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ABOUT INFLUENCE OF UNUSUAL WAY OF HOLDING WRITING DEVICE ON HANDWRITING

In expert practice, one of the known ways of distorting handwriting is the artificial creation of a change in the usual conditions for the execution of the manuscript by changing the mechanism of writing – an unusual way of holding a writing device by clipping it in the first or holding a writing device (ballpoint pen) at a considerable distance from the writing tip, at the end, opposite to the wanderer. Lack of necessary handwriting experts of modern reference materials with exhaustive information on changes in general and individual characteristics in handwriting with an unusual method of holding a writing device determines the relevance of the subject of this article.

The purpose of this research paper is to substantiate and systematize theoretical knowledge about the study of handwriting performed in unusual conditions – an unusual way of holding a writing device – by analyzing expert practice on the study of this kind of objects.

Methods general (formal-logical methods of cognition: analysis, synthesis, generalization, analogy), general science (observation, measurement, description, comparison), special (technical-forensic, identification, microscopic, quantitative, simulation, probabilistic-statistical).

The case from the expert practice of studying a handwritten text performed in unusual conditions artificially created by the performer for significant distortion of his handwriting – by holding a writing device (ballpoint pen) at a considerable distance from the writing tip at the end, opposite to the point, or clamped in the first is considered.

The general and private handwriting features are given, which change when handwriting is executed by distorted movements by the unusual holding of a writing instrument. The described mechanism of writing in the case of increasing the distance from the fingers to the tip of the writing device. The necessity of considering by the expert the character of changes of signs, caused by unusual way of maintenance of the writing device, is proved.

Keywords: handwriting, unusual method of holding a writing instrument, diagnosis, handwriting distortion, writing device clamped in a fist, holding a writing device (ballpoint pen) at a considerable distance from the writing tip, at the end, the opposite tip.

Formulation of Research Problem. While research on handwriting, it is important to correctly diagnose the fact of natural or deliberate distortion of handwriting, as each type of distortion has its own specific features. In expert practice, one of the well-known ways of twisting handwriting along with masking handwriting by using graphic print graphics, handwriting is unusual for an artificially created change in the usual conditions of writing a manuscript by changing the writing mechanism – an unusual way of holding a writing device by clamping it or clenching it the writing device (ballpoint pen) at a considerable distance from the writing edge, in the opposite direction to the edge.

Analysis of Current Researches.

Despite the presence of theoretical and practical work that implements approaches to the study of features of the study of handwriting in an unusual way of holding a writing device, a complete and systematic description of the problem is not yet available.

Issues regarding unusual conditions of execution and ways of distortion of handwritten texts and signatures were studied by L. E. Arotsker, E. P. Konovalov, V. P. Burchaninov, M. G. Bogatyrev, A. D. Topolsky, A. I. Mantsvetova, E. B. Melnikov, V. F. Orlova, V. A. Efremov, L. V. Markov, L. P. Nebesna, and others. L. E. Arotsker and E. P. Konovalov studied the signs of autocorrecting signatures.

L. E. Arotsker and E. P. Konovalov[1] studied the signs of signature auto-forgery.

Burchaninov V.P., Bogatyrev M.G. and Topolsky A.D. considered the problem of the stability of handwriting when intentionally changed, including in cases of change of slope, acceleration or coherence.

A. I Mancvetova, E. B Melnikova and V. F. Orlova studied the interdependence of features in high-quality handwriting, the study of a manuscript made with changed handwriting, as well as the dependence of general features of handwriting on the method of holding a writing device.

V. A. Efremov, L. VMarkova deal with questions on the investigation of signatures made under unusual conditions in solving diagnostic and identification tasks.

L. P. Nebesna studied the question of the influence on the signs of the handwriting of the unusual direction of movements of the writing hand at the unusual position of a sheet of paper.

[1] *Arocker L. E., Konovalov E. P.* Priznaki avtopodloga podpisej [Signs of auto-forgery of signatures]. Kriminalistika i sudebnaja jekspertiza. Kiev : Rad. Ukraina, 1957. S. 79–86 [in Russian].

Lack of the necessary for forensic graphology experts of modern reference materials with comprehensive information on changes in general and individual features in handwriting in the unusual way of holding a writing device by clamping it in a fist or holding a writing device (ballpoint pen) at a considerable distance from the writing edge, opposite, determines the relevance of the topic of this article.

The **Research Purpose** is to substantiate and systematize the theoretical knowledge of the study of handwriting performed in unusual conditions – an unusual way of holding a writing instrument – by analyzing expert practice in the study of such objects.

As a result of the analysis of expert practice conducted to find out the degree and nature of the influence on the handwriting characteristics of such confounding circumstances, as an unusual way of holding a writing device by clamping it in a fist or holding a writing device (ballpoint pen) at a considerable distance from the writing edge, the end opposite the edge, some regularities and general features of the general and individual features of the handwriting were substantiated and systematized. Expert practice requires some specific criteria that can be used to judge the robustness of features in manuscripts made in the unusual way of holding a writing device.

That is why the establishment of such criteria has been the focus of attention on this topic.

Main content presentation. Research object is the handwriting of identification and diagnostic information contained in handwritten entries made under unusual conditions – by holding the typewriter (ballpoint pen) at a considerable distance from the writing edge, the end opposite the edge or clenched in the fist.

There is a whole range of issues related to finding out the dependencies of handwriting on a variety of circumstances, which should include technical writing skills: coordination of movements, pace of writing, style to hold a writing device. Unfavorable external conditions of the letter are the reasons that cause natural changes in handwriting. While executing handwritten texts in artificially created unfavorable writing conditions (an unusual way of holding a typewriter), significant changes in handwriting occur, making it difficult to identify the artist. Several features of the graphic side of the letter, which relate to both general and individual handwriting features, testify to the handwriting execution in the conditions of unusual holding of the writing device.

The analysis of expert practice shows that there is a dependence of general and individual features of the handwriting on the influence of the writing mechanism such a mechanism of writing, as a way of holding a writing device by clamping it in a fist or holding a writing device (ballpoint pen) at a considerable distance from the writing edge, at the end opposite the edge.

So, at the Hon. Prof. M. S. Bokarius Kharkiv Research Institute of forensic examinations was held handwriting examination, the object of

which was the handwriting of an anonymous letter that began by the words:

«I've heard on the train...» The examination decision raised the question of the fulfillment of the manuscript under study by an anonymous letter from a citizen of G. under the influence of natural or artificial confounding factors. The studied handwriting was executed in simple motions and high-quality handwriting, which provides for the formation and stability of writing and motor skills of writing.

Because of the study, the expert concluded that the manuscript of the above-mentioned anonymous letter was written by the writing node of the ballpoint pen by G. himself under the influence of artificial confounding factors. In this case, the above handwritten text of an anonymous letter was made in unusual conditions, artificially created by the artist for the most significant distortion of his handwriting – by holding the writing device (ballpoint pen) at a considerable distance from the writing edge, the end opposite the edge, or clamped in the fists. There were no signs of an unusual hand letter in this text.

Analyzing the findings, the expert identified several features inherent in handwriting made in unusual conditions – an unusual way of holding a writing device by clamping it in a fist or holding a writing device (ballpoint pen) at a considerable distance from the writing edge, the end opposite the edge. The choice of the writer to distort the change of the mechanism of writing while holding the writing device clamped in the fist or holding the writing device (ballpoint pen) at a considerable distance from the writing edge, the end opposite the edge, provides a change in the appearance of the handwriting compared to normal. As practice has shown, the biggest changes occur with common signs of handwriting.

In the process of writing with a writing device clamped in a fist, there is an increase in the activity of the brush in the writing process.

Fingers pinch, become almost stationary, and movements begin to be carried out, mainly by the brush and forearm. The mobility of the hand and forearm increases and allows the arm to move along the line. The support of the hand increases, as the forearm and the outer edge of the brush are pressed tightly to the paper. The writing device adopts a strictly vertical position perpendicular to the plane of the table.

Reduced coordination of movements affected, first and foremost, the slenderness of the handwriting, significantly reducing it, which was reflected in the fractures of straight lines, the irregularity of the line, uneven height, slope, acceleration, the cohesiveness of letters and their placement vertically.

The decrease in the coordination of movements was accompanied by a decrease in the clarity of the handwriting: the clear handwriting became relatively clear and fuzzy, some letters looked deformed, others much simplified.

Comparison of indicators of height, inclination, acceleration and coherence of letters in the samples in the usual and considered unusual

way of holding the writing instrument revealed an increase in the height and width of the letters as a whole; the slope of the letters became mixed, within one line there was a different position of the longitudinal axes of the letters with a clear predominance of the vertical; with a marked increase in the width of the letters there was a decrease in acceleration (the larger letters were more closely spaced); the cohesiveness of the letters increased in general, which is explained by the inconvenience of the letter, when it is difficult for the performer to tear the writing device from the paper because of the great stiffness of his fingers and hands.

Handwriting increased the pressure. Considering the unusual mutual position of the hand and the writing device of all the common features, the greatest stability was observed with respect to the degree of elaboration. Some performance indicators, such as coordination and tempo, have undergone significant changes due to a slowdown in performance. The general character of the letter came closer to the character of the letter of the persons possessing technically low handwriting.

However, the difference from the poorly crafted handwriting is that along with the unstable coordination of movements there are signs of the produced letter and variants of letters that go far beyond the graphical construction of the typical spelling of these letters, which allows to judge the degree of elaboration of the artist's handwriting. Without significant changes in the conducted research the topographic features remained; peculiarities of the layout of the text in the line, paragraphs, on the page were stable.

Holding the typewriter by the end opposite to the edge, there is a decrease in coordination of movements, a decrease in pressure, there are simplifications in the structure of letters; motion automation is not saved.

Reduced coordination of movements and simplification of the structure of letters is associated with unusual letter conditions. Signs of low coordination of movements are expressed in fractures of straight strokes and angularity of ovals, in uneven height, inclination, acceleration of letters, their placement vertically and unevenness of pressure, decrease in slenderness and clarity of handwriting.

The decrease in pressure is due to the weakening of the efforts of the writer, aimed at the working part of the writing device, due to the removal of her fingers and the reduction of the support area of the hand or lack of support, which leads to tension and stiffness of the brush. The mechanism of the letter changes somewhat as the distance from the fingers to the tip of the writing device increases. The writing device adopts an even more inclined position relative to the plane of the table. The support decreases, the fingers are less pressed to the paper, the writing rests on the bent little finger, the lateral surface of the hand and forearm.

Mobility of the thumb, index and middle fingers (bending, stretching) increases. Therefore, the amplitude of the oscillatory movements in the vertical or inclined surface increases, which determines

the height of the letters. To align the writing device slightly, to bring it closer to normal, the writing person raises part of his hand, leaving support only on the little finger or on his last phalanx and on the forearm or part of his elbow. The other part of the arm remains without support. The little finger is straightened. Sometimes only part of the wrist or all brush or fingers can be left unsupported, and only the forearm or elbow rests. It can remain without the forearm support, and the support in the hand and little finger will remain.

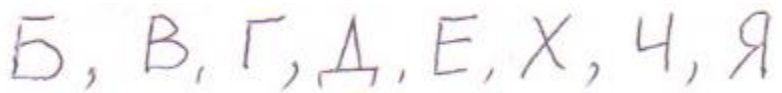
In this example, the height of the letters increased with the distance between the fingers and the tip of the writing device increased. This is since increasing the distance from the fingers to the tip of the writing device allows you to perform through the bending and extension of the fingers together with other links of the writing hand strokes of great magnitude. While maintaining the former coordination of movements and increasing the specified distance strokes of handwriting should be greater.

It is more difficult to keep the letter mechanism clear to the performer when locating the fingers at a great distance from the working part of the writing device. Here also decreases the usual resistance. Hence, more effort is needed to hold the writing device in a specific position, which causes some tension in the hands and fingers. Maintaining the uniqueness of the mechanism of writing is easier for a person writing when performing larger movements. By controlling the edges of the writing device at a considerable distance from it to the fingers, it is easier for the performer to use the only necessary movements for playing the letter out of all possible hand movements.

The movements of individual elements and letters become simpler and more convenient. This explains the appearance of cursive simplifications in the structure of letters. The biggest changes in our example were observed in the general features of the handwriting, especially the height of the letters.

The letters as a whole or their elements have become more structurally simpler. Simplification of movements occurred in the following letters or their elements: «В», «в», «д», «ж», «з», «і», «К», «к», «Н», «н», «П», «р», «т», numerals»1», «2», «9», rarely found when writing in the usual position simplified version of letters or elements of letters became more prevalent when writing with increasing distance from the fingers to the tip of the writing device.

In addition, there are new simplified variants of letters (most often the letter «d« with an extra-left element). In performed research instead of cursive variants of lowercase letters: «б», «в», «г», «д», «е», «х», «ч», «я» typographic letters were executed:



The greatest simplification of the structure of letters was noted by the end of the word. Attention is drawn to the degree of storage of the elements in the letter. In most cases, the elements in the letter that are relevant to its reading are retained. So, in letters: «б», «в», «д», «з», «ї», «й», «р», «у», «ф», «щ», «ц» in the first the queue was stored above and below the line items:

Some letters were stored completely the letters «ч», «з», «ю», which may be due to the rare occurrence of these letters.

In this example, the inclination of the letters while holding the writing device clenched in a fist or holding the writing device (ballpoint pen) at a considerable distance from the writing edge, by the end opposite to the edge, increased. This increase can be explained by the fact that in the ordinary letter the longitudinal axis of each letter is determined by the nature of the movements of the hand and fingers with a specific position of the hand and specific coordination of movements. The movements of the hand in this case occur on a very small segment of the circle, part of which can describe the hand with the writing device with a fixed forearm. The longitudinal axis of the letters must correspond to a small segment of this circle, corrected for finger movements and other factors. The specified section is where the tip of the writing device is located.

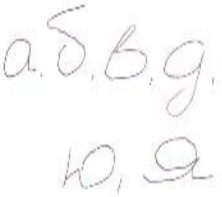
With considerable removal of the fingers from the tip of the writing device, the radius of the circle increases, only the upper right segment of the circle is described (the arc becomes hollow). Due to the unusual conditions of the letter and increased efforts to maintain the uniqueness of the mechanism of writing, it becomes more difficult to adjust the movements of the fingers of the movement of the brush (in an arc). In this case, the most convenient are inclined movements that run along the sloping part of the circle, located at the top right (considering the center of the circle of the wrist).

Connectivity has remained largely unchanged. In some words, it increased that was caused by the known inconvenience of the letter under the conditions under consideration. It is difficult for the writer to tear the writing device away from the paper, as it requires the implementation of individual movements and their great accuracy (turning the tip of the writing device after the separation to a strictly defined point).

Easier to write without a break. Even if in some words the gap and there was, in this case, there was a slowdown in movement when writing.

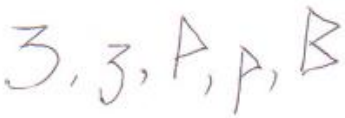
The main variant of writing the letters: «К«, «к« in an unusual way of holding the writing device were those in which the first and second elements are not connected, and the second and third elements are performed by a single drive movement; in the second element of the letters: «К», «к» the arc shape of the movements was replaced by a straight-angular, directed from top to bottom.

There was a change (horizontal extension) of the areas formed by the strokes of the oval letters: «а», «б», «в», «д», «о», «р», «ф», «ю», «я»:



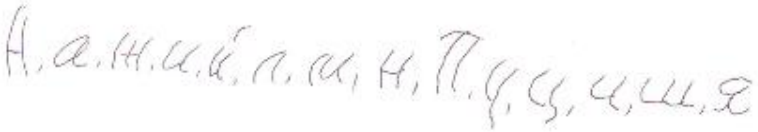
Of the individual features that make up the structural characteristics of the movements, the most stable were the shape and direction of the movements when performing the letters. The preservation of the general direction of movements in the execution of letters caused the stability of the form of movements. However, the decrease in the coordination of movements has affected the stability of the form of movements in several manifestations.

The shape of the movements when performing elements of letters from straight (for straight strokes) and arc (for oval elements) became angular or close to angular. There were numerous fractures of straight lines and the angularity of the ovals in the text. The first element of the letters «З», «з», the second element of the letters «Р», «р», the second and third elements of the letter «В» have acquired the likeness of *cuneiform*:



Multiple angularity of movements was observed when performing closed ovals in letters: «б», «в», «д», «о», «р», «ф», «ю»,

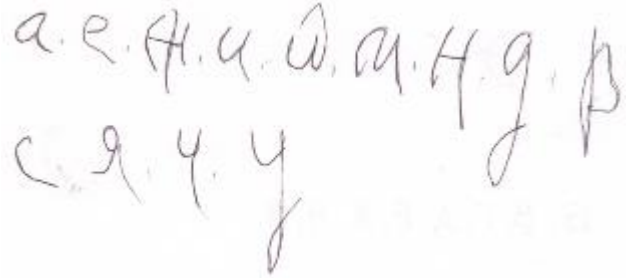
dominated by the angular shape of the movements and when performing the seminal elements of the letters: «б», «г», «к», «с», «т»:



While maintaining the usual arc shape of the movements when performing the humming elements was characteristic of the following: the arc shape of the movements combined with the left circular driving direction of motion.

The letters: «А», «а», «ж», «и», «й», «л», «м», «н», «П», «у», «ц», «ч», «ш», «я»; the elements of the number «4« were performed in pronounced arcuate, left-circular drive motions: There was a replacement of the rectilinear shape of the movements in the execution of the second element of the letter «у» on the winding and arc shape of the movements on the bush when performing the superscript element of the letter «б ».

The area of the square narrowed considerably outlined by the strokes of the lowercase elements of the letters «д», «з», «у», «ц» and the length of movements increased. There was a low position relative to the line of the line of points of termination of movements when executing the final elements of the letters: «а», «е», «ж», «и», «й», «м», «н», «д», «р», «с», «я», «ч», «у »:



There was a sharp deformation of individual letters, «bouncing» and «sagging» of letters in words, horizontal («lying») position of individual letters, «falling» letters, different position of longitudinal axes of letters (from right-handed to left-handed) within one word, offset by horizontal, «splicing» letters on each other, mutual cross-over of elements in the letters «ж», «ч». There were no signs of *mirror* movements. The most convenient were the oblique left-circular motions, there was also a large length of the final parts of the elements of letters, which, in turn, caused differences in the location of the point of end of the movements in the corresponding letters relative to the line of the line and other parts of these letters.

There have been inaccurate connections, cross-overlapping of elements, shifted horizontal movement as elements of letters with the

previous or next ones are shifted. A significant number of letters in the manuscript text under study looked warped. When selecting experimental samples of handwriting, the expert was recommended to the judge to select a text like the one studied while holding the writing device clenched in a fist, as well as at different distances from the tip.

Later in the analysis of the obtained samples it was found that when holding the writing device at a short distance from the edge (1-2 cm), the height of the letters appeared to be small, while finding the fingers from the edge at a great distance (4-5 cm), the height was large, with an average the position of the fingers (more than 2-3 cm) height was often within the average.

The greater this distance, the greater the amplitude of the oscillatory movements of the hand vertically or inclined surface, which determines the height of the letters, and vice versa, the smaller the specified distance, the lower the height.

Apparently, this distance should be correlated with the type of coordination of the movements of the writing hand, with its degree of perfection and other reasons. It is easier for the contractor to maintain the uniqueness of the mechanism of writing, controlling the edges of the writing device at a short distance from him to his fingers than at a considerable distance.

To perform fine movements at a small height of letters and a relatively large distance between the fingers and the tip of the writing device, better coordination of movements is required than at a shorter distance. Hence, it is possible to maintain a small height of letters with better coordination of movements and finding the fingers at a relatively large distance from the writing edge. With less perfect coordination of movements, the height of the letters may be greater with the close location of the fingers and the tip of the writing device. At a short distance, the performer can perform letters of great height, connecting more actively to the movements of the finger movements of the hand and forearm, which provide a greater amplitude of movements when writing.

Conclusions. Thus, the choice of the writer, as a method of distortion unusual way of holding a writing device by clamping it in a fist or holding a writing device (ballpoint pen) at a considerable distance from the writing edge, the end opposite to the edge, provides a significant change in the appearance of handwriting in compared to normal.

Such an unfavorable condition of the letter entails a change in the pace and level of coordination of movements in the direction of their decrease. The general character of the letter approaches the character of the letter of persons possessing technically low handwriting. The general features of the handwriting are subject to considerable changes, some of the features change to a lesser extent, the handwriting becomes like the poorly produced or to the handwriting of a younger student. Therefore, in all cases of detection in handwriting (writing) signs of «poorly made» handwriting should establish their origin.

The expert in handwriting should be aware that the presence in the handwriting or writing of signs of low degree of coordination of movements and slow pace because of excessive tension of the muscles of the hand in writing, by itself does not yet indicate the execution of the manuscript by a person with a low degree of mastery of writing skills. It should be borne in mind that such signs may indicate the execution of handwriting (records) under artificially created unusual conditions – when holding the writing device (ballpoint pen) at a considerable distance from the writing edge, the end opposite the edge, or clamped in the fist – with the purpose of the most effective distortion of handwriting.

Changes in the general and individual features of the handwriting, depending on a violation of the usual conditions of the letter, should be considered by the expert both when checking the handwritten text (records) for unusual performance and in the process of comparative research. This kind of change in the handwriting of an expert should be borne in mind, as in practice there may often be cases of intentional change in the distance from the fingers to the tip of the writing device or to the writing device clamped in a fist. In assessing the converging and divergent features of the handwriting, the expert is obliged to consider, if there are grounds for this, that the presence of several features may be a consequence of the execution of handwriting (records) in the unusual mutual position of the hand and the writing device. He also needs to know the nature of the change in features caused by the unusual position of the hand and the writing device.

Information about those specific features that appear in handwritten text (entries) in unusual conditions – in the unusual way of holding the writing device by clamping it in a fist or holding the writing device (ballpoint pen) at a considerable distance from the writing edge, the end opposite to the edge needed by an expert to diagnose a method of intentionally distorting handwriting. At the same time, it is essential for expert that greater variability is revealed by the general signs of the handwriting, while the individual signs in the majority retain stability allowing to identify the performer in in case of forensic examinations.

Therefore, the study of handwriting in an unusual way of holding a writing device by clamping it in a fist or holding a writing device (ballpoint pen) at a considerable distance from the writing edge is relevant today and requires further careful study.

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ПРО ВПЛИВ НА ОЗНАКИ ПОЧЕРКУ НЕЗВИЧНОГО СПОСОБУ ТРИМАННЯ ПИШУЧОГО ПРИЛАДУ

Мета роботи полягає в обгрунтуванні і систематизуванні теоретичних знань щодо дослідження почерку, виконаного в незвичних умовах – незвичним способом тримання пишучого приладу – шляхом аналізу експертної практики щодо дослідження подібного виду об'єктів. Розглянуто випадок із експертної практики дослідження рукописного тексту, який виконано у незвичних умовах, штучно створених виконавцем для найбільш значного перекручення свого почерку, – шляхом тримання пишучого приладу (кулькової ручки) на значній відстані від пишучого вістря, за кінець, протилежний вістрю, або затиснутим у кулаці. Описано механізм письма і доведено необхідність врахування експертом характеру змін ознак, обумовлених незвичним способом тримання пишучого приладу.

*Ключові слова**:** почерк; незвичний спосіб тримання пишучого приладу; діагностування; перекручення почерку; затиснення пишучого приладу в кулаці.*

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