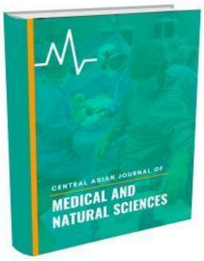

CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
https://cajmns.centralasianstudies.org/index.php/CAJMNS
Volume: 05 Issue: 03 | April 2024 ISSN: 2660-4159

CENTRAL ASIAN STUDIES

Article

Characteristics of Deficit Disorders in Patients with Paranoid Schizophrenia

Dusov Abdimurod Kholmurodovich[1*], Ochilov Ulugbek Usmanovich[2]

1. Termez branch of the Tashkent Medical Academy, Termez, Uzbekistan.
2. Samarkand State Medical University, Samarkand, Uzbekistan

* Correspondence: abdumurod@mail.ru

Abstract: This study investigated the relationship between delusions of control and aberrant self-action recognition in schizophrenia. Delusions of control, where individuals feel that their actions are being controlled by external forces, are a prominent symptom of schizophrenia, yet the underlying mechanisms remain unclear. We aimed to determine if these delusions are linked to difficulties in attributing actions to oneself. A total of 6 patients with delusions of control, 18 patients without these delusions, and 29 healthy controls participated in an action recognition task. Participants performed movements with a virtual hand while experiencing random angular deviations and delays, then assessed whether the observed movements were their own. Results showed that both patient groups made more recognition errors, especially with temporal delays, than controls. Moreover, patients with delusions of control had significantly higher error rates with angular biases compared to both other groups. These findings suggest a specific impairment in the neural system for action attribution in schizophrenia patients with delusions of control, highlighting the need for targeted interventions.

Keywords: schizophrenia, personality, types of schizophrenia, cognitive disorders.

1. Introduction

In the diverse spectrum of symptoms associated with schizophrenia, certain positive symptoms are deemed crucial for diagnosing the disorder [1,2]. According to Schneider [3], first-rank symptoms describe a state in which individuals interpret their thoughts or actions as controlled by external influences or others. The distinctiveness of these symptoms in schizophrenia, particularly when narrowly defined [4,6], and their consistency across patients, highlight a significant aspect. First-rank symptoms may indicate a breakdown in the mechanism responsible for self-awareness of actions and thoughts, leading to challenges in correctly attributing them to oneself [5,7-10]. Therefore, investigating attribution behavior in schizophrenic individuals not only illuminates this vital function but also aids in understanding the underlying factors contributing to misattribution in these patients.

Prior research has explored action monitoring in schizophrenia: individuals with positive symptoms exhibit difficulties in error correction tasks without visual feedback or in tasks involving drawing using a joystick or keyboard [3,5,9]. Nevertheless, these findings do not clarify whether the impaired performance without visual control stems from distorted action representation or dysfunction in the sensorimotor loops responsible for movement control.

Citation: Dusov Abdimurod Kholmurodovich, Ochilov Ulugbek Usmanovich Characteristics of Deficit Disorders in Patients with Paranoid Schizophrenia Central Asian Journal of Medical and Natural Science 2024, 5(3), 378-384

Received: 10th Aptil 2024
Revised: 10th May 2024
Accepted: 17th Jan 2024
Published: 24th May 2024

The idea of a skewed portrayal seems to be the most credible reasoning. For instance, individuals with delusions of control often disown decisions to enact their actions, even after performing these actions, suggesting an inability to match executed actions with their corresponding intentions or representations. This hypothesis could be evaluated by assessing patients' ability to distinguish between their own actions and those performed by others [5,7,10]. In an innovative investigation [11], individuals without any abnormalities were shown movements of uncertain origin, where the hand of an actor was visually overlaid onto their own hand. Even when the actor's movements did not align with their own, subjects perceived the actor's hand as their own, reporting feelings of oddness or sensations of external force manipulation.

Daprati and colleagues extended this paradigm to schizophrenic patients [15,17], who were asked to make agency judgements about the identity of the hand they observed performing gestures. In challenging trials where participants saw another hand executing the same gesture, those with delusions of control misidentified the alien hand as their own significantly more often than those without such delusions.

While these experiments illustrate the difficulty schizophrenic patients face in attributing actions, especially influenced patients, they do not elucidate the specific cues used by unaffected individuals to provide accurate attribution responses. The current experiment was designed to address this gap, employing a setup akin to Daprati et al [12-16], study but using a realistic virtual hand instead of an experimenter's hand. This modification not only facilitated more standardized experimental conditions but also enabled deliberate distortions of the virtual hand's movements relative to the subjects' hand. The findings strongly support the presence of impaired action attributions in schizophrenia, particularly pronounced in influenced patients.

2. Materials and Methods

Twenty-nine individuals diagnosed with schizophrenia, comprising twenty-three males and six females, with an average age of 34.6 (standard deviation = 11.0), participated in the study. Additionally, 29 healthy control subjects, consisting of twenty males and nine females, with an average age of 36.7 (standard deviation = 11.5), were involved. Both patients and control participants were unaware of the study's objectives. The study obtained approval from the local ethics committee (CCPPRB Leon Berard, Lyon), and following a detailed explanation, all participants provided written consent.

Patients were selected based on DSM-IV criteria without any accompanying diagnoses. Control subjects were recruited from the maintenance staff of two hospitals. Exclusion criteria for both groups included visual and auditory impairments, a history of neurological conditions or trauma, substance dependence according to DSM-IV criteria, age outside the range of 18 to 65. There were no significant differences between the patient and control groups regarding age, gender, handedness, or level of education.

Seventeen out of the 29 patients were hospitalized at the time of the study. Among them, twelve had paranoid schizophrenia, three had disorganized schizophrenia, eleven had undifferentiated schizophrenia, and three had residual schizophrenia. The majority of the patients were right-handed, as determined by Handedness Inventory. The average duration of illness was 11.3 years, with a standard deviation of 9.0 years and a range of 1 to 33 years. All patients were undergoing antipsychotic treatment, primarily with medications such as risperidone, olanzapine, clozapine, and levomepromazine, and they were clinically stable during the testing period. However, there was no documented literature regarding the effects of these medications on tasks similar to those used in this study or on motor tasks in general.

Neuropsychological assessments were conducted to evaluate patients' spatial perception abilities and intellectual functioning. This was accomplished using the Birmingham Object Recognition Battery (BORB) and the Raven Progressive Matrices

PM47. Patients' performances in both tests fell within the normal range for the six administered tasks of the BORB and the PM47 test. Clinical evaluations were performed using the Scale for Assessment of Positive Symptoms (SAPS) and the Scale for Assessment of Negative Symptoms (SANS). Patients were further classified based on the passivity phenomena sub-scale to distinguish between "influenced" (n=6) and "non-influenced" individuals (n=23). Differences in age and performance on the BORB were observed between influenced and non-influenced patients.

During the experiment, five non-influenced patients were unable to complete the task accurately and were therefore excluded from the comparative analysis. These individuals exhibited higher total SANS scores compared to other non-influenced patients but did not differ significantly in other factors like age, illness duration, educational level, intellectual performance, perceptual abilities, or total SAPS score.

During the experiment, participants were shown an electronically generated image of a hand holding a joystick on a high refresh rate computer screen. A custom program was used to create visual representations of the hand and joystick based on the actual position of the joystick held by the participant and connected to the computer. This setup allowed for real-time visualization of the participant's joystick movements with an inherent delay of less than 30 milliseconds. The program could introduce temporal or angular distortions in the displayed representation, altering the apparent direction or synchronization level of the participant's movements shown on the screen.

The computer screen was set facing down on a metallic stand. A mirror, placed horizontally 18 centimeters below the screen, projected the visual image. Positioned under the mirror, on the support table of the apparatus, was the joystick. The gap between the table and the mirror measured 31 cm, positioning the joystick roughly 18 cm beneath the mirror. This setup allowed participants, when looking into the mirror, to see a virtual hand controlling the joystick directly above their actual hand performing the same movements.

3. Results

Descriptive analysis

Both the control subjects and patients predominantly responded with YES (correct) answers in almost all neutral trials. The median count of incorrect NO responses was consistently low (N=1) across all three groups. While the distribution of YES responses in biased trials varied noticeably between the groups, it maintained a somewhat similar trend across all groups. In both control subjects and patients, the frequency of YES responses was higher for smaller temporal and angular biases, decreasing as the biases intensified. In essence, the only difference between the groups was the steepness of this trend. Notably, five out of the 29 patients did not exhibit a decline in YES responses as the magnitude of angular biases increased, consistently providing YES responses at near-maximum rates for all bias levels. These patients stood out as unresponsive to this experimental factor, as they maintained over 90% YES responses even at the highest angular bias levels (25°, 30°, and 40°). These individuals, who did not display any influence or hallucination, were excluded from the comparative analysis.

Between-Group Analysis

1. Global Differences

Schizophrenic patients who experienced influence responded with "YES" more frequently overall than both non-influenced schizophrenic patients and control subjects in trials with angular and temporal biases. Specifically, the median "YES" responses were as follows: influenced patients had 56.5 in angular bias trials and 53.5 in temporal bias trials; non-influenced patients scored 39 and 49.5 respectively; while control subjects recorded lower scores of 33 and 29 respectively. The Median test revealed significant differences among these groups in both angular (χ^2=7.67, df=2, p=0.022) and temporal bias trials (χ^2=20.49, df=2, p<0.001).

Further analysis using the Mann-Whitney U-test showed that influenced patients made significantly more errors compared to control subjects in both angular (U=19.5, Z=-2.95, N=35, p=0.003) and temporal bias trials (U=16.5, Z=-3.09, N=35, p=0.002). Non-influenced patients also differed significantly from control subjects in temporal bias trials (U=73.0, Z=-4.11, N=47, p<0.001), and showed a trend towards significance in angular bias trials (U=178.5, Z=-1.80, N=47, p=0.071). A notable significant difference was also found between the two patient groups in angular bias trials (U=23.5, Z=2.03, N=24, p=0.042).

No correlations were identified between the participants' overall scores in the experiment and factors such as age, gender, illness duration, performance on the Birmingham Object Recognition Battery (BORB) among patients, age and gender among control subjects.

2. Pairwise comparisons

Highlights another significant aspect of these findings, showing that the distinctions between the control group and the two patient groups varied based on the magnitude of the biases. In Figure 1A, the graph displays the YES responses for trials with angular biases. Non-influenced patients exhibit a noticeable decline in incorrect YES responses (reaching 50% of the maximum error count) already with a bias between 15° and 20°, a value quite similar to that of the control group. Conversely, influenced patients do not demonstrate a similar reduction until the bias reaches 30°-40°. Figure 1B depicts the data for trials with temporal biases. While control subjects exhibit a clear decrease in YES responses with a relatively small bias (100-150 milliseconds), both influenced and non-influenced patients show a consistent pattern without a decrease until the bias extends to 300 milliseconds.

The Mann-Whitney U-test was used to compare each set of trials. The analysis indicated that both patient groups—those experiencing influence and those not influenced—committed significantly more errors than the control group in trials with temporal delays exceeding 100 milliseconds. In trials with angular biases, influenced patients significantly differed from the control group starting from biases larger than 10°. In contrast, non-influenced patients showed significant differences from the control group only at larger angular biases of 30° and 40°.

Among the patient groups, a significant difference was observed only in trials with a 10° angular bias. For most other angular biases, the differences between the patient groups were nearing significance, indicating a trend but not reaching conventional levels of statistical significance. No significant variations were observed in trials involving temporal biases, suggesting that the temporal delay itself did not distinguish between the behaviors of the different groups under study.

4. Discussion

The results from this study illustrate that altering the visual perception of one's own movements impairs the accurate self-attribution of those movements, with a much more pronounced effect observed in patients with schizophrenia.

Control subjects still perceive movements delayed by up to 150 milliseconds or deviated by approximately 15 degrees as their own. This suggests that the precision in identifying specific characteristics of one's movements is constrained, surpassing the typical perceptual thresholds for detecting temporal delays or angular deviations. The constraints observed here in distinguishing between self-generated and externally generated movements likely reflect the limitations of a specialized neural system dedicated to perceiving biological movements, as indicated by previous psychophysical studies [16-18].

In this experiment, patients exhibited greater difficulty than control subjects in distinguishing movements that were delayed or deviated. Remarkably, five patients, excluded from the comparison analysis, struggled to perform half of the task successfully, consistently providing the same response in all trials involving angular biases. This behavior may be attributed to the randomized presentation of trials with temporal and angular biases, potentially hindering these patients' ability to consciously monitor both types of biases simultaneously. Speculatively, their performance might have differed in a blocked trial design compared to a randomized one, given their successful performance in the training session where biases were introduced separately.

Among the remaining 24 schizophrenic patients, their responses to trials involving temporal delays up to 300 milliseconds were at chance levels, indicating no significant ability to detect these delays. For angular deviations, the influenced patients performed at chance levels for angles up to 30 degrees, suggesting a marked impairment in recognizing deviations unless they were quite large. In contrast, non-influenced patients detected deviations closer to the performance levels of control subjects, with an awareness threshold around 15 degrees. This suggests a better preserved ability in non-influenced patients to recognize angular changes. Before concluding that the lower threshold for self-attribution observed in some patients is due to a specific cognitive impairment, it's critical to consider other potential factors, such as deficits in perceptual or attentional mechanisms. However, it's notable that all patients, including those influenced, demonstrated competent performance on the Birmingham Object Recognition Battery (BORB) test. This performance indicates that their ability to discriminate minor angular differences remains intact, which suggests that their issues with angular deviation in the joystick task may not be due to basic perceptual deficits. In the case of temporal biases, one could argue that schizophrenic patients are generally slower in tasks with increased reaction times, a characteristic often associated with negative symptoms, suggesting a more global cognitive challenge rather than a specific impairment related to self-attribution [20,22,26].

The delay in our temporal condition differs significantly from a typical reaction time task, and the patients' difficulties do not stem from mere slowness in responding but rather from challenges in perceiving subtle temporal discrepancies. Recent studies highlighting the struggle of individuals with schizophrenia in distinguishing moving visual stimuli may provide insights into the difficulties faced by the patients in our study [21,23,25]. While the difficulty in resolving temporal delays likely contributes to the high misattribution rates observed, it may not be the primary issue as it does not differentiate between the two patient subgroups.

Conversely, the inability to detect movement direction may be a critical factor in misattributing actions. Previous reports have indicated deficits in trajectory judgments among individuals with schizophrenia [25,27], though this aspect was not linked to the patients' clinical symptoms. Notably, our novel finding reveals that only influenced patients displayed difficulties in attributing movements with angular biases. Perceiving the direction of movement is crucial for understanding the intention behind an action, as the movement's path points towards the action's goal and reveals the agent's intent. Therefore, patients lacking this information may misinterpret others' intentions conveyed through their movements, affecting their comprehension of interpersonal interactions. The observation that influenced patients attributed movements different from their own suggests they could erroneously assign movements performed by others to themselves, leading to a sense of external influence.

An intriguing hypothesis suggests that comprehending an action performed by an external agent involves internally simulating that action. By mentally placing oneself in the agent's position, the observer may experience similar feelings and construct a representation of the observed action [23,24]. This theory is supported by the activation of the motor system across various forms of action representation and consistent patterns of brain activity during action imagination, preparation, and observation. Common brain regions activated during these processes include the inferior parietal lobule, supplementary motor area (SMA), and ventral premotor area. This neural activity could aid individuals in determining the origin of an action. A functional imaging study on influenced schizophrenic patients further supports this hypothesis.

It is essential to interpret the current results with caution and conduct additional experiments to validate them, given the limited size of the influenced sample and the multiple statistical analyses performed. Additionally, exploring the performance patterns of non-schizophrenic psychiatric patients will be necessary to gain a comprehensive understanding of these findings

5. Conclusion

The present study highlights significant impairments in self-attribution of actions in schizophrenic patients, particularly those experiencing delusions of control. These patients exhibited higher error rates in recognizing their own movements, especially when faced with angular biases and temporal delays, compared to both non-influenced patients and healthy controls. The findings suggest a specific deficit in the neural mechanisms responsible for action attribution in patients with delusions of control, which may contribute to their misattribution of external control over their actions. These results emphasize the need for targeted interventions to address these cognitive impairments. Future research should explore larger sample sizes and include non-schizophrenic psychiatric patients to further validate these findings and elucidate the underlying neural mechanisms of action attribution deficits in schizophrenia.

REFERENCES

[1.] V. V. Chugunov and N. V. Danilevskaya, "Pseudo-Obsessive Syndrome in the Clinic of Schizophrenia," Ukrainian Bulletin of Psychoneurology, no. 20, vol. 3, pp. 234-234, 2012.

[2.] S. N. Mosolov and P. A. Yaltonskaya, "Primary and Secondary Negative Symptoms in Schizophrenia," Frontiers in Psychiatry, vol. 12, p. 766692, 2022.

[3.] K. Schneider, Clinical Psychopathology. Kiev, 1999, p. 215.

[4.] D. M. Nazarkina and V. V. Novikov, "Internal Picture of the Illness of Patients with Paranoid Schizophrenia," Personality in a Changing World: Health, Adaptation, Development, no. 4(11), pp. 71-80, 2015.

[5.] P. P. Balashov and L. V. Bekeneva, "Clinical and Social Characteristics of Patients with Paranoid Schizophrenia with a Long Course of the Disease," Siberian Bulletin of Psychiatry and Narcology, no. 5, pp. 12-15, 2010.

[6.] D. M. Nazarkina, "Features of the Internal Picture of the Illness of Patients with Paranoid Schizophrenia," Current Problems and Prospects for the Development of Modern Psychology, no. 1, pp. 93-98, 2016.

[7.] E. V. Makushkin, N. V. Simashkova, L. O. Perezhogin, and A. V. Goryunov, "Schizophrenia in Childhood and Adolescence," Russian Psychiatric Journal, no. 6, pp. 62-81, 2016.

[8.] M. N. Dmitriev, A. N. Sannikov, O. V. Bachurina, and A. S. Moskvitin, "Therapeutic Factors of Compliance in the Treatment of Psychosis: A Review of Individual Problems," Chief Doctor of the South of Russia, no. 3(56), pp. 59-62, 2017.

[9.] E. A. Laktaeva, "Features of the Pathogenesis of Personality-Abnormal and Psychogenic-Neurotic Pathopsychological Syndromes," Bulletin of the All-Russian Society of Specialists in Medical and Social Expertise, Rehabilitation and Rehabilitation Industry, no. 4, pp. 56-59, 2012.

[10.] N. K. Kharitonova, V. I. Vasyanina, and E. A. Yakovleva, "Forensic Psychiatric Assessment of Various Forms of Schizophrenia when Resolving the Issue of Incapacity," Russian Psychiatric Journal, no. 6, pp. 33-41, 2011.

[11.] M. Yu. Burykina, "Comparative Analysis of Clinical and Psychological Characteristics of Schizophrenia and Schizoid Psychopathy in the Context of Their Pathopsychological Differentiation," Theoretical and Practical Aspects of the Development of Modern Science, pp. 139-158, 2014.

[12.] I. F. Pirogov, "Factors of Autogenic Exacerbation of Schizophrenia-like Disorders in a Differential Diagnostic Perspective," International Neurological Journal, no. 4(66), pp. 107-113, 2014.

[13.] G. A. Fastovtsov and S. N. Oskolkova, "Formation of Criteria for Remission in Schizophrenia," Russian Psychiatric Journal, no. 5, pp. 26-32, 2016.

[14.] D. E. Melekhov, "On the Problem of Residual and Defective States in Schizophrenia," Psychiatry, no. 1, pp. 94-104, 2009.

[15.] J. Muñoz-Estrada, A. Lora-Castellanos, I. Meza, S. A. Elizalde, and G. Benítez-King, "Primary Cilia Formation is Diminished in Schizophrenia and Bipolar Disorder: A Possible Marker for These Psychiatric Diseases," Schizophrenia Research, vol. 195, pp. 412-420, 2018.

[16.] N. Utayeva, D. Sharapova, and B. Turayev, "Psychopathological and Neuropsychological Features of Negative Diseases in Late Schizophrenia," Modern Science and Research, vol. 3, no. 1, pp. 428-436, 2024.

[17.] N. Prostyakova, D. Sharapova, F. Shernazarov, and B. Turayev, "Changes in the Postpsychotic Period after Acute Polymorphic Disorder," Science and Innovation, vol. 2, no. D12, pp. 356-360, 2023.

[18.] S. Tarasova and A. Bobrovnikova, "Gender Differences in the Development of Schizophrenia," The International Conference "Health and Wellbeing in Modern Society" (ICHW 2020), Atlantis Press, pp. 318-323, 2020.

[19.] L. Korovina, I. Strelnikova, and T. Radchenko, "Features of Cognitive Functioning in Patients with Paranoid Schizophrenia and Concomitant Cerebrovascular Pathology," Psychiatry, Psychotherapy and Clinical Psychology, vol. 12, no. 2, pp. 231-237, 2021.

[20.] V. K. Abdullaeva and T. B. Irmukhamedov, "Features of the Structure and Severity of Cognitive Disorders in Patients with Paranoid Schizophrenia with Concomitant Cerebral and Hemodynamic Disorders," Uzbek Medical Journal, no. Special 1, 2021.

[21.] V. L. Kovalenko, R. S. Maslov, and O. V. Maslova, "Variants of Thanatogenesis in Schizophrenia Associated with Neuroleptic and Other Diseases," Medical Science and Education of the Urals, vol. 16, no. 3, pp. 94-97, 2015.

[22.] E. V. Shchetinina, "Cognitive and Emotional-Volitional Deficits as Targets of Psychosocial Rehabilitation of Patients who have Suffered a First Psychotic Episode," Psychology. Psychophysiology, vol. 16, no. 2, pp. 49-56, 2023.

[23.] V. A. Verbenko and L. N. Gumenyuk, "Principles of Gender-Specific Psychosocial Rehabilitation of Women with Paranoid Schizophrenia," Tauride Medical-Biological Bulletin, vol. 20, no. 4, pp. 39-43, 2017.

[24.] A. A. Koblova, "Some Aspects of Social Adaptation of Patients with Schizophrenia," Bulletin of Medical Internet Conferences, vol. 1, no. 7, pp. 114-115, 2011.

[25.] R. M. Kubayev, M. H. Ibragimova, and B. T. Turayev, "The Effect of Exogenous Factors on the Clinical Course of Paranoid Schizophrenia," Journal of Healthcare and Life-Science Research, vol. 2, no. 10, pp. 28-34, 2023.

[26.] M. Spirkina, B. Turayev, D. Sharapova, and F. Shernazarov, "Integrated Approach to Correcting Neurocognitive Defects in Schizophrenia," Science and Innovation, vol. 2, no. D11, pp. 76-81, 2023.

[27.] D. S. Burminsky, "Residual Psychotic Disorders in Remission of Schizophrenia with Paroxysmal-Progressive Course: Clinical Typology and Therapeutic Approaches," M.: NCPC RAS, pp. 24-25, 2018.