Sex differentiation in the organization of emergency sensorimotor action

Abstract

The purpose of the study is to determine characteristics of the gender factor’s influence on the structure and speed of implementation of emergency sensorimotor action. The empirical research method is a computer-assisted laboratory experiment with an inrasubject implementation plan. The participants were students divided into two groups: 78 men and 74 women. In the series of attempts, the participants completed tasks of simple sensorimotor response, sensorimotor response, and two-choice response. In the two-choice response task, the subject is first given a reference point for the option of future stimulation, to which one should adjust urgently. After, the subject should act when the stimulus appears. The U Mann-Whitney test and Spearman's Rank correlation.

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Анотація

Метою дослідження є визначення особливостей впливу фактору статі на структуру та швидкість реалізації екстреної сенсомоторної дії. Метод емпіричного дослідження — комп’ютерний лабораторний експеримент з внутрішньосуб’єктним планом реалізації. Досліджуваними були студенти, поділені на дві групи: 78 чоловіків та 74 жінки. У серіях спроб досліджувані вирішували завдання простого сенсомоторного реагування, сенсомоторної реакції вибору, реакції подвійного вибору. У задачі подвійного вибору досліджуваному спочатку надавався орієнтир щодо варіанту майбутньої стимуляції, на який необхідно було екстрено налаштуватись, а після появи стимулу — відповідно діяти. Для обробки експериментальних
Sex differentiation in the organization of emergency sensorimotor action

coefficient were applied to process experimental data. **Results.** It is established that men surpassed women in the speed of simple sensorimotor response (U=2147.00; p=.006) and sensorimotor choice response (U=1733.00; p<.001), and the reaction speed in a two-choice task with one possible stimulus (U=2078.00; p=.003) and three possible stimuli (U=2006.00; p=.001). Compared to women, men spend less time on organizing emergency sensorimotor action under a rapid change in the current situation (U=2090.00; p=.003). It is found that in the male group, in contrast to the female one, the orientation time in a two-choice task correlates with the time of motor response in the variant with one possible stimulus (r=.257; p=.023) and anticipation probability (r=.365; p=.001).

**Conclusions.** The general structure of the organization of emergency sensorimotor action does not differ significantly in men and women. The time of simple sensorimotor response and choice reaction in individual tasks and, if required, their emergency selective implementation in a two-choice task is less in the male group than in the female one. Men have a faster organization of emergency sensorimotor action in response to rapid changes in the current situation than women. Compared to men, relative operational complexity for women regarding the differentiation of time references in the anticipation process since stimulus appearance is associated with a destabilization of the speed of sensorimotor action.

**Keywords:** attitude, anticipation, simple sensorimotor response, sensorimotor choice response, man, woman.

**Introduction**

With the development of engineering and technologies, there increases the probability of occurrence of situations that require a person to respond emergently with the necessary high speed, accuracy, and full responsibility for the possible consequences. The processes of society’s life activity are notably accelerating, and the significance of their substantial disruption and subsequent rapid resumption is growing. The latter is most evident in human actions to solve tasks of driving vehicles, processing saturated information flows, and during intensive social communication. It should also be added that besides men, women are enthusiastically learning new areas of highly dynamic activity. Given the mentioned aspects, there appears a set of topical issues concerning the influence of the gender factor on the adequacy and speed of the subject’s assessment of drastic changes in the current situation, as well as on the speed and accuracy of making and implementing danih застосовані критерії U Манна-Уїтті та рангову кореляцію за Спірменом. **Результати.** Встановлено переважання чоловіків над жінками в швидкості простого сенсомоторного реагування (U=2147.00; p=.006) та сенсомоторної реакції вибору (U=1733.00; p<.001), а також у швидкості реагування у варіанті з одним можливим стимулом (U=2078.00; p=.003) і варіанті з триома можливими стимулами (U=2006.00; p=.001) в задачі подвійного вибору. З’ясовано, що чоловіки, порівняно з жінками, менше витрачають час на організацію екстеної сенсомоторної дії при швидкій зміні поточної ситуації (U=2090.00; p=.003). Встановлено, що в чоловічій групі, на відміну від жіночої, час орієнтування в задачі подвійного вибору корелює з часом рухової відповіді у варіанті з одним можливим стимулом (r=.257; p=.023) та з імовірністю антиципації (r=.365; p=.001).

**Висновки.** Загальна структура організації екстеної сенсомоторної дії у чоловіків та жінок суттєво не відрізняється. Час простого сенсомоторного реагування та реакції вибору в окремих завданнях і при необхідності їх екстеної вибіркової реалізації в задачі подвійного вибору в чоловічій групі менше, порівняно з жіночою. У чоловіків більш швидка, порівняно з жінками, організація екстеної сенсомоторної дії у відповідь на швидкі зміни поточної ситуації. Відносна, порівняно з чоловіками, операційна складність для жінок щодо диференціації часових орієнтирів у процесі антиципації моменту появи стимулу пов’язується з порушенням стабільність в швидкості виконання сенсомоторної дії.

**Ключові слова:** установка, антиципація, проста сенсомоторна реакція, сенсомоторна реакція вибору, чоловік, жінка.

**Вступ**

З розвитком техніки та технологій підвищується ймовірність виникнення ситуацій, у яких від людини вимагається екстрене реагування з необхідною високою швидкістю, точністю та повною відповідальністю за можливі наслідки. Процеси життєдіяльності суспільства виражено прискорюються, і значно збільшується ймовірність виникнення ситуацій, які потребують дії людини. Тому необхідно вивчати, як впливає гендерний фактор на результати експериментів, які демонструють вплив швидкості, точності та точності відповідальності на процеси, які відбуваються в ситуаціях, які вимагають екстреного реагування.

**Introduction**

With the development of engineering and technologies, there increases the probability of occurrence of situations that require a person to respond emergently with the necessary high speed, accuracy, and full responsibility for the possible consequences. The processes of society’s life activity are notably accelerating, and the significance of their substantial disruption and subsequent rapid resumption is growing. The latter is most evident in human actions to solve tasks of driving vehicles, processing saturated information flows, and during intensive social communication. It should also be added that besides men, women are enthusiastically learning new areas of highly dynamic activity. Given the mentioned aspects, there appears a set of topical issues concerning the influence of the gender factor on the adequacy and speed of the subject's assessment of drastic changes in the current situation, as well as on the speed and accuracy of making and implementing decisions.
follow-up decisions when performing emergency actions.

The following can be regarded as factors that determine emergency actions: uncertainty in the specifics of significant changes in the situation; a sharp increase in the significance of such changes in the situation which require an immediate response; uncertainty in alternatives for responding to changes in the situation; uncertainty at the time of significant changes; uncertainty in the time limit for making and implementing the necessary decision; shortage of time for solving the task. Unlike the familiar structure of action, which is actualized in the usual circumstances, the following components are fundamentally important in the structure of emergency action: preliminary orientation in changes in the situation; formation of a new relevant attitude that is adequate to the conditions that have changed; adoption of the best working apperception scheme; the fastest assessment of available resources with subsequent goal statement. At the same time, the specific requirements for the speed and accuracy of achieving the necessary result depend identifying a particular situation. In most cases associated with time shortage, high (extremely high) speed and sufficiently high accuracy of implementation are expected from emergency actions (Cheban et al., 2020a; 2020b; Plokhikh, 2011; Zinchenko et al., 2022).

Emergency actions in relevant situations are usually peculiar. However, distinctive features and typical components of their structural organization mainly persist. In this regard, it should be reckoned that the extent to which the subject is able to actualize most essential components of emergency action affects his ability to act in a real situation.

In the case of an urgent response to a drastic change in the situation, the subject must assess the adequacy of the previously adopted relevant attitude. In addition, a sharp change in conditions is a kind of methodological technique during the experimental study of peculiarities of implementing the relevant attitude (Uznadze, 2001). In the latter case, the emphasis is more on identifying the specifics of attitude previously adopted by the subject, while the speed and accuracy of shaping a new attitude and system of actions in full accordance with the changed situation are of primary importance.

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for emergency action. Moreover, the design of a new apperception scheme, setting a new goal, and adapting a new sequence of operations make sense in terms of shaping a full-fledged structure of emergency action.

The key requirements for the outcome of emergency action (high speed and accuracy) largely coincide with the requirements for a simple sensorimotor response and a choice response. The sensorimotor reaction fully retains the main components of action structure and is not overwhelmed by many substantial features of more complex actions. It should be added that under certain circumstances, the structure of sensorimotor actions drives the activity of anticipation mechanisms quite simply and effectively (Ariani et al., 2021; Plokhikh, 2011; Sadaphal et al., 2022; Silverman, 2010). The latter is of great importance for studying of emergency actions, given the natural identification in their organization of the previous stage of assessing the nature and trends of changes in the situation. The above features of sensorimotor reaction are applicable for the model variant in studies of psychological mechanisms of emergency actions.

Sensorimotor action, and even its variant with a preliminary assessment of the situation, changes under the influence of many external and internal factors. Such factors include the requirements of a task implemented in a specific situation and the subject's characteristics of the subject (Boyko, 2002; Jain et al., 2015; Shoshol, 1978; Vidal et al., 2015).

The subject's characteristics, which are stable when performing actions, are jointly fixed in the form of individual style (Merlin, 2005). Gender is one of the factors determining style features of activity arrangement most consistently. Gender characteristics of a person affect the functioning of the musculoskeletal system, preferences, response stereotypes, and attitudes towards uncertainty and stress-producing effects (Eaton et al., 1986; Van Uffelen et al., 2017; Wu et al., 2020). Studies by M. Gartstein (2019) have shown that in the first months of life, the brain structure of male and female infants has different relationships between the right and left hemispheres (Gartstein et al., 2019). This is due to the differences in the temperament of male
and female representatives. The studies also note the differentiated impact of the environment on the formation of psychodynamic traits of a child’s mental organization (Coe et al., 2020). At the same time, one can consider complex functional syntheses of temperament traits with firmly fixed attitudes and response methods within the framework of stylistic mental constructs.

The development of an individual style of activity, which includes peculiarities typical for a specific gender, depends on the subject’s preferences for the situation, means, and ways of implementing purposeful activities. From a young age, boys opt for more active forms of behavior, and such preferences retain in different forms at further life stages (Eaton et al., 1986; Wu et al., 2020). Moreover, it is referred not only to behavioral schemes but also their support at the level of physiological processes, tonus, and functional characteristics of the muscular apparatus. A study by A. Jain (2015) et al. found that high physical activity in the organization of the subject’s life is good for the speed of his sensorimotor response (Jain et al., 2015). It is also noted that the reaction time in men, compared to women, is shorter for different stimulation options. The mentioned result confirms the data of Ye. Boyko and R. Shoshol that men have the edge over women in the speed of sensorimotor response (Boyko, 2002; Shoshol, 1978).

The presented information demonstrates that the speed of performing necessary operations upon emergency actions is higher in men than women. At the same time, it is essential to clarify the influence of gender on the speed of a radical change of the current attitude by the subject, apperception scheme, and target points in the case of situation reversal.

The purpose of the study is to determine peculiarities of the influence of the gender factor on the structure and implementation speed of emergency sensorimotor action.

Research tasks:

1) identify the main aspects of the influence of the gender factor on the subject’s actions using theoretical analysis;

2) experimentally prove the influence of the subject’s gender on the structural organization, the speed of estimation of significant changes in the situation, and the implementation time of emergency sensorimotor action.

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Research methodology

152 male and female students participated in the experimental study. The male group included 78 persons (age: Me = 19, min = 17, max = 25). The female group consisted of 74 persons (age: Me = 18, min = 16, max = 25).

According to the experimental plan, the subjects solved the following tasks: simple response (one option of stimulation – 1_PS); choice response (three possible options of stimulation – 3_PS); two-choice (TC). All experimental tasks were implemented in software, and the participants solve them using computer technology. Simple-response and choice-response schemes have been somewhat combined in the two-choice (TC) task (Plokhikh, 2021). The task also actualized a response scheme with an attention (indicative) signal and provided for the effects described by Hick’s law. According to the law, more stimuli take more reaction time (Shoshol, 1978; Usher et al., 2002).

A detailed substantiation and description of the experimental study methodology, as well as instructions for the subjects are available in previous works (Plokhikh, 2021; Plokhikh et al., 2021).

At the first stage of the TC task, the participants aimed for (adopted the attitude) the relevant variant of the task (1_PS or 3_PS) and then came up with a reaction to the stimulus. The stimulus in the 1_PS variant corresponded to one of three stimulation alternatives according to the 3_PS scheme. From the beginning, the subject knows neither a task variant nor the future stimulus in the subsequent trial. The indicative signal performed a double function. On the one hand, it pointed at the relevant task variant, and on the other hand, it was the reference time for the appearance of a stimulus for a motor response. It was the second function expression that determined the possible anticipation effects in the participants’ solutions in a 1_PS variant (Cravo et al., 2017). In contrast to a case when a participant could prepare for the corresponding action after a signal, a 3_PS variant complicated anticipation by the expectation of the stimulus and a motor response alternative. A TC task also considered that in the uncertainty of the current situation and the prospect of future actions, a person makes up the mind to perceive and recompose the largest array of information about reality (Plokhikh et al., 2021; Shoshol, 1978). As a result, an apperception scheme focused on a 3_PS variant was envisaged as...
initial and actualized for the following trial. After an indicative signal, the scheme either remained or changed for a time for the apperception scheme of the proposed 1_PS variant.

Under an experimental series, the subjects performed some training trials to familiarize themselves with the task before the test trials. In each experimental task, the subject aimed to respond to the stimulus that appeared on the computer monitor as quickly as possible. A burgundy square had been always a stimulus. The subject solved a task of simple sensorimotor response in series 1, a choice reaction task in series 2, and a TC task in series 3.

In the task of simple sensorimotor response, the stimulus square appeared in the center of the screen. In the choice reaction task, the stimulus square could appear on the screen in one of three possible places: in the center; to the right of the center; and the left of the center. According to the instruction, the subject had to press the corresponding key on the keyboard when appearing the stimulus. In the simple sensorimotor response task, the “↓” key was functional. A subject pressed one of the following keys for the selection reaction and the motor response in the 3_PS variant in the TC task: the square to the left – “←”; the square in the center – “↓”; the square to the right – “→”. In the 1_PS variant of the TC task, the mentioned keys were also functional, but given the location of stimulus. In the TC task, the relevant variant of stimulation was indicated by displaying burgundy circles on the monitor above the places of possible appearance of a stimulus.

In the TC task, the change in the orientation time of each subsequent trial was carried out automatically according to the established algorithm. The relevant change was made given the result of the software comparison of the time of the sensorimotor action of the 1_PS variant with the criterion value of the required time of the motor response. The criterion was the median time of response in series 1 obtained for a specific participant. In a case where the sensorimotor action time was higher than the criterion value, the orientation time in the next trial was automatically increased by .05 sec. Otherwise, the orientation time was reduced by 05 sec. Given the above algorithm, the orientation time was adjusted so that the motor response time tended to the value of the given criterion (“ranged” from trial to trial around the relevant value).
In the reaction choice task and the TC task, the place of the stimulus appearance on the screen in the next trial was determined by a random number sensor. The relevant variant of the TC task (1_PS or 3_PS) was determined likewise. In every experimental series, the time interval between subsequent trials also changed automatically and randomly, but within 1.7±2.3 seconds.

In series 1 (simple reaction), the participants performed 5–7 training and 25 control trials. In series 2 (selection reaction), it was also necessary to perform 5-7 training and 25 test trials. In series 3 (TC task), the participants were offered to perform 7–8 training and 50 test trials. Data on each performed trial (conditions, results) was immediately and automatically entered into the data array, which was promptly formed. Upon completion of the planned tests within trials, the array of collected data was automatically processed. The data and results of their processing were recorded in a file that was attributed to the subject performing the task.

A separate procedure in processing the results of solving the TC task by the participants was the elucidation of pronounced anticipation effects. The pronounced anticipation effect was recorded when performing the action if the motor response time to the stimulus in a 1_PS variant did not exceed the certain minimum time of simple response to the visual signal (.150 sec) (Boyko, 2002). In the proposed study, anticipation probability was calculated for each subject (Boyko, 2002). In the reaction choice task and the TC task, the motor response time to the stimulus in a 1_PS variant did not exceed the certain minimum time of simple response to the visual signal (.150 sec) (Boyko, 2002). In the proposed study, anticipation probability was calculated for each subject (Boyko, 2002). In the reaction choice task and the TC task, the motor response time to the stimulus in a 1_PS variant did not exceed the certain minimum time of simple response to the visual signal (.150 sec) (Boyko, 2002). In the proposed study, anticipation probability was calculated for each subject (Boyko, 2002). In the reaction choice task and the TC task, the motor response time to the stimulus in a 1_PS variant did not exceed the certain minimum time of simple response to the visual signal (.150 sec) (Boyko, 2002). In the proposed study, anticipation probability was calculated for each subject.
of statistical criteria: the Mann–Whitney U test and Spearman's rank correlation coefficient. IBM SPSS Statistics 20 was applied.

**Results**

Using the non-parametric criterion U (Mann-Whitney), the effectiveness of solving experimental tasks of male and female participants was compared (Table 1). In all considered cases, except one (parameter – anticipation probability), significant differences were established between the groups.

The coefficients of rank correlation between the parameters of solutions of experimental tasks in the male (Table 2) and female (Table 3) groups were determined.

The change in significant statistical relationships of the properties of sensorimotor processes in the male and female groups predominantly coincides (see Tables 2 and 3). All indicators of response time in both groups are directly correlated with each other. There are differences between the groups in the required orientation time. In the male group, in contrast to the female one, the parameter of the TC task is inversely correlated with the motor response time in the 1_PS variant and directly correlated with anticipation probability.

### Table 1. Results of statistical comparison (Mann-Whitney U-test) of the parameters of sensorimotor actions for solving experimental tasks in male and female groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Statistical parameter</th>
<th>Simple Reaction</th>
<th>Choice Reaction</th>
<th>Two-choice task</th>
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<tr>
<td></td>
<td></td>
<td>T with 1</td>
<td>T with 3</td>
<td>To</td>
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<tr>
<td></td>
<td></td>
<td>T до 1</td>
<td>T до 3</td>
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<tr>
<td>Men</td>
<td>Me</td>
<td>.220</td>
<td>.320</td>
<td>.198</td>
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<tr>
<td></td>
<td>min</td>
<td>.150</td>
<td>.230</td>
<td>.070</td>
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<tr>
<td></td>
<td>max</td>
<td>.260</td>
<td>.410</td>
<td>.390</td>
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<tr>
<td>Women</td>
<td>Me</td>
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<td>.350</td>
<td>.236</td>
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<td></td>
<td>min</td>
<td>.170</td>
<td>.260</td>
<td>.060</td>
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<td></td>
<td>max</td>
<td>.280</td>
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<td>.056</td>
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<td></td>
<td>U</td>
<td>2147.000</td>
<td>1733.000</td>
<td>2090.500</td>
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<tr>
<td></td>
<td>P</td>
<td>.006</td>
<td>&lt; .001</td>
<td>.003</td>
</tr>
</tbody>
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**Notes:**
- p – possibility of a type I error; T with 1 – motor response time with one possible stimulus; T with 3 – motor response time with three possible stimuli; To – orientation time; AP – anticipation probability.

### Table 2. Coefficients of rank correlation between the parameters of solutions of experimental tasks in the male group

<table>
<thead>
<tr>
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### Table 3. Coefficients of rank correlation between the parameters of solutions of experimental tasks in the female group

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Simple Reaction</th>
<th>Choice Reaction</th>
<th>Two-choice task</th>
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<tr>
<td></td>
<td>max</td>
<td>.260</td>
<td>.410</td>
</tr>
<tr>
<td>Women</td>
<td>Me</td>
<td>.226</td>
<td>.350</td>
</tr>
<tr>
<td></td>
<td>min</td>
<td>.170</td>
<td>.260</td>
</tr>
<tr>
<td></td>
<td>max</td>
<td>.280</td>
<td>.510</td>
</tr>
</tbody>
</table>

**Notes:** p – possibility of a type I error; T with 1 – motor response time with one possible stimulus; T with 3 – motor response time with three possible stimuli; To – orientation time; AP – anticipation probability.

Примітки:
- p – можливість помилки 1 роду; T до 1 – час рухової відповіді при одному можливому стимулі; T до 3 – час рухової відповіді при трьох можливих стимулах; To – час орієнтування; ЙА – ймовірність антиципації.
### Table 2. Correlation matrix (Spearman) of the parameters of performing sensorimotor actions in experimental tasks (male group)

<table>
<thead>
<tr>
<th>Task Завдання</th>
<th>Action parameter Параметр дії</th>
<th>Statistical parameter Статистичний параметр</th>
<th>Choice reaction Реакція вибору</th>
<th>Two-choice task Завдання подвійного вибору</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple reaction</td>
<td>T with 1, T до 1</td>
<td>Rs</td>
<td>.401</td>
<td>To</td>
</tr>
<tr>
<td>Choice reaction</td>
<td>T with 3, T до 3</td>
<td>Rs</td>
<td>.303</td>
<td>p</td>
</tr>
<tr>
<td>Two-choice подвійного вибору</td>
<td>T with 1, T до 1</td>
<td>Rs</td>
<td>.352</td>
<td>p</td>
</tr>
<tr>
<td></td>
<td>T with 3, T до 3</td>
<td>Rs</td>
<td>.262</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Rs – the Spearman’s Rank Correlation Coefficient; p – possibility of a type I error; T with 1 – motor response time with one possible stimulus; T with 3 – motor response time with three possible stimuli; To – orientation time; AP – anticipation probability.

### Table 3. Intercorrelation matrix (Spearman) of the parameters of performing sensorimotor actions in experimental tasks (female group)

<table>
<thead>
<tr>
<th>Task Завдання</th>
<th>Action parameter Параметр дії</th>
<th>Statistical parameter Статистичний параметр</th>
<th>Choice reaction Реакція вибору</th>
<th>Two-choice task Завдання подвійного вибору</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple reaction</td>
<td>T with 1, T до 1</td>
<td>Rs</td>
<td>.402</td>
<td>To</td>
</tr>
<tr>
<td>Choice reaction</td>
<td>T with 3, T до 3</td>
<td>Rs</td>
<td>.300</td>
<td>p</td>
</tr>
<tr>
<td>Two-choice подвійного вибору</td>
<td>T with 1, T до 1</td>
<td>Rs</td>
<td>.300</td>
<td>p</td>
</tr>
</tbody>
</table>

**Notes:** Rs – the Spearman’s Rank Correlation Coefficient; p – possibility of a type I error; T with 1 – motor response time with one possible stimulus; T with 3 – motor response time with three possible stimuli; To – orientation time; AP – anticipation probability.

**Prимітки:** Rs – коефіцієнт кореляції за Спірменом; p – ймовірність помилки 1 роду; T до 1 – час рухової відповіді при одному можливому стимулі; T до 3 – час рухової відповіді при трьох можливих стимулах; То – час орієнтування; ЙА – ймовірність антиципації.
Discussion

Reported experimental data fully confirm the results of the prompter simple reaction and choice reaction in the male group compared to the female one (Boyko, 2002; Jain et al., 2015; Shoshol, 1978). Moreover, male subjects showed the best results in the speed of emergency change of the perception scheme and, accordingly, the psychological system of the relevant action. In this regard, it was found that the orientation time required for a complete motor response when switching from action structure in the 3_PS variant to the 1_PS variant is much less in the male group than in the female one (see Table 1). Given the mentioned sex differentiation in group results, it raises the question of its psychological basis.

The effectiveness of implementing the sensorimotor action system is mainly determined by the properties of temperament, specifically associated with each other and with other psychological and physiological features. Persistent complexes of connections, which stipulate the dynamics of mental processes, are formed and strengthened in practice and characterize the individual style of activity in general and sensorimotor response in particular (Merlin, 2005). As opposed to the speed performance of the response to external stimulus, the pronounced effects of anticipation, which is implemented through actualizing cognitive resources, do not have significant differences in the participants of different sexes (see table 1). In other words, the cognitive schemes of achieving the goal with an advance in the TC task do not differ fundamentally and show similar effectiveness in the participants. As a result, the above speed differences in the groups should be associated with the gender factor in terms of features that characterize the dynamics of the subject's mental performance: energy, activity, and mobility.

The experimental data available in the literature indicate that when moving into adulthood, males opt for an active and fast-paced lifestyle (Jain et al., 2015; Wu et al., 2020). It shows in preferences and styles of performing actions, involving the emergence and formation of feasible configurations of temperament properties. These property configurations are individual but have a pronounced focus to ensure high speed with sufficient accuracy in implementing actions. Plokhikh Viktor Volodymyrovych
Yanovska Svitlana Germanivna
The intercorrelations of the time of motor responses for different variants of experimental tasks in both male and female groups support the statement about the general source of activity of the sensorimotor response system in the participants (see table 2 and 3).

In general, the structure of connections of the indicators of the time of motor responses in all cases of sensorimotor processes is the same for most participants. At the same time, there are also characteristic differences in the correlations between the orientation time and the motor response time and anticipation probability in 1_PS of the TC task in both groups: there are significantly expressed connections in the male group in the latter case, and the female group does not have them. (see table 2 and 3). These differences can be considered in terms of gender peculiarities of sensorimotor action organization.

When solving the TC task, at the moment of exposure of the indicative signal on the screen, the assessment and clock start for the emergence of the response stimulus begins in the mental system. The subject, preparing a motor response, unconsciously compares the time interval of the stimulus waiting period being measured with the programmatically adjustable orientation duration known from previous trials. From the moment when the time measured by psychological mechanisms approaches a known time reference and the system of action already sufficiently corresponds to 1_PS, the hidden phase of motor response preparation can be triggered even before the stimulus appears. Thus, anticipation mechanisms are activated in the organization of action, which ensures a significant increase in the speed of achieving the goal to be sought (Cravo et al., 2017; Česonis et al., 2020).

In the above sequence of operations in solving the experimental TC task, the most important role is given to the psychological mechanisms of time estimation. In addition, in the preparation of emergency action, the time limit for organizing a full response structure when switching from 3_PS to 1_PS is also crucial. In this regard, it is worth mentioning that the experimental data obtained earlier indicate that the motor response time in a 1_PS variant naturally decreases (linear...
dependence) with an increase in the orientation time (highly required to organize the necessary response) and the probability of anticipation effects rises (Plokhikh et al., 2021). The above patterns are quite clearly expressed in the male and female groups (see table 2 and 3).

The findings of another experimental research showed that compared to men, women are more difficult to withstand mental temporal orientation without support from external time meters (Plokhikh, 2011). By relying on the beforementioned, it should be considered that in solving the TC task, the female group had a somewhat complicated estimate of the waiting period for the stimulus (orientation) with the transition to the hidden phase of motor response preparation. The latter can be regarded as the cause of significant variations in temporal estimates and disturbances of the regular ratios of the orientation time with the motor response time and anticipation probability in a 1_PS variant. The mentioned disturbances under a limited range of changes in the orientation time, which were programatically calculated given the maintenance of the criterion of its change (median time of a simple sensorimotor reaction), could result in local deviations in these patterns and hence the lack of corresponding statistical connections of parameters in the female group. In the male group, where mental time estimates were more accurate and known patterns were more clearly sustained, the expected correlations of the orientation time with the motor response time and anticipation probability are statistically significant and characteristic enough.

Conclusions
1. The general structure of an emergency organization of the sensorimotor action system in male and female groups is not significantly different and includes almost the same components and connections.
2. Compared to the female group, the male one needs less time for the simple sensorimotor response and choice response in individual tasks and, if required, for their selective implementation in the two-choice task (emergency actions). Compared to female subjects, male ones can also organize a new sensorimotor system more quickly if an emergency response is required.

2020). Такі варіанти закріплюються у перевагах, у відповідних стилях реалізації дій, що передбачають виникнення та формування доцільних конфігурацій властивостей темпераменту. Ці конфігурації властивостей індивідуально обумовлені, але при цьому мають виражену спрямованість задля забезпечення високої швидкості з достатньою точністю у виконанні дій. Твердження про загальне джерело активності системи сенсомоторного реагування у досліджуваних підтверджується і інтеркореляціями показників часу рухових відповідей для різних варіантів експериментальних завдань і в чоловічій, і жіночій групах (див. табл. 2 і 3).

У цілому структура зв’язків показників часу рухових відповідей у всіх випадках сенсомоторних процесів є однаковою для більшості досліджуваних. Разом з тим спостерігаються і характерні відмінності в кореляціях часу орієнтування з часом рухової відповіді та її мовірністю антиципації у варіанті 1_MC задачі ПВ у групах чоловіків та жінок: якщо в чоловічій групі в останньому випадку з’являється значна відмінність, то в жіночій групі така з’являється відсутні (див. табл. 2 і 3). Зазначені відмінності з середньої значимості можна розглядати з точки зору статевої своєрідності організації сенсомоторної дії.

У процесі вирішення завдання ПВ у момент експозиції на екрані орієнтовного сигналу починається оцінка та відмірювання в психічній системі часу до моменту появи стимулу реагування. Досліджуваний, готуючись рухову відповідь, неосвідомлено зіставляє тимчасовий інтервал етапу очікування стимулу, що відмірюється, з відомою попередніми пробами програмою регулювання тривалістю орієнтування. З моменту, коли час, що відмірюється психологічними механізмами, наближається до відомого часового орієнту і система дії вже достатньою мірою відповідає варіанті 1_MC, може запускатися прихована фаза підготовки рухової відповіді, ще до того, як з’явиться стимул. Таким чином, активуються антиципаційні механізми в організації дії, чим забезпечується суттєве підвищення швидкості досягнення поставлени мети (Cravo et al., 2017; Česonis et al., 2020).

У представленій вище послідовності операцій у вирішенні експериментального
3. The subjective complexity of the differentiation of mental time references in the process of the necessary organization of the system of emergency sensorimotor action is higher in women than in men. This explains the operational complexity in the female group towards the differentiation of time references for the anticipation of a possible appearance of the stimulus that affects the stability of the execution time of the sensorimotor action.

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