achievers (up to 10th percentile) in level of consistency.

Discrimination was not expected to be in relationship with PID scales and our results support our expectations. Neither PID deliberation nor PID intuition related to the ability to seek for details (discrimination) and apply these differences to their decision making (discrimination).

ACKNOWLEDGMENT

This work was supported by Centre of Excellence at Slovak Academy of Sciences: Centre for interdisciplinary research and strategies in society – CESTA, Centre of strategic analyses.

REFERENCES

Armstrong, S., Cools, E., Sadler-Smith, E. (2012). "Role of Cognitive Styles in Business and Management: Reviewing 40 Years of Research." INTERNATIONAL JOURNAL OF MANAGEMENT REVIEWS, *14*, 238 - 262

Ballová Mikušková, E., (2013). "O racionalite intuície". In. Hanák, R., Ballová Mikušková, E., Čavojová, V. (Eds.) ROZHODOVANIE A USUDZOVANIE IV. Bratislava: Ústav experimentálnej psychológie SAV, 34-47

Ballová Mikušková, Hanák, Čavojová, (2014) Intuition versus Deliberation: Psychometric properties of two self-reported scales (under review)

Betsch, C. (2004). „*Präferenz für Intuition und Deliberation (PID): Inventar zur Erfassung von affekt- und kognitionsbasiertem Entscheiden*". ZEITSCHRIFT FUR DIFFERENTIELLE UND DIAGNOSTISCHE PSYCHOLOGIE, Volume 25, No. 4, 179–197.

Betsch, C. (2008). "Chronic preferences for intuition and deliberation in decision making". In H. Plessner, C. Betsch, T.Betsch (Eds.), INTUITION IN JUDGMENT AND DECISION MAKING (231–248). New York: Erlbaum.

Betsch, C., Iannello P. (2010). "Measuring individual differences in intuitive and deliberative decision-making styles: a comparison of different measures." In Glöckner, A., Witteman, C. (Eds.), FOUNDATIONS FOR TRACING INTUITION. CHALLENGES AND METHODS. Hove: Psychology Press. 252 – 267.

Betsch, C., Kunz, J. (2008). "Individual strategy preferences and decisional fit". JOURNAL OF BEHAVIORAL DECISION MAKING, *21*, 532 -555

Betsch, C., Renkewitz, F., Betsch, T., Ulshofer, C. (2010). "The influence of Vaccine-critical Websites on perceiving vaccination Risks". JOURNAL OF HEALTH PSYCHOLOGY, *15*, 3, 446

Bruine de Bruin, W., Parker, A. M., & Fischhoff, B. (2007). "Individual differences in adult decision-making competence". JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY, *92*(5), 938.

Čavojová, V., Ballová Mikušková, E., Hanák, R. (2013) "Preferencia k deliberácii: (ne) istota úspechu v kognitívnych úlohách". Kelemen, J. et al. (eds.) KOGNITIVNÍ VĚDA A UMĚLÝ ŽIVOT. Zborník príspevkov. Slezská univerzita v Opavě. Opava.

Čavojová, V. (2013a) "O racionalite intuície". In. Hanák, R., Ballová Mikušková, E., Čavojová, V. (Eds.) ROZHODOVANIE A USUDZOVANIE IV. Bratislava: Ústav experimentálnej psychológie SAV, 11-33

Čavojová, V. (2013b). "Emócie a intuícia". In D. Kusá (Ed.): PSYCHO-LOGIKA EMÓCIÍ. Bratislava: Veda, 87 -104.

Dewberry, Ch., Juanchich, M., Narendran S. (2013). "The latent structure of decision styles." PERSONALITY AND INDIVIDUAL DIFFERENCES, *54*, 566-571

Epstein, S. (2003). "Cognitive-experiential self-theory of personality". In Millon, T., & Lerner, M. J. (Eds), *Comprehensive Handbook of Psychology, 5:* PERSONALITY AND SOCIAL PSYCHOLOGY (159-184). Hoboken, NJ: Wiley & Sons.

Epstein, S., Pacini, R., Denes-Raj, V., Heier, H. (1996), "*Individual differences in Intuitive-Experiential and Analytical-Rational Thinking Styles*". JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY, Volume 71, No.2, 390–405.

Gigerenzer, G., (2007) "*Gut feelings*." London, Penguin Books

Glöckner, A., Witteman, C. (2010). "Foundations for tracing intuition: models, findings, categorizations." In Glöckner, A., Witteman, C. (Eds.), FOUNDATIONS FOR TRACING INTUITION. CHALLENGES AND METHODS. Hove: Psychology Press. 1-23.

Hammond, K.R. (1996). "*Human judgement and social policy: Irreducible uncertainity, inevitable error, unavoidable injustice."* New York: Oxford University Press.

Hanák, R., Čavojová, V., Ballová Mikušková, E. (2012) "Je intuícia pri rozhodovaní v časovom strese výhodnejšia?" SOCIÁLNE PROCESY A OSOBNOSŤ 2012. Zborník príspevkov. Ústav experimentálnej psychológie. Bratislava.

Hanák, R. (2013a). "Prediktívna validita dotazníkov merajúcich intuíciu PID, REI a GDMS". In. R Hanák, E. Ballová Mikušková, V. Čavojová (Eds.), ROZHODOVANIE A USUDZOVANIE IV., Aplikácie a limity intuície. Bratislava: Ústav experimentálnej psychológie SAV.101 –127

Hanák, R. (2013b). "Nástroje na meranie individuálnych preferencií k intuitívnemu rozhodovaniu." In. R Hanák, E. Ballová Mikušková, V. Čavojová (Eds.), ROZHODOVANIE A USUDZOVANIE IV., Aplikácie a limity intuície. Bratislava: Ústav

experimentálnej psychológie SAV.71 –101

Kahneman, D. (2011). "*Thinking, fast and slow*." London, Penguin Group.

Koele, P., Dietvorst, G. (2010). The internal validity of self-report measures for intuitive and rational decision making. in Glöckner, A., Witteman, C. (Eds.), FOUNDATIONS FOR TRACING INTUITION. CHALLENGES AND METHODS. Hove: Psychology Press., 238-250.

Kokis, J. V., Macpherson, R., Toplak, M. E., West, R. F., & Stanovich, K. E. (2002). "Heuristic and analytic processing: Age trends and associations with cognitive ability and cognitive styles." JOURNAL OF EXPERIMENTAL CHILD PSYCHOLOGY, *83*(1), 26-52.

Ku, K. Y., & Ho, I. T. (2010). Dispositional factors predicting Chinese students' critical thinking performance. PERSONALITY AND INDIVIDUAL DIFFERENCES, *48*(1), 54-58.

Newstead, S. E., Handley, S. J., Harley, C., Wright, H., Farrelly, D. (2004), „*Individual differences in deductive reasoning*". The quarterly journal of experimental psychology. A HUMAN EXPERIMENTAL PSYCHOLOGY, Volume 57, No.1. 33–60.

Pacini, R., Epstein, S. (1999), „*The relation of rational and experiential information processing styles to personality, basic beliefs, and the ratio-bias phenomenon*".JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY, Volume 76, No. 6, 972–987.

Perkins, D. N., Jay, E., & Tishman, S. (1993). Beyond abilities: A dispositional theory of thinking.

Perkins, D. N., Ritchhart, R. (2004). "When is good thinking?" In D.Y. Dai & R. J. Sternberg (Eds.), MOTIVATION, EMOTION, AND COGNITON: INTEGRATIVE PERSPECTIVES ON INTELECTUAL FUNCTIONING AND DEVELOPMENT (pp. 351-384) Mahwah, NJ: Lawrence Erlbaum Associates.

Scott, S. G., Bruce, R. A. (1995). "Decision-making style: The development and assessment of a new measure". EDUCATIONAL AND PSYCHOLOGICAL MEASUREMENT, *55*(5), 818-831.

Shanteau, J et al. (2003) "*How can you tell if someone is an expert? Empirical Assesment of Expertise."* EMERGING PERSPECTIVES ON DECISION RESEARCH, Cambridge, U.K. : Cambridge University Press.

Shanteau, J.et al. (2001) "Identifying expertise without a gold standard: Four applications." *Paper presented at the 11th International Symposium on Aviation Psychology.* Columbus, OH.

Sirota, M. (2008), "*Individuálne rozdiely v racionálnom usudzovaní. Kognitívne parametre a komputačné stratégie v „bayesovskom" usudzovaní v úlohách s odlišnými číselnými reprezentáciami"*. Bratislava: Univerzita Komenského.

Stanovich, K. E. (2011), "*Rationality and the Reflective Mind"*. New York: Oxford University Press.

Stanovich, K. E., & West, R. F. (1997). "Reasoning independently of prior belief and individual differences in actively open-minded thinking." JOURNAL OF EDUCATIONAL PSYCHOLOGY, 89, 342–357.

Stanovich, K. E., (2008) "Higher – order preferences and Master Rationality Motive". THINKING & REASONING, 14 (1), 111 - 127

Toplak, M. E., West, R. F., & Stanovich, K. E. (2011). "The Cognitive Reflection Test as a predictor of performance on heuristics-and-biases tasks". MEMORY & COGNITION, *39*(7), 1275-1289.

Toplak, M. E., West, R. F., & Stanovich, K. E. (2013). "Assessing miserly information processing: An expansion of the Cognitive Reflection Test". THINKING & REASONING, (ahead-of-print), 1-22.

Witteman, C., van den Bercken, J., Claes, L., Godoy, A. (2009). "*Assessing Rational and Intuitive Thinking Styles*", EUROPEAN JOURNAL OF PSYCHOLOGICAL SSESSMENT, Volume 25 No. 1. 39–47.

Weiss, D., Shanteau, J. 2003 . "Empirical Assesment of Expertise". HUMAN FACTORS, Vol 45, No. 1, Spring