

DOI: 10.12731/2658-6649-2022-14-3-298-311

UDC 159.96

DIGITAL TECHNOLOGIES IN ATTENTION BIAS STUDY IN SOCIAL ANXIETY DISORDER

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The paper aims to methodologically reflect on the scientific perspectives and risk-related reductionist understanding of mental processes of the limitations of digital technologies in the study of attention biases in social anxiety disorder.

Materials and methods of research include theoretical-methodological analysis, expert analysis of sources on the problem of application of digital technologies in the study of attention biases in social anxiety disorder. Methodological basis of analysis is the positions of the cultural-activity approach in comprehension of psychological aspects of application of digital technologies to research mental disorders (Tkhostov, Emelin, Soldatova, etc.), pathopsychology in studying distortions of mental activity (Zeigarnik, Kholmogorova, etc.), cognitive and cognitive-behavioral model of social anxiety disorder in the reconstruction of mechanisms of formation and maintenance of anxiety (Clark, Wells, etc.), principles of organization of contemporary studies using digital technologies, and the results of individual empirical studies on the features of attention in social anxiety disorder.

Results. The use of technology in research can be close to the research aim, substituting its scientific methodological understanding at the expense of visibility and the halo of scientificity of the data obtained. Improvement of digital technologies takes their application to a new level, which includes the priority of methodology. The use of digital technology in the study of mechanisms of social anxiety has provided empirical confirmation of motivational bias to social stimuli and the phenomenon of self-focused attention. The most meaningful results in terms of verification of cognitive and cognitive-behavioral models of social anxiety were obtained using eye-tracking technology and electroencephalography. They allow explicating dynamic properties of attention when solving the task in the experiment. Application of digital technologies provides (1) detection of empirical indicators of selectivity of cognitive-perceptual activity when perceiving social objects, (2) determination of phenotypical features of socially anxious individuals. The last distinguish clinical and normative samples, provide an opportunity to verify the models which put forward biases of attention as leading mechanisms of social anxiety. The variety of empirical studies using different paradigms and methods of

study does not always allow for comparisons or generalizations; inconsistencies persist in results.

Scope of the results. *The research results can be applied in (1) the planning of current studies using digital technology and comprehending of the results; (2) clarification of the mechanisms of disorders and selectivity of attention in social anxiety; (3) development of psychological interventions aimed to work with biases of attention in relation to social stimuli.*

Keywords: *social anxiety; social anxiety disorder; digital technology; eye-tracking experiment; attention distraction; self-focused attention; attention avoidance and hypervigilance*

For citation. *Sagalakova O.A., Truevtsev D.V., Zhirnova O.V. Digital Technologies in Attention Bias Study in Social Anxiety Disorder. Siberian Journal of Life Sciences and Agriculture, 2022, vol. 14, no. 3, pp. 76-89. DOI: 10.12731/2658-6649-2022-14-3-298-311*

ЦИФРОВЫЕ ТЕХНОЛОГИИ В ИССЛЕДОВАНИИ ИСКАЖЕНИЙ ВНИМАНИЯ ПРИ СОЦИАЛЬНОМ ТРЕВОЖНОМ РАССТРОЙСТВЕ

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Целью работы является методологическое осмысление научных перспектив и связанных с риском редуccionистского понимания психических процессов ограничений цифровых технологий в изучении искажений внимания при социальном тревожном расстройстве.

Материалы и методы исследования включают теоретико-методологический анализ, экспертный анализ источников по проблеме применения цифровых технологий в исследовании искажений внимания при социальном тревожном расстройстве. Методологическая база анализа – положения культурно-деятельностного подхода в осмыслении психологических аспектов применения цифровых технологий для исследования нарушений психики (Тхостов, Емелин, Солдатова, др.), патопсихологии в изучении искажений психической деятельности (Зейгарник, Холмогорова, др.), когнитивной и когнитивно-поведенческой модели социального тревожного расстройства в реконструкции механизмов формирования и поддержания тревоги (Кларк, Вэлс, др.), принципы организации современных исследова-

ний с применением цифровых технологий и результаты отдельных эмпирических исследований особенностей внимания при социальном тревожном расстройстве.

Результаты. Применение технологий в исследовании может оказаться близким к самоцели, подменяя научное методологическое понимание феномена за счет наглядности и ореола наукообразия получаемых данных. Совершенствование цифровых технологий выводит их применение на новый уровень, включающий приоритет методологии. При использовании цифровых технологий в изучении механизмов социальной тревоги оказалось возможным эмпирическое подтверждение мотивационной предвзятости в отношении социальных стимулов и феномена самосфокусированного внимания. Наиболее содержательные результаты в плане верификации когнитивных и когнитивно-поведенческих моделей социальной тревоги получены с помощью технологии айтрекинга и электроэнцефалографии, позволяющих эксплицировать динамические свойства внимания при решении задачи в эксперименте. Применение цифровых технологий обеспечивает обнаружение эмпирических индикаторов избирательности когнитивно-перцептивной деятельности при восприятии социальных объектов, определение фенотипических особенностей социально тревожных индивидов, отличающих клинические и нормативные выборки, предоставляя возможность верификации моделей, выдвигающих в качестве ведущих механизмов социальной тревоги искажения внимания. Многообразие эмпирических исследований с использованием разных парадигм и способов изучения не всегда позволяет сопоставлять или обобщать данные; противоречия в результатах сохраняются.

Область применения результатов. Результаты исследования могут быть применены при планировании современных исследований с использованием цифровых технологий и осмыслении получаемых результатов; уточнении механизмов нарушений и избирательности внимания при социальной тревоге; разработке психологического вмешательства, нацеленного на работу с искажениями внимания в отношении социальных стимулов.

Ключевые слова: социальная тревога; социальное тревожное расстройство; цифровые технологии; эксперимент с айтрекингом; отвлечение внимания; самосфокусированное внимание; избегание внимания и повышенная бдительность

Для цитирования. Сагалакова О.А., Труевцев Д.В., Жирнова О.В. Цифровые технологии в исследовании искажений внимания при социальном тревожном расстройстве // Siberian Journal of Life Sciences and Agriculture. 2022. Т. 14, №3. С. 76-89. DOI: 10.12731/2658-6649-2022-14-3-298-311

Introduction

Social Anxiety Disorder (SAD) is a widespread anxiety disorder characterized by the fear of negative social assessment that exhausts personal resources and impedes the realization of significant social motives for activity [8]. In SAD, social situations or situations related to self-presentation in public, performance evaluation are avoided wherever possible in order to reduce the fear of potential social rejection or humiliation [11]. The relevance of studying the distractions of mental activity in SAD is substantiated due to the current social conditions that determine interpersonal interaction transformation. The COVID-19 pandemic contributes to the social desirability of avoiding communication as a supportive behavioral factor for anxiety disorders, including social anxiety (SA) and SAD. The World Health Organization stresses that the hostile context in which pandemics is discussed, which is manifested in the use of the phrases “suspects,” “spreading the virus,” “infecting others,” contributes to stigmatization in society, increased SA, and selective attention to threatening incentives. Current digital reality dictates the necessity to study the anxiety that arises and can disorganize activities in direct communication and indirectly through digital technology (Internet, virtual reality, messengers, etc.). The experience of mediated communication and issue solving, which has become a standard technology, is a heuristic condition for objectifying the peculiarities of psychic activity in SA/SAD in the experiment. The study of anxiety disorders in the space of mediated communication and with the help of digital technologies is an essential trend of the modern era.

Materials and methods of research include theoretical-methodological analysis, expert analysis of sources on the problem of application of digital technologies in the study of attention biases in social anxiety disorder. Methodological basis of analysis - is the positions of the cultural-activity approach in comprehension of psychological aspects of application of digital technologies to the research mental disorders (Emelin, Tkhostov, Soldatova [2; 6], etc.), pathopsychology in studying distortions of mental activity (Zeigarnik, Kholmogorova [3; 7], etc.), cognitive and cognitive-behavioral model of social anxiety disorder in the reconstruction of mechanisms of formation and maintenance of anxiety (Clark, Wells [12], etc.), principles of organization of contemporary studies using digital technologies.

Results and discussion.

Methodological limitations in the study of attention distractions in SA/SAD

From some scientists' perspective, distractions of the so-called “social attention” are the primary component of SAD. Many hypotheses have been

constructed about selectivity and distraction of attention in SA/SAD. Various empirical data on the features of social attention and perception in various experimental paradigms have been obtained. However, methodological limitations in understanding the disorder pathogenesis mechanisms create obstacles in choosing the study direction of these distractions. Therefore, the presentation of the primary scientific papers on the properties of attention in SA/SAD is advisable to prepare a methodological understanding of common ideas that hinder systematic understanding when fearing a negative social assessment of the qualitative properties of complex mediated socially conditioned activity.

The issue of the legitimacy of dividing mental activity as a whole and its different types into social and non-social ones in the context of modern science seems untenable. The attempt to polarize the social and non-social psyche is akin to Bleuler's early ideas of "autistic" thinking based on effect and needs, which is opposed to rational thinking. The cultural and action-oriented approach emphasizes the social nature of the human psyche, the acquisition of tools to master their behavior in the process of social interaction. "Any function in cultural development comes on stage twice, in two acts, first socially, then psychologically" [1]. The partiality of mental activity is inappropriate to eliminate in the experiment to detect the "objective" mental process and the selectivity indicators of attention, perception, and thinking. In this case, the experiment model can correspond to the actual life situation.

Zeigarnik [3] is theoretically grounded in the framework of pathopsychology based on the cultural-activity approach. The fundamental role of motivation in the construction and unfolding of any mental activity is experimentally proven. The trend of detaching the psyche from the personal orientation of the active subject, the process of its implementation in the activity based on motive, the consideration of affective and cognitive spheres as conditionally independent instances of mental activity reduces the possibility of a complete study of the regularities of the course of mental activity. The use of the concept of "pure experiment" frees from a mental issue, the conditions of actual life activity, and a person's activity. It also reduces the chance of going beyond the limits of this or that type of explanatory reductionism in psychology. Facts obtained even in a technically perfect experiment may lose their competent psychological interpretation.

Actual reconstructions in the nosological architecture of SAD, the desire for apparent isolation, differentiation of many diagnostic units, orientation in the analysis of mental disorders associated with anxiety on the concept of "domains" are criticized, emphasizing the lack of scientific substantiation and

artificiality of such a way of organizing the symptoms as external signs of pathological processes. Over-reliance on digital neurocognitive research in understanding the nature of mental disorders often represents a new stage in biological reductionism—the search for mental activity disorders “in the brain.” Vygotsky [1], Zeigarnik [3], Kholmogorova [7], Emelin, Rasskazova, Tkhostov [2] & Soldatova [6] and other representatives of the Moscow psychological school warn scientists against such set of simplified interpretations of the human psyche.

**Selectivity and attention distractions in SA/SAD:
theoretical models and experimental studies using digital technology**

Currently, there is no unified method of empirical verification of the most popular and globally respected science models of social anxiety [12; 19]. It is still being discussed what is more characteristic of SA/SAD – avoidance of attention from stimuli perceived as socially threatening or hyper-involvement/concentration/absorption of attention by these stimuli. In the classical cognitive model of attention distraction in SA/SAD, high SA is characterized by self-focusing attention in social situations that act as a factor in maintaining SA [12]. However, avoidance of social threats is not the only way to distract attention in SA/SAD. Socially anxious people often tend to shift their attention to facial stimuli [10] and maintain intrusive vigilance against social threats [19]. Current models present attention as a dynamic process and the idea of changing strategies of attention distraction in SA/SAD [9; 18].

A separate issue is a methodological interpretation of empirical indicators of attention peculiarities in SA, the possibility of systematization of disparate data in the context of using different techniques, methods, technical variations, heterogeneity of subject groups, non-constancy of organization of an experimental event, and other features of attention distractions expression in specific research papers.

The study of attention distractions usually uses eye motor activity tracking, or “eye-tracker,” with the help of which it is possible to track activity dynamics over time and create more normal natural conditions for the subject. This method provides more accurate experimental data on the procedural properties of attention, its relationship with other variables, which determines the appropriateness of the “eye-tracker” in studying the features of attention in mental disorders, including SAD and SA [5]. In traditional experiments using eye-tracking technology in studying attention distractions in SA/SAD, facial expressions are often used as a stimulus material (social objects). They are one of the most critical information units for the subject’s interpretation of the communication

meaning. Current research papers contain more additional conditions increasingly in the form of stimulus animation, the inclusion of video communication situations, modeling communication situations in popular messengers [22].

For example, the results of an original experimental “eye-tracker” study using Skype messenger [22] objectivized the most studied and essential mechanism for maintaining SA/SAD – self-focus of attention. During the experiment, the subjects – young women with low and high SA levels – were asked to talk to a male experimenter assistant via video call (Skype). During the entire communication, an online video of the conversation was shown on the screen, and the broadcast included equal-sized windows with both the interviewee and the subjects themselves. The experimental situation had four stages – warm-up, positive stage (the conversation partner was friendly), critical stage (the conversation partner was critical of the conversation partner), and active (the conversation partner themselves asked questions). The authors conclude that for socially anxious people, it is common to lose control of anxiety level in a situation of critical, unfriendly attitude in the process of communication. In SAD, any context of the interaction is probably perceived as a potential threat of possible criticism and rejection, negative assessment, self-focus becomes a stable indicator of the distraction of attention [17].

Current research examines attention distraction in anxiety disorders with the help of “eye-tracker,” electroencephalography (EEG), and magnetic resonance imaging (MRI). There is an active search for the spectrum of attention distraction indicators in order to get closer to understanding the mechanisms of the phenomenon under discussion [14]. For example, McTeague et al. [16] conducted an experiment aimed at studying the neurocognitive correlates of social attention dynamics using a continuous recording of steady state visually evoked potentials (SSVEP) in response to facial expressions (neutral facial expressions, expressions of anger, fear, joy), in which the control group and clinical samples were compared with anxiety symptoms in different psychiatric diagnoses. It was found that SA features a stable way of attention distraction – in most patients, vigilance increases with increasing severity of SA symptoms. However, patients exhausted by mental illness demonstrate avoidance. Thus, another type of attention distraction (avoidance) is characteristic of patients in the depletion of resources due to prolonged intrusive vigilance [16; 21].

The current research aimed at clarifying the features of attention distraction in SA aggravates the discussion about the qualitative features of attention avoidance/avoidance in SA [15]. Thus, in the experimental “eye-tracker” study of the trajectory of tracking facial expressions and features of attention to facial expressions in SA, Gregory, Bolderston, and Antolin [13] propose a paradigm of

dynamic tracking of social attention features. The authors suggest the subjects a task to watch a video of an emotionally neutral scene, in which two actors from time to time look into the periphery of the scene. According to several significant study parameters, no differences are found between groups with low and high SA. The authors of the experiment suggest that what has been previously interpreted as attention avoidance does not qualify as such but represents a qualitatively different social information processing stage [13].

The most versatile part of the work aimed at studying the properties of attention in SA/SAD remains the specificity of the task proposed to be solved in the experience. One of the frequently used research paradigms is the dot-probe task, namely, a modification of this method, where the stimuli are facial expressions rather than words as in the original version. Scientists also use other tasks, for example, visual search tasks, such as the Stroop Task. It is important to note that in most studies, incentives-distributors are either congruent to priority and goals or non-congruent to it, and the peculiarities of attention shifting towards both congruent and non-congruent stimuli have been rarely studied. Often, the subjects are not aware of the target or the distributor's spatial position, so they have to pay attention to several locations.

Conclusion

Methodological limitations in the comprehension of the pathogenesis patterns of SAD act as an obstacle to the construction of a theoretical model and experimental study of selectivity and distraction of attention in SA/SAD. The use of digital technologies in psychological experiments in the era of COVID-19 recreates the format of social activities mediated by digital technology, which is as "real" for the majority of people and contributes to the objectification of natural attention distractions in SAD. Experiments using eye-tracking technology, based on dynamic properties of the attention process are promising in this direction, which contributes to actualization in the unfolding activity of self-focusing, hypervigilance or attention avoidance concerning socially threatening stimuli, disorganization of attention purposefulness in the conditions of multi-tasking related to the monitoring of threats (deviation from the target priority).

The current research tendency consists in, on the one hand, the dynamic procedural aspect of stimulation in an experimental task and, on the other hand, the design of the task in such a way that the degree of disorganization of activities (deviation from the target priority) can be achieved. While relying on the methodology of cultural-activity approach, pathopsychology in understanding the mental activity and personality of a person, the study of social attention and

perception in SA/SAD should also be based on the principle of unity of effect and intelligence, the social nature of the psyche, the motivational-demanding tension in the psychological system. For example, Sagalakova, Truevtsev, Tinekov, and Zhirmova [20] included into the experiment, aimed at studying selectivity and distraction of social attention in SA, the Eriksen Task, which promotes modeling in the experiment the conflict conditions of multitasking, which are inherent to the real-life situation. The revealed features of attention distractions based on the pathopsychological model of SA are comprehended in the context of a shift in the motivational-target structure of activity – from the motive to perform the task in accordance with the goal (success) to the motive “not to make a mistake” (failure avoidance). It causes target deviations from the priority activities and can disorganize it (decision time and failures increase) [4; 20].

Thus, from the point of view of national pathopsychology, the experiments have the most significant prospects, which cannot avoid the emphasis on subjective attention bias in solving a particular target task in the conditions of the analysis of the activity process, which includes a stage, an inevitable expansion in the time of decision making.

Acknowledgments. The research was funded by Russian Foundation for Basic Research (RFBR) research project No. 17-29-02420, “Neurocognitive Mechanisms of Mental Activity Disturbances in Social Anxiety and Social Phobia.”

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Поступила 03.02.2022

После рецензирования 15.02.2022

Принята 17.03.2022

Received 03.02.2022

Revised 15.02.2022

Accepted 17.03.2022