



# STRATEGIES FOR SOLVING ANALYTICAL AND HOLISTIC PROBLEMS

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Studies of the contribution of institutional identity to the formation of psychological structures suggest that such identity imposes restrictions on the formation of new experience. The aim of this work was to describe strategies for solving analytical and holistic problems that are characteristic for individuals with analytical and holistic types of mentality. Participants (N = 105) were solving analytical (a) and holistic (h) word problems (a-problems: “Knights and Knaves” and “Grid-logic”; h-problems: “Anagrams” and “Moral dilemmas”). The results have shown that “normativity” was the principle characteristic of the problem-solving strategy accounting for the observed differences between individuals with analytical and holistic types of mentality.

**Keywords:** institutionality, type of mentality, word problem, problem-solving strategy, normativity.

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## СПОСОБЫ РЕШЕНИЯ АНАЛИТИЧЕСКИХ И ХОЛИСТИЧЕСКИХ ЗАДАЧ

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В рамках концепций о вкладе институциональной принадлежности в формирование психологических структур принимается, что такая принадлежность накладывает ограничения на формирование нового опыта. Цель данной работы состояла в описании способов решения аналитических и холистических задач индивидами с аналитической и холистической ментальностью. Участники исследования (N = 105) решали аналитические (а) и холистические (х) текстовые задачи (а-задачи – «Рыцари и лжецы»; «Соответствие»; х-задачи – «Анаграммы» и «Моральные дилеммы»). Было установлено, что характеристика «нормативность решения» является ведущей для объяснения различий между индивидами с аналитической и холистической ментальностью.

**Ключевые слова:** институциональность, тип ментальности, текстовые задачи, способ решения, нормативность.

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**Финансирование.** Теоретико-методологическая база исследования выполнена при финансовой поддержке РФФИ в рамках научного проекта № 18-313-20003 мол\_а\_вед, сбор и анализ данных – в рамках госзадания ФАНО № 0159-2019-0001 «Закономерности системогенеза и актуализации ранее сформированной памяти в индивидуальном и коллективном поведении».

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### **Introduction**

The role of social identity in the formation of psychological structures remains an important research topic in contemporary psychological literature [29; 34; 35; 36; 44; 45]. The central idea is that individual development should always be considered in the context of interactions with the society [7, с. 455; 8; 14], which is an integral part



of the environment [12; 22]. The structure of individual experience [4], in its possible diversity, is formed during coordinated interactions between individuals representing various communities within the sociocultural environment [3]. A community is considered as a “supra-individual unit” [1] organised as a variety of supra-individual psychological structures comprising culture [3; 25]. Culture, in turn, is formed within interactions of individuals with different domains of knowledge, or subject areas [11]. Evolution (and co-evolution) of communities and social institutes in different countries can be described via institutional types of mentality on the “analytical-holistic” scale (AHS, see [1; 35])<sup>1</sup>. Analytical type of mentality is characteristic for Western cultures (e.g., USA and Western European countries). Holistic type of mentality is characteristic for non-Western cultures (e.g., Eastern Asian countries and Russia). At the same time, “analytical-holistic” types of mentality can also vary across sub-cultures of individuals within the same culture. Our previous work showed that there are differences in how individuals with analytical and holistic types of mentality solve various tasks. We identified types of tasks that can be described as analytical and holistic. This was done on the bases of two criteria: the number of steps it takes to solve the task and how many alternatives can be considered simultaneously in the process of problem-solving [6].

Tasks (problems<sup>2</sup>) can be viewed as “symbolic models of problem situations” in specific subject areas [19]. The main attributes of a task are objectivity, syntax and solutions [18]. Our definition: a task is a homomorphic representation of a problem situation, expressed in a symbolic form and defining the nature of an individual’s interaction with the subject area. It is important that this definition establishes the relationship between the attributes of a task. In this work, we explore solution as a task attribute. Solution is understood as a combination of actions, complexity of these actions and a form of recording (presentation of conditions, or formalization) [13]. We suggest using the concept of “normativity” as a characteristic of solution strategies. Normativity is understood as compliance of a solution strategy with requirements of the subject area in which the problem was formulated. (e.g., [43]). Normativity of a solution strategy provides the shortest ways of solving the problem (the most probable achievement of the right solution in the shortest time frame). It is possible to define normative solution strategies based on the characteristics of analytical and holistic thinking [36].

Institutionality, as a fundamental property of individual experience, defines degrees of freedom for its formation and, thus, sets limitations on what its structure could be and what can be developed within interactions with new subject areas and social groups.

<sup>1</sup> There are differences in attitudes towards the environment and learning across individuals from various sociocultural groups [35]. These differences are described in terms of dual processes [31] and tested using a constructed questionnaire [29].

<sup>2</sup> We use the term ‘task’ (нем. – die Aufgabe) when talking about a specific problem it addresses; thus, tasks are considered as models of a problem.



The aim of this work was to reveal the strategies for solving analytical (a-) and holistic (h-) tasks by individuals with analytical (A-) and holistic (H-) types of mentality.

### **Hypotheses:**

Hypothesis 1. Normativity of a solution strategy and AHS score correlate as follows: A-individuals use normative solution strategies only for a-tasks and H-individuals use normative solution strategies only for h-tasks.

Hypothesis 2. A-individuals are more successful at solving A-tasks and H-individuals are more successful at solving h-tasks, which is reflected in faster solution time, smaller variation in solution time, and higher rate of correct solutions.

Hypothesis 3. The use of normative solution strategies correlates with faster solution time and higher percentage of correct solutions.

## **Methods**

### ***Participants***

Participants (N = 105) were 37 men and 68 women aged between 17 and 35 years old. Participants' education varied from high school and college to university levels in the fields of humanities, technical and natural sciences.

### ***Experimental procedures***

Before beginning of the experiment, all participants completed the AHS questionnaire [31] adapted for use in the Russian population [5]. On the bases of the AHS results, the participants were divided into analytical (A-) and holistic (H-) groups. Previously defined Median value (Med) [5] was used as a more stable criterion. Participants with AHS scores lower than Med were labelled as A-individuals (N = 54) and participants with AHS scores higher than Med were labelled as H-individuals (N=51).

During the main experiment participants were asked to find solutions for a set of word problem tasks (for further details, see [6]). For each block of tasks, a participant was given a note sheet, instructions, response sheet and printed word problem tasks, face down. A participant read the instructions and indicated when ready to proceed. Then an experimenter authorised to begin problem-solving and started the timer along with audio recording.

### ***Tasks***

We used a set of word problem tasks that had been designed previously [6]. Participants were presented with 2 blocks of a- and 2 blocks of h-tasks. A- and h- tasks were alternated during the experiment.

#### ***Analytical tasks:***

This type of tasks is characterized by a linear sequence of distinct steps. A limited number of elements are operated at each step. We used logic problems where a solution can be presented as a constructed grid with established relationships between its elements<sup>3</sup> [28].

<sup>3</sup> A grid is the representation of problem conditions and its solution in the form of a matrix, where relationships between all objects are established and defined.



– “Knights and Knaves” (four tasks): a set of characters are described along with judgements they express about one another; on the basis of this information, participants are asked to figure out which character is a “knight” and which character is a “knave”, given that “knights” always tell the truth and “knaves” always lie [16].

– “Logic grid puzzles” (two tasks): a set of objects is presented with some information about relationships between these objects; participants are asked to establish a correspondence between the given task conditions.

#### *Holistic tasks:*

This type of tasks is characterized by a simultaneous solution; all elements of the task can be operated within a one-step solution process.

– “Anagrams” (six tasks): participants are presented with sets of mixed letters that can compose meaningful words when placed in the right order. We used common words consisting of 7 or 8 letters. The frequency of use was aligned based on the Russian language frequency corpus. Anagrams are considered as synthetic problems because they require a simultaneous solution [10].

– “Moral dilemmas” (four tasks): participants were asked to evaluate moral permissibility of actions in situations when sacrificing one person resulted in saving five other people [26]. Actions were rated on a 7-point scale: one end of the scale was labelled as “Forbidden” and the other end was labelled as “Obligatory”. After rating actions on the scale, participants were asked to justify their response in writing. In these tasks, active actions resulted in the death of one person and survival of five people while failure to act lead to five people dying and one person surviving.

#### *Variables*

We analysed response times (in sec) and the number of correct solutions for each type of tasks with the exception of moral dilemmas. Moral dilemmas do not have correct solutions by definition, therefore permissibility ratings were analysed in these tasks. Normativity of solutions was defined for each group of tasks as follows<sup>4</sup>:

– for “Knights and Knaves”, logical or non-logical reasons were considered as normative and non-normative solutions, correspondingly. Based on written argumentations (collected from 21 participant), we identified the following categories of reasons: “*Logical*”, “*Logical with an error*”, “*Non-logical (operating with properties)*” and “*Non-logical (creating additional assumptions)*”.

Four types of note structure are presented in Table 1: *grid* (for details, see the Tasks section); *diagram or tree* illustrating logic and conclusions; *characters’ judgements* could be present in full or partially, sometimes without a solution; *chaotic and unstructured notes* that did not describe either task conditions, or solution.

<sup>4</sup> Some authors identify normative and non-normative tasks based on “normative activity” [15]. However, we emphasize that normative component can be found for any type of tasks.



– for “Logic grid puzzles”, the note structure was also considered ( $N = 75$ ) and four types of notes similar to the task above were identified: grid, diagram or tree, distinct task conditions and chaotic unstructured notes.

– for “Anagrams”, – simultaneity/succession of the solution strategy was described based on self-report, solution times and usage of a note sheet ( $N = 21$ ). Simultaneity scale was used as a characteristic of normativity: simultaneous solution was rated as 2 and successive trial and error approach was rated as 0; the sum of ratings across all tasks was used as a measure on the simultaneity scale.

1. Simultaneous solutions, or momentary realizations, were achieved with minimal time delays and by means of operating with the entire set of letters: “look and see”.

2. Language-based solutions: participants evaluated the compatibility of letters and their combinations, for example, by listing vowels and consonants as separate sets.

3. Solutions by testing all possible combinations of letters.

4. Solutions based on analogies and associations: participants evaluated whether a given set of letters is similar (for example, by consonance) with words they might know.

– for “Moral dilemmas”, utilitarian and non-utilitarian (deontological) justifications of given permissibility ratings were considered as normative solutions (see [27]).

The following types of justification categories were identified and analysed:

1. Doubting and questioning conditions of the given situations, pointing out that such situations are unrealistic, and suggesting alternative ways of dealing with the problem that contradicted the task conditions.

2. Utilitarian reasoning: saving more people, minimising harm for the majority.

3. Deontological reasoning: pointing to the qualities of actions rather than their consequences (e.g. “killing is bad” and “the goal doesn’t justify the action”).

4. Utilitarian and deontological reasoning: considering both utilitarian and deontological reasons, searching for a compromise solution.

5. Expressing feelings, emotions and wishes.

6. Describing aspects of the action, its goals and qualities, including using physical contact and force.

7. Making assumptions about the agent, i.e. their identity and possible circumstances of their life, personal responsibility, being either guilty or innocent, etc.

8. Making assumptions about the victim/victims, i.e. whether they are guilty or innocent, assuming their relationship to the agent etc.

9. Using theological or supernatural concepts, such as god, destiny, karma etc.

10. Appealing to the law, the significance of the act for society and consideration of public opinion, including possible options for justifying actions to others.

11. No explanation – simple statements containing no explanation of the solution and sometimes irrelevant to the task.

It was also analysed whether participants used a note sheet, or not. Unlike previous studies using the “Knights and Knaves” tasks [39], our participants could use a note sheet in the process of problem-solving.



### ***Statistical analyses***

Statistical analyses were performed in Statistica 8 (StatSoft) and SPSS 17 (IBMStatistics). We used analysis of variance (ANOVA); Fisher exact test; Kolmogorov–Smirnov test (for comparison with the normal distribution); Spearman rank correlation coefficient (Rs); Mann-Whitney U Test.  $H_0$  hypotheses were rejected at  $p \leq 0.05$ . Tendencies were highlighted at  $0.05 < p \leq 0.09$ .

## **Results**

### **1. Qualitative analysis**

#### *“Knights and Knaves”*

Descriptive statistics for variables is presented in Table 1 (note: in Tables 1 to 5, values indicate the number of participants for a given measurement).

Table 1

**The use of a note sheet in “Knights and Knaves” tasks**

<b>Task ID</b>	<b>Task 1</b>	<b>Task 2</b>	<b>Task 3</b>	<b>Task 4</b>
No notes	63	65	59	64
Grid	2	3	3	3
Diagram or tree	6	6	8	5
Characters' judgements	6	5	5	6
Chaotic and unstructured notes	13	11	15	12

We analysed logical and non-logical reasons (see Table 2). Logical reasons are formal logical judgements based on the principle of syllogism and leading to the correct solution (or containing a formal logical error). Logical reasons were considered as normative solutions. Non-logical reasons are judgments appealing to everyday concepts or properties of the characters that were not included in the task conditions (e.g., randomly used additional assumptions). Non-logical reasons were considered as non-normative solutions.

Table 2

**Types of reasons in “Knights and Knaves” tasks**

<b>Tasks</b>	<b>Task 1</b>	<b>Task 2</b>	<b>Task 3</b>	<b>Task 4</b>
<b>Reasons</b>				
Logical	5	9	15	7
Logical but containing a formal logical error	11	5	12	15
Non-logical (operating with properties)	9	8	2	1
Non-logical (creating additional assumptions)	5	8	1	7



“Logic grid puzzles”

Table 3

The use of a note sheet in “Logic grid puzzles”

Task number	Task 1	Task 2
Type of notes		
No notes	13	8
Grid	5	6
Diagram or tree	20	7
Distinct relationships in task conditions	17	47
Chaotic and unstructured notes	20	10
Final solution only	15	12

“Anagrams”

Table 4

Solution strategies in “Anagrams” derived from self-reports

Task number	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6
Strategy						
Momentary realization	4	5	4	5	6	5
Language-based solutions	4	1	1	1	1	1
Solutions by testing all possible combinations	7	10	10	9	9	9
Solutions based on analogies and associations	6	5	6	6	5	6

2. Normativity, solution time and number of correct solutions

“Knights and Knaves”:

The results have shown a positive correlation between normativity (quantity of logical solutions) and total solution time ( $r = .409$ ,  $p = .025$ ). No correlation was observed between normativity and median solution time ( $r = .189$ ,  $p = .317$ ). Total solution time was higher for normative solutions, as compared with non-normative solutions ( $U = 59$ ,  $p = .028$ ; see Fig. 1).

No correlation was found between normative solutions and correct solutions ( $r = 0.09$ ,  $p = .635$ ). This could be due to correct solutions achieved via random guessing in case of non-normative solutions: when adjusted for random guessing, normative solutions correlated with correct solutions ( $r = .368$ ,  $p = .05$ ).

“Logic grid puzzles”

The probability of errors significantly decreased with higher levels of notes structuring ( $r = 0.25$ ,  $p = 0.042$ ). Solution time increased with lower levels of notes structuring, but did not reach statistical significance ( $r = 0.223$ ,  $p = 0.07$ ).

“Anagrams”

Total solution time ( $U = 21$ ,  $p = .016$ ) and median solution time ( $U = 6$ ,  $p < 0.001$ ) were lower for normative solutions, as compared with non-normative solutions.



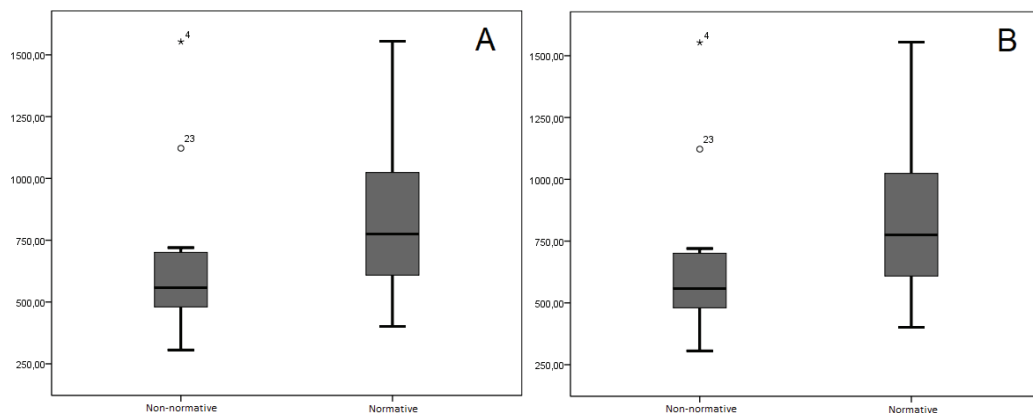


Fig. 1. Total solution time (A) and median solution time (B) for normative and non-normative solutions in “Knights and Knaves” tasks

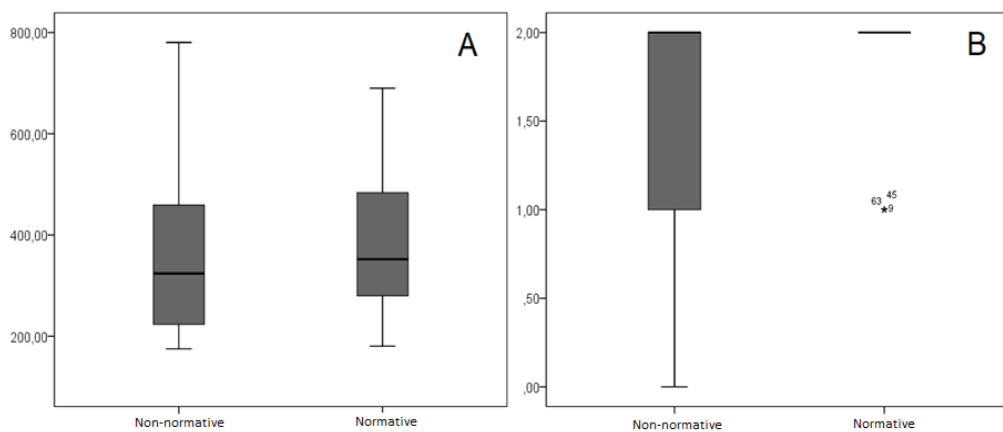


Fig. 2. Normativity, total solution time and number of correct solutions for “Logic grid puzzles”.  
A – Total solution time and B – Correct solutions

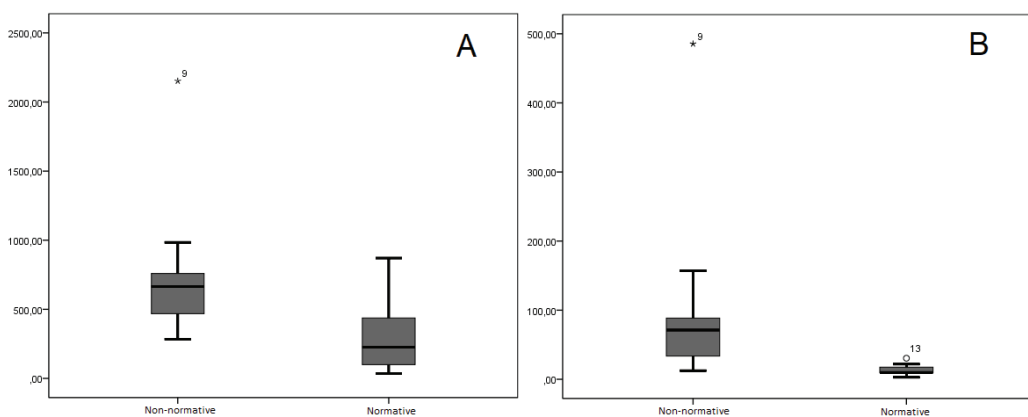


Fig. 3. Total solution time (A) and median solution time (B) for normative and non-normative solutions in “Anagrams” tasks



Momentary realization on average took less time than testing all possible combinations ( $U = 0, p = 0.002$ ). Momentary realization on average also took less time than solutions based on analogies and associations ( $U = 4, p = 0.044$ ).

### 3. Analysis of relationship between AHS scores and using normative solution strategies

The number of normative solution strategies in the four tasks used in our study was not different between A- and H-individuals (see Table 5).

Table 5

**Number of A- and H-individuals using normative and non-normative solution strategies**

	A-individuals		H-individuals	
	Normative solution	Non-normative solution	Normative solution	Non-normative solution
<i>Knights and Knaves</i> (30)	7	7	8	7
Anagrams (21)	8	6	3	4
Logic grid puzzles (64)	11	19	15	19
<i>Moral dilemmas</i> (104)	7	44	5	49

### 4. Analysis of relationship between AHS scores and solution strategies

No difference between A- and H-individuals was observed in total solution time, median solution time or number of correct solutions within a-tasks:

- for “Knights and Knaves”: total solution time ( $U = 107, p = .902$ ), median solution time ( $U = 86, p = .320$ ) and number of correct solutions ( $U = 932, p = .501$ ).
- for “Logic Grid Puzzles”: total solution time ( $U = 984, p = .824$ ) and number of correct solutions ( $U = 989, p = .852$ ).

No difference between A- and H-individuals was observed in total solution time (with the exception of moral dilemmas), median solution time or number of correct solutions (for moral dilemmas, number of justifications containing doubts was analysed as the opposite to correct solutions) within h-tasks:

- for “Anagrams” – total solution time ( $U = 46, p = .856$ ), median solution time ( $U = 33, p = .255$ ), and number of correct solutions ( $U = 855, p = .131$ ).
- for “Moral dilemmas” – total solution time ( $U = 1064, p = .086$ ), median solution time ( $U = 1105, p = .081$ ), and number of justifications containing doubts ( $U = 760, p = .557$ ).

#### “Knights and Knaves”

Total solution time ( $U = 30, p = .834$ ) and median solution time ( $U = 32, p = 1$ ) did not differ between A- and H- individuals using normative solution strategies. H-individuals who used non-normative strategies solved the tasks faster than H-individuals who used normative strategies ( $U = 9, p = 0.029$ ). No difference was ob-



served between A-individuals who used normative and non-normative strategies ( $U = 24$ ,  $p = 0.643$ ; see Fig. 4).

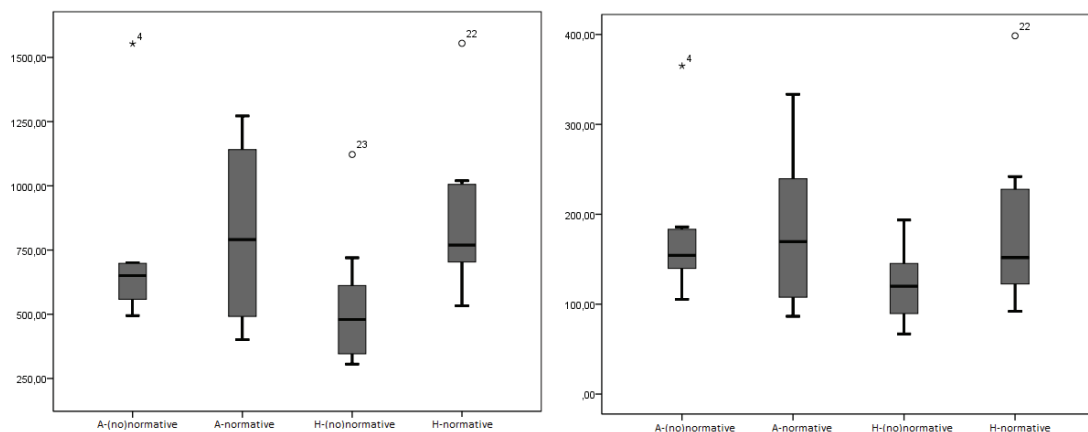


Fig. 4. Total solution time (left) and median solution time (right) in A- and H- individuals who used normative and non-normative strategies for solving Knights and Knaves tasks

### “Logic grid puzzles”

Interestingly, A-individuals solved this type of tasks faster when making structured notes, as compared with non-structured notes, while H-individuals solved the tasks slower when making structured notes, as compared with non-structured notes ( $F = 4.118$ ,  $p = 0.014$ , ANOVA; see Fig. 6).

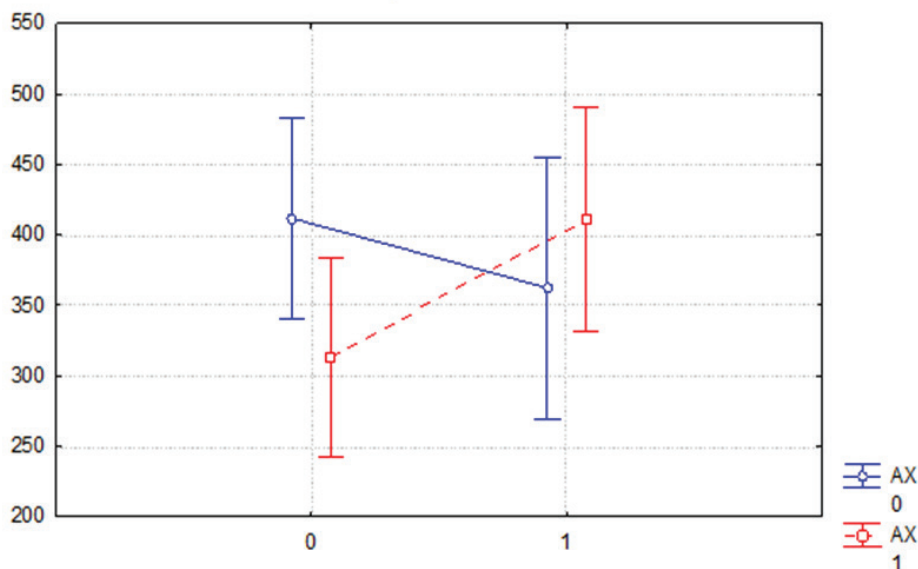


Fig. 5. Normative and non-normative solution strategies in A- and H-individuals for “Logic grid puzzles”. Note: (0 – non-structured notes; 1 – structured notes; AX-0 – A-individuals and AX-1 – H-individuals)



A tendency ( $F = 1.85, p = .094$ ) for a higher variation in solution time was observed for normative solution strategies ( $SD = 172$ ), as compared with non-normative solution strategies ( $SD = 126$ ).

### *“Anagrams”*

When individuals used solution strategies that did not correspond to their AHS score group, variation in their solution time was higher than when individuals used solution strategies corresponding to their AHS score group (ANOVA,  $F = 6.5, p = 0.01$ ). When using non-normative solution strategies, dispersion of total solution time was higher in H-individuals, as compared to A-individuals ( $F = 4.68, p = 0.019$ ). H-individuals using non-normative solution strategies were the slowest at solving anagrams (see Fig. 6).

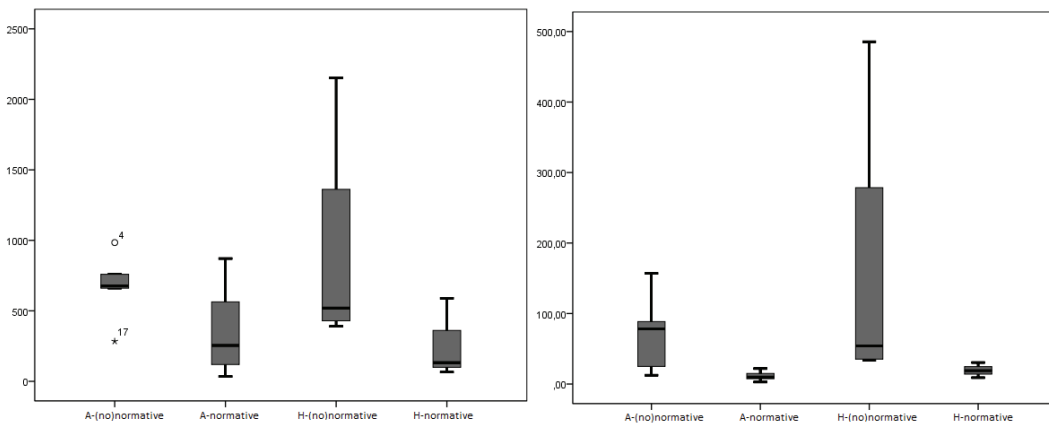


Fig. 6. Total solution time (left) and median solution time (right) for A- and H-individuals using normative and non-normative solution strategies in “Anagrams”

### *Moral dilemmas*

No difference was observed in total solution time ( $U = 13, p = .530$ ) or median solution time ( $U = 14, p = .639$ ) between A- and H-individuals using normative solution strategies.

### **Analysis of the use of a note sheet**

The use of a note sheet was an important indicator in “Knights and Knaves” tasks. Participants were divided into three groups: 1) did not use a note sheet, 2) used a note sheet for all tasks, and 3) used a note sheet for some tasks. The analysis has shown that the participants that did not use a note sheet solved tasks faster ( $U = 110.5, p < .001$ ), with a smaller variation in solution time ( $U = 188, p < .001$ ) and with a tendency to give less number of correct solutions ( $U = 403.5, p = .075$ ), as compared with participants that used note sheets for all tasks. The participants who did not use a note sheet solved the tasks faster ( $U = 264.5, p = .033$ ) and with a smaller variation in solution time

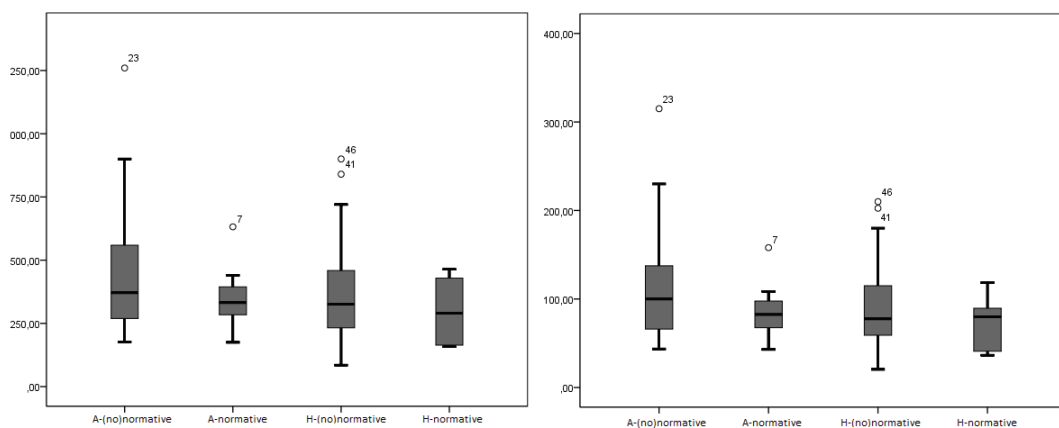


Fig. 7.1. Total solution time (A) and median solution time (B) for A- and H-individuals using normative and non-normative solution strategies

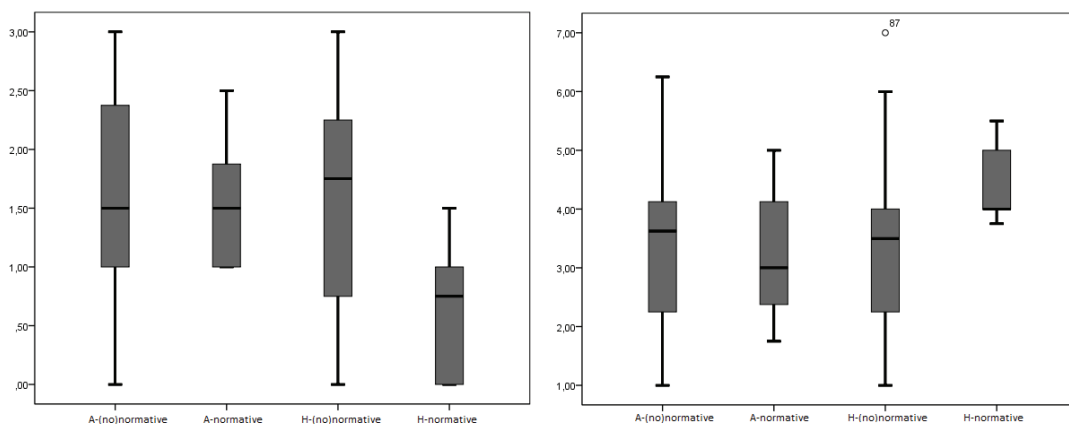


Fig. 7.2. Responses to moral dilemmas and tendency to use the ends of the scale in A- and H- individuals using normative and non-normative strategies A – tendency to use the ends of the scale; B – responses on the scale

( $U = 244, p = .015$ ) than the participants who used a note sheet at least for some tasks. The participants who always used a note sheet, solved tasks slower ( $U = 72, p = .009$ ) and with a tendency ( $U = 99, p = .093$ ) for a higher variation in solution time than the participants who used a note sheet in some tasks. No such effect was observed for the other groups. Thirteen participants did not use a note sheet in any of the tasks.

## Discussion

In this work, we explored the frequency of use and distribution of solution strategies for certain types of tasks among A- and H-individuals. The results of the study showed that A- and H-individuals use similar solution strategies for a- and h-tasks.



A- and H-individuals use both, normative and non-normative solution strategies when solving a- and h-tasks. In a-tasks, the use of normative solution strategies is associated with higher number of correct solutions, longer time required to solve tasks along with higher dispersion of solution time. In h-tasks, the use of normative solution strategies is associated with lower solution time and lower dispersion of the solution time while correctness of solutions is not discriminative. In “Logic grid puzzles” (a-tasks), individual using solution strategies characteristic for their type of mentality solved tasks faster. In “Anagrams” (h-tasks), variation in solution time is higher in individuals who used solution strategies that are not characteristic for their type of mentality. This suggests that faster solutions can be achieved by individuals who use non-normative solution strategies, if these strategies correspond to their type of mentality.

It had been assumed previously that when individuals use normative solution strategies, their solution time would be less variable [4]. Our results do not support this hypotheses but this could potentially be explained by random solutions in individuals using non-normative strategies as well as by a high number of participants using normative strategies and utilising a note sheet. Another factor that could have impacted the observed results is different degree of discrimination in solution time between normative and non-normative solution strategies within a- and h-tasks.

The results obtained in this work update and provide more detail into previously made conclusions that A-individuals solve a-tasks better and faster while H-individuals are better and faster at solving h-tasks [17]. In general, for each type of tasks there are A-individuals using normative solution strategies, A-individuals using non-normative solution strategies, H-individuals using normative solution strategies and H-individuals using non-normative solution strategies. Each individual has both analytical and holistic characteristics [3; 37]. This can also be viewed in terms of quadripolar dimension, i.e. the phenomenon of “splitting” ends of cognitive styles [21; 38]. The lack of significant differences between A- and H-individuals that used normative solution strategies may indicate that normativity counterbalances them in various types of tasks; and this can be considered as specificity of acquiring the dictated rules of a subject area. Such rules force A- and H- individuals to adapt for solving tasks they are facing in laboratory conditions and real life situations. Possibly, the lack of differences is associated with the “analytic-holistic” construct as an aggregate characteristic of implicit, unreflected attitudes organized in a four-component model, excluding the “components of thinking” (according to Nissbett), and corresponding to the general attitude to what can be learnt in society [30; 31]. In this case, normativity can be viewed as institutionality of a solution strategy, or how individuals’ behaviour within a certain subject area corresponds to the values and norms accepted in their social group [24]. This includes the formation of professional ways of solving problems [34; 42].

In this work, we considered normativity (institutionality) as a possible component of solution strategies. The obtained results indicate that this characteristic can be a descriptor but the entire catalogue of descriptors can only be achieved in the situation of access to all possible forms of an individual’s interaction with the task [39]. The results



of this study allow us to describe some of the descriptors and their role in the organisation of the solution strategies. Groups of A- and H-individuals are heterogeneous and diverse; and normativity is one characteristic illustrating this.

One of the central concepts in the system-evolutionary theory [27] is the history of the formation of behavioural repertoire, which develops and changes during the process of an individual's interaction with the environment. Solution strategies represent a behavioural repertoire formed within an individual's interactions with the environment, they can be modified and potentially replaced by new ones when the old strategies fail to work [15]. This can be compared with the other authors' ideas about a step-by-step development of psychological structures and described as the reorganization of previously formed experience [14].

One possible way to develop the study of solution strategies is exploring individuals' behaviour in situations of solving cognitive tasks [23]. A complex analysis of individuals' interaction with a task is one of the objectives for our future research.

### Conclusions

1. Qualitative characteristics of solution strategies are described based on participants' notes and self-reports. These characteristics are compared with normativity/institutionality.

2. An indirect relationship between normativity and productive changes in solution strategies was found.

3. Normative solution strategies were shown to be implemented by both, A- and H-individuals in all types of tested tasks.

4. No correlation was observed between AHS score and quantitative measures of problem-solving within distinct tasks.

5. When individuals used solution strategies inconsistent with their type of mentality, tendencies for longer response times (in "Logic grid puzzles") and higher variation in response times (in "Anagrams") were observed.

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