

Parametric analysis of the dynamics of attention variability functioning

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Abstract - The paper analyzes the dynamics of attention variability as a time-dependent process using parameters derived from a continuous performance test. The focus of the research is on two key indicators: the variability of reaction time and the variability of response duration to visual stimuli. A parametric approach is applied to examine how the passage of time affects average attentional efficiency and stability, and to determine whether these changes follow a statistically significant trend. The results show a partly expected linear pattern and reveal that mean response duration differs significantly between subjects. On this basis, a critical zone and a danger zone indicating increased risk of attention variability are identified. These findings support the relevance of parametrically modelling attention dynamics and contribute to the methodological objectification of continuous performance testing in applied research settings.

Keywords: parameterization of attention, time flow, continuous performance test, attention variability, reaction time, response time distribution, time-dependent attention dynamics, attentional efficiency and stability, critical zone of attention risk, continuous performance test (CPT) metrics

I. INTRODUCTION

Numerous researchers direct their scientific interest in the area of attention from which various models and theories have emerged, but the parameterization of the dynamics of its variability has not yet been precisely defined. The variability of attention is largely determined by the selection and initiation of information that we receive from the environment through our sensory system.

The variability of attention largely determines which information from the environment an individual will direct their attention to. Attention is defined as a selective orientation of experiencing, accompanied by the inhibition of currently irrelevant stimuli and a series of activation changes of the organism that can be somatic, autonomic, or electroencephalographic, and have a common role of promoting reception and selective responding, [1].

Some authors defined attention as a behavioral and

cognitive mechanism that directs attention toward the most relevant elements of incoming information, while filtering out or disregarding those that are less relevant, [2]. It participates in the selection of stimuli, the significance of which is determined by the characteristics of the stimulus, individual preferences of the individual, motivation, and cognitive strategies used by the person, [3].

Variable attention represents a set of cognitive processes with an associated neural basis whose purpose is to selectively receive stimuli from the environment while simultaneously inhibiting irrelevant stimuli, [4]. The main models that try to explain attention processes and which are most often mentioned in the scientific literature are filter theories and theories of attention resources.

A. Theories of attention

One of the first theories of attention selectivity was developed by [5], in which he starts from the assumption that information is filtered immediately after it is registered at the sensory level, hence named rigid filter theory. Within his theoretical framework, the author explains that the selection of information proceeds such that inputs from different sensory modalities are first routed to an attentional filter, which permits only specific sensory signals to pass through, while suppressing the remaining stimuli so that they do not initiate any perceptual response, [5].

[6] complements Broadbent's model and develops an attenuation model, explaining that the filter attenuates stimuli from the environment, amplifies relevant information, and reduces the intensity of stimuli that are considered unimportant, [7]. Through his theoretical framework, also emphasizes the role of the meaning we attach to stimuli. The aforementioned theories are followed by a filter model, which analyzes the input of sensory data from the environment at the physical level (which takes place continuously) and at the semantic level, which depends on the cognitive capacities of the individual, [8]. Filter theories start from the assumption that a selective filter is needed due to huge amount of information that enters the sensory system through our senses, and that certain information must be either inhibited or filtered, [5].

In addition to filter theories that try to explain the selectivity and distribution of attention, there are theories of

attention resources that start from the assumption that each of us has a unique amount of attention that we can focus on stimuli from the environment. From the perspective of this paper, it is interesting to observe the example of Kahneman's model, according to whose interpretation, gradual automation enables the successful performance of complex tasks, thereby reducing the variability of attention when performing them, [4].

In addition to the mentioned capacity of attention, the perceptual sensitivity of the sensory system can be related to the variability of attention. Children have more difficulties with inhibiting irrelevant stimuli and more difficulties with directing attention to the task compared to the adult population, [9].

Building on the aforementioned theoretical frameworks, the theory of perceptual load [10] tries to explain the processes behind (in)distractibility during focusing on a specific task, which can significantly shape the outcome of measured values. Her theoretical assumptions derive from the fact that distractors will not reach a person's consciousness in those situations that require a high perceptual load, but we still do not find precisely defined parameters of the dynamics of the functioning of attention variability in the relevant literature.

The theory of perceptual load presents two mechanisms of selective attention, which can partially explain the functioning dynamics of attention variability. The first perceptual mechanism enables the exclusion of irrelevant distractors in situations characterized by high perceptual load, [10]. This mechanism is mostly seen as passive because distractions are simply not perceived when the organism does not have enough capacity to process them. Another mechanism, which has been seen as active, involves the conscious rejection of distractors from the environment even when they are perceived.

According to the aforementioned theory, a high perceptual load results in increased processing of irrelevant distractors, which can be interpreted through the prism of the dynamics of the functioning of attention variability through an increase in the probability of noise during the transmission of information from the sender to the receiver. Fluctuations in attention shape the fidelity of perceptual representations, a fidelity that can be quantified in terms of precision (or, conversely, variability) and formalized using simple psychophysical models that describe how stimulus intensity, its interpretation, and the resulting behavioral response are related. Altered attention variability may present as difficulties in tracking and completing tasks, problems maintaining focus on a given activity or shifting between voluntary activities, and generally as a reduced capacity to resist distracting stimuli, [11].

Children are more susceptible to distractibility due to the insufficient development of executive functions, and given that their capacity for awareness is lower, it is possible, even with small changes within the perceptual process, to reduce the variability of attention, [12].

By evaluating the presented theories and models, it can be concluded that most of the presented models and theories talk about the variability of attention with an emphasis on

selectivity and distractibility, while they do not include a precise analysis of the same functioning, determining warning zones and critical zones when the variability turns into an atypical pattern that can be defined as an attention disorder. Also, all presented theories include individuals with normal development, while theoretical frameworks that explain the specifics of attention in individuals with developmental deviations are insufficiently represented.

In the parameterization of the dynamics of the functioning of attention variability, there are complex, interrelated processes such as the process of anticipation, activity initiation, temporal organization of behavior, self-regulation, the ability to inhibit stimuli from the environment, and response evaluation, [13], [14], [15]. During the process of perceiving stimuli, certain errors in estimation are possible, and most often they occur due to the lack of time required for an answer. It is precisely the lack of time required for an answer, i.e., the length of time it takes for the subject to receive and process information from the environment, interpret it, and form a response, that is one of the main features of attention disorders, [16]. Therefore, there is a need for a more precise definition of warning zones and critical zones with the aim of reducing and optimizing available computerized tests that are used as objectification indicators of attention variability.

B. Attention deficit disorder

Attention deficit disorder is defined as a common neurodevelopmental disorder that affects a child's overall functioning, including the psychosocial area, functioning within educational institutions, as well as the child's overall quality of life, [17], [18]. Perceptual difficulties, sensory modulation difficulties, and difficulties in relation to variability are often present in the framework of the attention disorder, which significantly affect the course and outcome of assessment, [19]. Some of the specificities that are observed refer to insufficient or excessive reactivity to stimuli from the environment, difficulties with directing attention, and difficulties with the selection of relevant information.

The visual system is dominant in children with attention deficit disorder. When our attention is focused on an object, then that object and its immediate environment create an image of that object and its immediate occlusion at the receptors on the retina of the eye. The retina is a 0.4 mm thick network of light-sensitive receptors and other neurons that cover the back of the eye. This is extremely important because it represents the transformation of stimuli into an image on the retina. The process then goes on, and the image on the retina is converted into electrical signals in the receptors by a process called transduction. Transduction is the conversion of one form of energy into another. After the image is converted into an electrical signal at receptors, these signals activate other neurons, which again activate even more neurons. Along these paths, electrical signals travel, first from the eye to the brain and then inside the brain itself, where neural processing takes place, that is, operations that alter electrical responses in different ways, [20]. This is crucial because the pattern of signal

transmission shapes perception, understood as conscious sensory experience and as the mapping between the physical characteristics of stimuli and the perceptual responses they elicit. Our perception of the surrounding world is thus determined not only by the attributes of external objects, but also by the functional characteristics of our own sensory system, [21].

C. T.O.V.A. test

The measuring instrument used in the experimental part of the research is a culturally and linguistically unspecified computerized test based on a large normative sample that included more than 1,700 individuals for the visual test, [22]. T.O.V.A test software version 9.0 was used for research purposes within this doctoral dissertation. The aforementioned measuring instrument was developed by Dr. Lawrence Greenberg, and it is able to measure eight different variables, comparing them with norms for age and gender.

T.O.V.A. test consists of two parts, auditory and visual, and both parts were used in the experimental part of this research. In the visual section of the T.O.V.A. test, the stimuli consist of two easily distinguishable, monochrome geometric shapes that appear alternately at the center of the screen every 2 seconds. The use of such simple geometric forms minimizes the impact of participants' cultural background and reduces potential confounding effects related to learning difficulties, [22], [23].

Each section of the T.O.V.A. test has a fixed duration of 21.6 minutes. The first section is defined by an infrequent presentation of the target stimulus, with a target-to-nontarget ratio of 1:3.5 (the target appears roughly once for every 3.5 nontargets). In the second section, the target stimulus is presented frequently, with a target-to-nontarget ratio of 3.5:1, meaning that the target appears about 3.5 times for every single nontarget, [24].

T.O.V.A. test uses a uniform inter-stimulus interval (2 s). Compared to other continuous performance tests that use a keyboard for the subject's response to a stimulus and thus have a greater possibility of error in measuring the correct reaction time (up to ± 28 ms), the T.O.V.A. test uses a specially designed microswitch with almost no possibility of reaction time measurement error, [25].

In this part of the experiment, the T.O.V.A. test measured the variables. The length of time required for response, Variability of time required for a response were measured. The length of time required for a response is defined by the time it takes the subject to react to a visual stimulus and is expressed in milliseconds.

This variable tells how quickly or slowly the subject processes information and reacts by pressing the microswitch. The variable Variability of time required for response is also expressed in milliseconds, and indicates the constancy (stability) or nonconstancy (variability) of the attention required by the subject to respond to the stimulus, [24].

The attention variability is interpreted as the constancy or inconsistency of the attention required for the subject to respond to an auditory or visual stimulus. Despite the fact

that the visual stimulus on the screen alternates at fixed intervals of two seconds, sometimes the subject's response time is uniformly rhythmic, and sometimes uneven.

II. PREPARATION OF METHODOLOGY

The experimental research included 100 children aged 8 to 10 years, of normal intellectual status, of which 50 children were of normal development, and formed a control group of respondents. The experimental group consists of 50 children diagnosed with attention deficit disorder.

All participants are male and attend a regular primary school in the city of Varaždin (Croatia, Europe). The selection of control group subjects was made using equivalent pair matching.

At the time of data collection, none of the participants in either the control or the experimental group were undergoing pharmacological treatment. Children diagnosed with attention-deficit disorder were medication-naïve and had not received stimulant or other pharmacological interventions that might affect the variables assessed in this study. In order to determine attention variability and responses to visual stimuli, the T.O.V.A. test (Test of Variables of Attention) was used.

Tests were performed for visual stimulus according to the following variables:

- 1) Variability of time required for a response,
- 2) The length of time required for a response.

In the first phase, the visual stimulus was presented for 100 ms with an inter-stimulus interval of 2 000 ms. It appeared on 22.5% of trials ($n = 72$) in the first half of the procedure and on 77.5% of trials ($n = 252$) in the second half, and participants were instructed to respond to the target as rapidly as possible. Varying the proportion of target and non-target stimuli makes it possible to investigate how different response demands influence response time variability, overall response speed, inattention, and impulsive responding, [24].

The selected time of 100 ms was set as the lower fixation duration limit. For visual calibration and coloration, two types of stimulus measurements were performed: signal amplitude and time of occurrence.

For the visual stimuli, amplitude measurement involved specifying the luminance of the stimulus cell and fixation point, as well as calibrating the overall screen brightness. In the first segment of the visual test, 648 stimuli were presented, each shown for 100 ms with an inter-stimulus interval of 2 s, [26].

"Meta" and "non-meta" consisted of white squares of size 9.5 x 9.5 cm² with a black inner square measuring 1.2 x 1.2 cm², located 0.7 cm from the top of the target) or at the bottom (for the non-target). In the second phase of the visual test, 648 visual stimuli were used, displayed at 100 ms with a time interval of every 2 s.

"Meta" and "non-meta" consisted of white rectangles measuring 13 x 9.5 cm², with a black inner rectangle measuring 1.8 x 1.2 cm², located 0.7 cm from the top (for the

target) or at the bottom for the non-target, [24], [26]. The aim of this research is to determine the time required to test the subjects with the aim of obtaining relevant results.

Given that the time of the TOVA test is determined at 21.6 min, the determination of the test quartile determines the possibility of shortening it. Also, parametric analysis identifies warning zones and danger zones that may indicate the presence of attention disorders in the examinee.

Otherwise, the testing can be completed earlier, and objective indicators of the dynamics of attention functioning can be obtained. In accordance with the aim of the research, the following hypotheses (H) were stated:

H1: The control chart shortens the test time of the examinees

H2: The danger zone and the warning zone can be used as objective indicators of the functioning dynamics of attention variability

III. RESULTS

In order to determine the specificity of the dynamics of attention variability between children with typical development (typical) and children with attention disorder (atypical), a scatter diagram was made, i.e., the relationship between the time required for the answer and the accuracy of the answer was shown. Using the T.O.V.A. test, problems were observed in the classification of participants into groups ("Atypical" group and "Typical" group) and in random testing.

The aim of the research part of this paper is to examine the possibility of shortening the time required for testing the subjects. Figures 1-4 show the relationship between the time required for an answer and the accuracy of the answer, and by evaluating the diagram, it can be concluded that already in the first quartile, one can see a clear result about the dynamics of attention variability in the examinees.

Figure 1 shows the relationship between attention variability and response accuracy during testing in the 1st quartile. The scatterplot for "typical" shows less dispersion, i.e., the values are clearly clustered around the mean value.

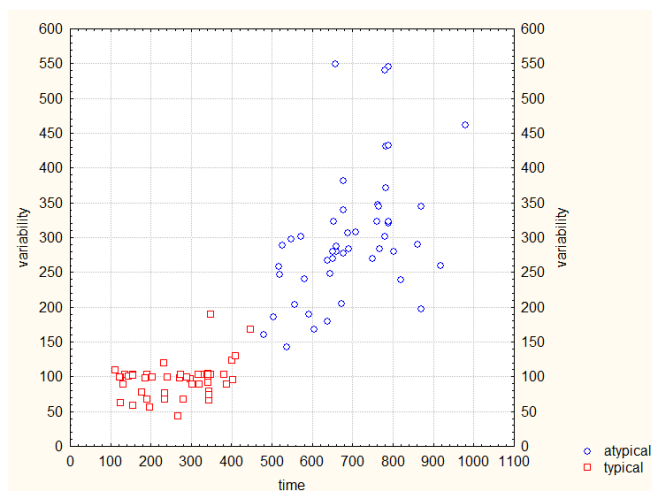


Fig. 1 First quartile.
Source: created by the authors

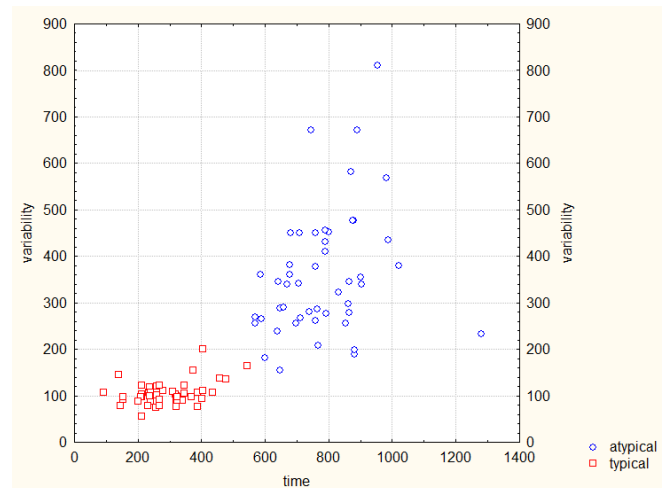


Fig. 2 Second quartile.
Source: created by the authors

Figure 2 shows the relationship between attention variability and response accuracy during research in the 2nd quartile. The cloud for the variable "typical" is even smaller than in the 1st quartile, that is, the values are even more densely distributed.

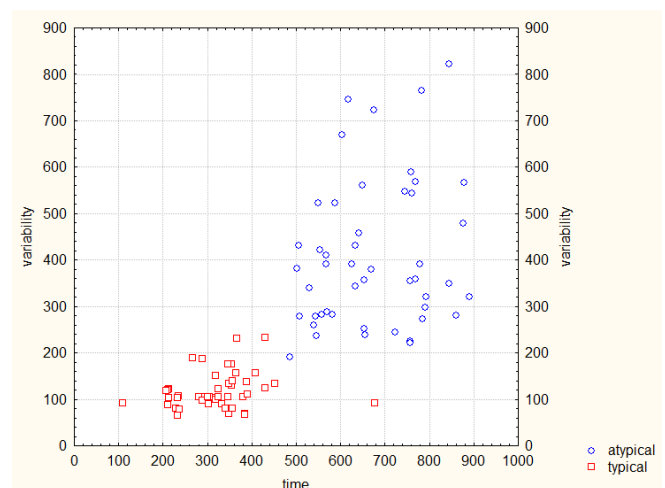


Fig. 3 Third quartile.
Source: created by the authors

When testing in the 3rd quartile, the occurrence of extremes is visible. The dispersion increases, and some values for the "typical" variable coincide with the values of the "atypical" variable. Respondents probably get tired, so errors in the accuracy of the answers are more frequent, as is the time required for the answer.

Figure 4 shows an even greater increase in clouds, as well as an increase in the number of extremes, and there is an area where the clouds overlap. It is evident from the scatter cloud that the typical scatter cloud is much smaller, i.e., denser, and that the data are drastically less scattered. With the aim of further confirming H1, a descriptive analysis of typical and atypical groups (Table 1, Appendix) was made, divided into quartiles according to the variables, the length of time required for a response and the variability of time required for a response.

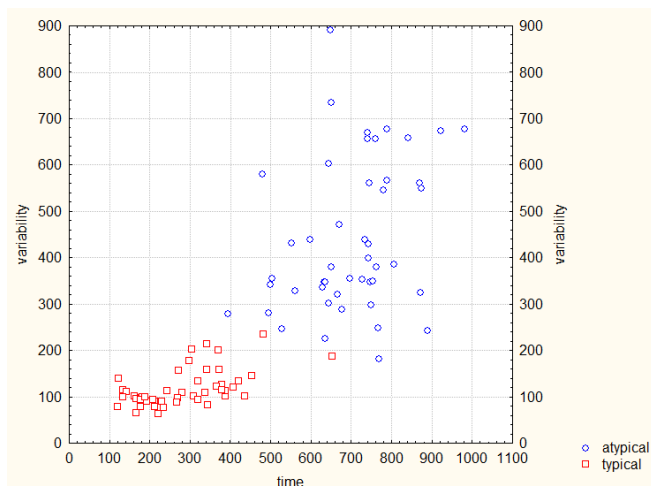


Fig. 4 Fourth quartile.

Source: created by the authors

The average efficiency of each cognitive process (within the scope of this work on the variability of attention), activated during the solving of a cognitive task, is regularly expressed as a measure of the central tendency (arithmetic mean or median) of the individual's performance in all tasks of the corresponding cognitive test [27]. Analyzing the data obtained by evaluating the results of descriptive statistics, a significant difference between the typical and atypical groups is observed in all variables.

Since this is a natural system, values in accordance with a Gaussian probability distribution are expected. According to the principles of the Gaussian distribution, extremes, or outliers, were examined (Table 2, Appendix).

With the aim of confirming H_2 over the extreme values of the "typical" set, the Listwise Deletion Method was applied. According to the received data, a warning zone was determined. If the test subject enters the warning zone during the test, it is recommended to continue the test with the next quartile, and in the case of entering the danger zone, with additional tests to specify the dynamics of attention variability. A test result above the upper limit of the danger zone indicates high attention variability, which may indicate an attention disorder and needs to be confirmed with additional diagnostic instruments.

In Table 1 (Appendix), typical and atypical groups were compared using independent samples t-tests with equal group sizes ($n = 50$ per group), resulting in 98 degrees of freedom ($df = 98$) for each test. Group differences between children with developmental disabilities and typically developing children were examined using independent - samples t - tests.

Each test was based on equal group sizes ($n = 50$ per group), resulting in 98 degrees of freedom ($df = 98$). All obtained t values reported in Table 1 (Appendix) were statistically significant at the two-ailed level, with exact p-values below 0.0001 for all comparisons. Analyzing the data with a t-test, it is concluded that there is a statistically significant difference between typical and atypical respondents in all quartiles; that is, the null hypothesis was confirmed with the t-test.

The next phase was the examination of extremes, or outliers (Table 3, Appendix). With the aim of confirming H_2 over the extreme values of the "typical" set, the Listwise Deletion Method [28] was applied, which removed 2% of the values, and the descriptive statistics of the processed values are given in Table 4 (Appendix). Since the reaction time (the length of time) cannot be negative, negative values for minimum in Table 3 (Appendix) were replaced by 0.

According to the obtained data, the warning area was determined and area of critical events (Table 5, Appendix) using six sigma methods, [29]. If the respondent during testing enters the warning area, it is recommended to continue tests with the next quartile, and in case of entering the area of critical events, testing with the TOVA test may be interrupted. A test result above the upper limit of the critical event area indicates a high variability of attention, and it is not necessary to continue the examination.

IV. DISCUSSION

In relevant scientific literature, numerous theoretical and methodological approaches to the analysis and evaluation of individual attention can be identified. However, despite the diversity of conceptual definitions and measurement strategies, the temporal dynamics of attention variability remain insufficiently explored, particularly within the framework of continuous performance tests.

These instruments, in their original and unmodified form, are often prolonged and cognitively demanding, which may be especially burdensome for individuals with attention-related deviations. Within the research framework of this study, the dynamics of attention variability were examined through time-course parameterization, an approach that remains relatively rare in existing literature. By organizing performance indicators into temporal quartiles, it was possible to monitor progressive changes in reaction time and its variability across sustained task engagement. Such segmentation enables a more refined understanding of attention not merely as a static capacity, but as a dynamically regulated cognitive process.

The comparison between experimental and control groups revealed clear differentiation already within the first quartile, allowing high-probability identification of atypical attention patterns at an early stage of testing, [26]. This finding suggests that deviations in attentional regulation are evident at the level of initial cognitive organization and are not exclusively the consequence of cumulative fatigue effects.

The parametric analysis further indicated a linear trend in attention indicators across quartiles, partially diverging from conventional expectations, yet demonstrating statistical robustness. Although similar temporal trends have not been systematically elaborated in previous literature, they may serve as an important empirical basis for optimizing test duration, particularly in populations with attention deficit disorder.

Additionally, the analyses demonstrated that the average length of response time significantly differed among

subjects in the experimental group, confirming that atypical patterns extend beyond mere impulsivity and include disturbances in temporal regulation of cognitive processing. On this basis, it was possible to define a critical zone and a danger zone associated with an increased risk of heightened attention variability.

These zones represent operationalized threshold values that distinguish adaptive fluctuations in performance from clinically relevant instability. In functional terms, they indicate the point at which stimulus processing either succeeds in eliciting a regulated perceptual-motor response or fails to maintain consistent cognitive control.

The establishment of such threshold zones introduces a normative and classification-oriented dimension to continuous performance testing. Rather than relying solely on average performance indices, this approach conceptualizes attention variability along a continuum of stability, enabling identification of destabilization points within the cognitive control system.

The defined zones are directly associated with increased variability and may therefore be of considerable importance for both shortening test duration and improving early identification of attention disorders. From a broader theoretical perspective, attention processes are frequently conceptualized as multiple interacting control mechanisms that regulate goal-directed behavior, [14], [23].

Disruptions in attention variability can thus be interpreted as disturbances within this integrative regulatory network, potentially affecting several domains of a child's functioning, including academic performance, behavioral organization, and communication. Consequently, the temporal parameterization of attention variability provides not only methodological refinement but also contributes to a more comprehensive theoretical understanding of attention as a dynamic and self-regulatory system.

V. CONCLUSION

The conducted research confirms that the dynamics of attention variability can be reliably assessed already within the first quartile of a continuous performance test, which opens up the possibility of rationalizing and shortening the diagnostic procedure without compromising its differential sensitivity. Parametric analysis of the temporal distribution of responses and their variability has enabled a more precise understanding of attention as a dynamic and temporally organized cognitive system, the stability of which can be quantified through reaction time patterns.

Defining warning zones and danger zones represents an important methodological contribution because it enables the operationalization of thresholds that separate expected developmental oscillations from those deviations that indicate an increased risk of atypical functioning. Thus, response time variability and average reaction length gain the status of objective indicators that go beyond the descriptive level and move into the area of predictive and differential diagnostics.

The consistency of the observed differences between typically developing children and children with attention

disorders across all analyzed time segments further confirms the justification of the temporal parameterization of the results. The observed trends of progressive increase in dispersion in the later stages of testing can be interpreted in the context of fatigue and reduced self-regulatory capacities, which further emphasizes the diagnostic relevance of the early stages of measurement. The scientific contribution of the work is reflected in the development of a systematic parametric approach to the analysis of the dynamics of attention variability in continuous performance tests and in the objectification of the temporal dimension of attention as a measurable and classificationally relevant construct.

The obtained temporal segmentation model and precisely defined thresholds can serve as a basis for the development of shorter, methodologically valid, and clinically applicable computer instruments for the assessment of attention, which simultaneously increases diagnostic efficiency and reduces the burden on the subjects. Despite the above contributions, the results need to be interpreted in the context of research limitations, including the age homogeneity of the sample, territorial limitations, and the inclusion of exclusively male subjects. Future research should include wider age ranges, different sociocultural contexts, and both sexes in order to further verify the stability of the defined thresholds and expand the applicability of the proposed model.

In conclusion, this research represents a methodological and conceptual breakthrough in understanding the temporal dynamics of attention and lays the foundation for a more precise, cost-effective, and scientifically sound assessment of attention variability in clinical and educational contexts.

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APPENDIX

Table 1. Descriptive analysis of typical and atypical respondents.

	TYPICAL							
	QUARTILE 1		QUARTILE 2		QUARTILE 3		QUARTILE 4	
	variability	the length of time	variability	the length of time	Variability	the length of time	variability	the length of time
min	43	112	56	93	66	110	63	121
max	189	4 122	200	543	232	678	234	654
R	146	4 010	144	450	166	568	171	533
average	95.19	342.35	105.67	291.81	118.02	319.60	117.56	280.04
median	98.5	273.0	101.0	273.5	105.5	324.0	101.5	270.5
mode	103	342	98	320	105	324	101	134
variance	625.01	319 048.91	633.04	9 030.37	1 501.64	7 918.63	1 582.81	13 080
stand.dev.	25.00	564.84	25.16	95.03	38.75	88.99	39.78	114.37
	ATYPICAL							
	QUARTILE 1		QUARTILE 2		QUARTILE 3		QUARTILE 4	
	variability	the length of time	variability	the length of time	Variability	the length of time	variability	the length of time
min	142	481	154	568	191	487	181	395
max	549	980	811	1280	822	890	891	981
R	407	499	657	712	631	403	710	586
average	299.42	695.54	359.81	781.48	408.04	673.58	435.27	703.56
median	286.0	678.0	340.5	766.0	369.5	654.0	380.0	737.0
mode	280	637	256	789	391	758	181	770
variance	8 805.70	13 648.85	18 441.22	19 070.08	24 894.76	13 815.52	27 714.63	15 387.36
stand.dev.	93.84	116.83	135.80	138.09	157.78	117.54	166.48	124.05

Source: created by the authors

Table 2. t-test.

		QUARTILE 1		QUARTILE 2		QUARTILE 3		QUARTILE 4	
		Variability	the length of time	variability	the length of time	variability	the length of time	variability	the length of time
Typical	average	95.19	342.35	105.67	291.81	118.02	319.6	117.56	280.04
	stand.dev.	25	564.84	25.16	95.03	38.75	88.99	39.78	114.37
atypical	average	299.42	695.54	359.81	781.48	408.04	673.58	435.27	703.56
	stand.dev.	93.84	116.83	135.8	138.09	157.78	117.54	166.48	124.05
stand.dev.		14.02	83.25	19.93	24.20	23.45	21.28	24.71	24.35
t		14.57	4.24	12.75	20.24	12.37	16.63	12.86	17.39

Source: created by the authors

Table 3. Outliers. Source: created by the authors

	TYPICAL							
	QUARTILE 1		QUARTILE 2		QUARTILE 3		QUARTILE 4	
	Variability	the length of time	variability	the length of time	variability	the length of time	variability	the length of time
stand.dev. (σ)	25.00	564.84	25.16	95.03	38.75	88.99	39.78	114.37
3 σ	75.00	1694.53	75.48	285.08	116.25	266.96	119.35	343.10
average	95.19	342.35	105.67	291.81	118.02	319.60	117.56	280.04
Min	20.19	0	30.19	6.73	1.77	52.64	-1.79	0
Max	120.19	907.20	130.83	386.84	156.77	408.59	157.35	394.41

Source: created by the authors

Table 4. Descriptive statistics of processed data. Source: created by the authors

	ATYPICAL							
	QUARTILE 1		QUARTILE 2		QUARTILE 3		QUARTILE 4	
	Variability	the length of time	variability	the length of time	variability	the length of time	variability	the length of time
Min	43	112	56	93	66	110	63	121
Max	109	389	123	367	156	380	139	387
R	66	277	67	274	90	270	76	266
Average	84.85	216	93.77	247.38	102.08	280.65	96.65	202.92
Median	89	200.5	98	239.5	104.5	294.5	96.5	185.5
Mode	99	125	98	211	105	213	100	134
Variance	328.30	5 836.88	180.74	4 681.77	348.31	4 220.40	303.36	4 536.15
stand.dev	18.12	76.40	13.44	68.42	18.66	64.96	17.42	67.35
coef.var. (%)	21.36	35.37	14.34	27.66	18.28	23.15	18.02	33.19

Source: created by the authors

Table 5. Descriptive statistics of processed data. Source: created by the authors

	QUARTILE 1		QUARTILE 2		QUARTILE 3	
WARNING ZONE	variability	the length of time	Variability	the length of time	variability	the length of time
min	102.97	292.40	107.21	315.81	120.74	345.62
max	121.08	368.80	120.66	384.23	139.40	410.58
DANGER ZONE	variability	the length of time	Variability	the length of time	variability	the length of time
min	121.08	368.80	120.66	384.23	139.40	410.58
max	139.20	445.20	134.10	452.65	158.07	475.55

Source: created by the authors