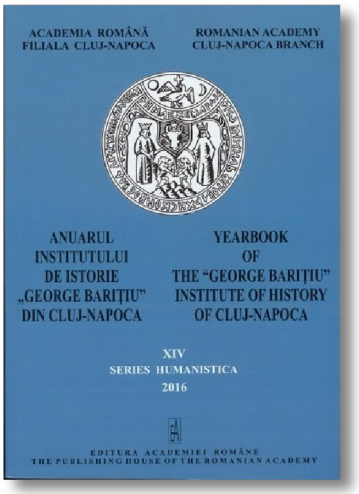

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ASPECTS RELATED TO THE CRIMINAL INVESTIGATION OF THE SIGNATURE'S MODIFICATIONS

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Abstract: *The criminal investigation of the signature, used by the handwriting experts, will be able to demonstrate that the examined signatures are genuine or forgeries. The signature is presumed to be finished at the end of the period in which the handwriting itself has been perfected, but, during the academic cycle, due to various needs and circumstances, the signature can change. We tried to extract, by examining signature characteristics, some statistics related to the general characteristics and specific aspects of the examined signatures. It was possible to distinguish between different student categories reflected in the evolution of their signatures. In the past few years, there has been a spectacular depreciation of the quality of handwriting. It is not hard to understand why: handwriting is losing ground, gradually replaced by typing, on computers or other electronic devices. Even if writing disappeared as a habit, olograph signatures will still exist for a long time by necessity.*

Key words: *criminal investigation of the signature, signature modifications.*

Signatures show a crucial significance as authentication elements, because signing a document means agreement in a transaction. The important legal value they have gives rise to the need of a separate graphoscopic section of the handwriting examination, namely the examination of the signatures themselves.

The creation of one's own signature is observed in most people after learning the basic graphs, after the formation of writing skills during the first school years. The factors contributing to its formation involve deliberate processes of consciousness in order to create a personalized signature, difficult to replicate, but with a distinct aesthetic image (Tilea, 2005, pp. 19-20).

In most cases, exercising the signature is presumed to be finished at the end of the period in which the handwriting itself has been perfected. Given that during university, for objective reasons, students have to take notes in lectures or for their individual study of a large volume of material, handwriting will be changed to

increase the execution speed, thus simplifying the used graphic signs. Also, their social status changes, meaning that, becoming adults, they are entitled, due to diverse needs and circumstances, to sign a greater number of personal or official documents. In these circumstances, the signature will also change. These changes will be more or less obvious depending on the frequency of repeating a sign, because the signature is a dynamic stereotype.

The purpose of this study is to examine the evolution of signature during the academic cycle, the development of student's signatures during university studies. In order to achieve this, I have randomly selected signatures from the annual enrollment files of one hundred students. I tried to extract some statistics related to the general characteristics and specific aspects of the examined signatures.

In many cases, a person's signature does not represent typical handwriting, nor does it always contain the same individual characteristics as normal handwriting. Signature tends to be very sensitive to context. Most people would sign an official document carefully, so that there would be no doubt about the name. This would be a formal signature. An informal signature would be used in routine correspondence in order to recognize the writer. The same person can use the abbreviated or stylistic signature for signing checks, receipts etc. (Houk, & Siegel, 2008, p. 543).

An example of the evolution of signature is when a person signs by writing his/her full name (sometimes even mentioning the initial of the father), following successive simplifications: first their first name, initial and surname, then only the initials of the first and last name, then only a stylized monogram and finally a specific non-literal form.

We must distinguish between simple signatures, which give a graphical overview reduced to a few tracks literal or illegible due to the writing inability of the holder, uneducated or insufficiently literate, and simplified signatures that are basically the result of successive developments of one's signature through the abstraction and simplification of an initially complex one, due to its frequency of use in the context of a trade involving frequent signatures (manager, director, clerk, secretary, etc.). A person's individuality is reflected in the characteristics of his/her signature. They are graphical notes, which, taken separately, can be found in other signatures, but the combination of which is unique, unrepeatable, each individual's own.

GENERAL CHARACTERISTICS OF SIGNATURES

General characteristics refer to attributes whose combination gives a signature, its general aspect, owing to which the signature can be recognized not only by its author but also by others. General graphic notes allow for a classification of signatures (Frățilă, & Păşescu, 1997, p. 35).

Signatures can be classified according to the evolution of writing, the frequency of the reproduction of the signing gesture, their dimension, their legibility or illegibility, among others. All these criteria can be combined in a single signature. As an example, here are some types of signatures, defined in accordance with the aforementioned criteria:

- under-evolved, moderately evolved or highly evolved signatures (by degree of evolution);
- legible (literal), semi-literal (mixed) or illegible signatures (by graphic composition);
- large, medium and small or simplified ("reduced ratio") signatures (by size).

The term "reduced ratio" is used chiefly in the graphoscopic analysis of signatures in criminal and civil cases, where these have a crucial importance in the authentication of written proof. Reduced ratio signatures are defined by the reproduction of a small number of graphic elements, legible or illegible.

This kind of signatures can be the result of both extremes of the signature evolution, as they can belong to an illiterate person as well as to a highly educated one. Normally, however, some characteristics allow for a clear distinction between the two categories. The degree of evolution of a signature is essential for the specialist since the beginning of the graphology examination. The rule of thumb that applies is the impossibility of imitating an evolved style of writing for the person with underdeveloped writing.

Brief scripts, reduced to the execution of a letter or illegible form, those simplified signatures or their auxiliary graphical signs, are what "reduced ratio scripts" refer to. The "reduced" ratio of a script is not an attribute that can be defined with mathematical precision, being, in a certain measure, up to the personal appreciation of the graphology expert (Frățilă, & Păşescu, 2008, p. 13).

Signatures that are short and simple are vulnerable to forgery since they reduce the requirement of complex character forms. Signatures that naturally demonstrate a wide range of variation are also vulnerable, since it is difficult to asses if the differences have arisen merely as a result of this variation or because of simulation by another person (White, 2005, p. 154).

When comparing signatures examined as proof within a trial with the model signatures produced for comparison purposes, difficulties often arise from the presence of a single signature, often of reduced ratio, in the body of proof, from the impossibility of obtaining sufficient and good quality samples of a person's handwriting and signature, or from the mere lack of complexity of the analyzed scripts (their specific particulars being few and easy to imitate).

COMPOSITION OF SIGNATURES

By composition, signatures can be literal – reproducing the name and/or surname, but these can be also reduced to the initials, which can be superposed (as in the case of monograms); they can be mixed, when they are accompanied by a

stylized initial, or can be illegible, when they consist of a combination of graphic motifs uncharacteristic of normal handwriting. These combinations can be of different shapes and sizes, linear, circular, curved and so on, made in one or several strokes of the pen, the number of strokes being of no incidence to the type of produced signature. For illegible signatures, their aspect includes apparently contingent shapes, but in most cases these have been reached through a constant evolution towards abstraction, from a literal sign to a symbol characteristic to the author. Some signatures abridge their owner's surname: Popescu can become Pop. In other cases, short surnames (Urs, Ion, Boc...) are included entirely. Many people sign with one or two stylized letters that are also called seals.

STABILITY (CONSTANCY) OF SIGNATURES

Signatures not only possess an individual character, but they also remain constant for certain lengths of time, a property called stability. When the dynamic stereotype is formed, the writing movements become automatic, which consequently allows for the signature to maintain the same characteristics at every execution. The influence of objective and subjective factors leads, in time, to transformations of the signature, which makes all stability relative. But stability is nevertheless a key factor in identifying the author of a script. The reduction of the graphical ratio to a minimum is the consequence of the consolidation of the writer's habits owing to the constant reiteration of the psychomotor gestures of signing (Frățilă, & Păşescu, 2008, p. 117).

NATURAL VARIABILITY OF SIGNATURES

Despite containing a reduced "graphical mass", small sized signatures fully reflect the phenomenon of natural variability or of "double or triple graphical personality", as it is also called in the discipline. All stability is relative, and this is what determines the natural variability of writing. The mechanisms underlying signatures will reflect the tendency, common to all life phenomena, of never identically repeating in any way. Individual variations associated with mechanical, physical and mental functions are expected in angularity, slope, speed, pressure, relative dimensions, connections, etc. (Saferstein, 2009, p. 553). This implies that different signatures belonging to the same person are never identical, as it is impossible to produce two signatures that are exactly the same. The variability can be simultaneous, observable in signatures produced for the same occasion, or of a long term nature, seen in signatures created at different times, within a time span of months or years. According to this, signatures can show a low, medium or high degree of variability. The latter shows changes at each execution, some of which can be quite serious, up to the point of changing the morphology of the reduced ratio signatures so as to produce negative conclusions in an examination in regard to their authenticity.

SPEED OF EXECUTION AND COORDINATION

When the speed of execution is higher, the ligatures are, as a rule, thinner, ethereal, dotted or broken, and the punctuation marks are pushed away from the general tracing following the direction of movement. Sometimes, the diacritical marks are connected to the body of the letter by a thin line. These global characteristics are completed by the graphic constructions in the details (Cârjan, & Chiper, 2009, p. 123).

When the signature includes the letters "t" and/or "f" in lower case, the length and position of the horizontal strokes also offer clues about the speed of execution (Frăţilă, & Păşescu, 2008, p. 121). Eventually, this will belong to one of three categories: low, medium or high.

The coordination of the execution is determined by the way in which the act of writing takes place. The relevant elements to be examined are the precision of the movements in the inscription of the thread, the assurance in the tracing of each element, the way in which they all connect, the dynamism of the execution, and the balance of the graphic production as a whole. According to its coordination, in a court case, the signature will be classified as a lower-, medium-, or high-level one.

The other general graphic characteristics, such as the topography, baseline, pressure or continuity of the signature can have a great importance in certain cases, through corroboration with the elements described previously.

INDIVIDUAL CHARACTERISTICS OF SIGNATURES

To individualize the signature it is necessary to analyze its specific form, manner and direction of execution, the number of elements composing it and their disposition. Individuals may incorporate short-cuts from the copybook style or add an extra flair to their signature, which, perhaps, they saw it in someone else's writing (Stuart, & Nordby, 2009, p. 441). A systematic examination of all the features in the structure of a graphic sign is necessary in order to achieve this.

EXAMPLES AND STATISTICS

In our faculty there are two programs: full-time studies with daily frequency and a program for distance learning with weekend reunions (part-time studies). About two thirds from the total number of our students are females and only about a third are males.

Among the students enrolled in full-time studies, 95% are recent college graduates, which means that they are around 20 years of age, and about 15% are simultaneously preparing for another university degree.

Among the students enrolled in the distance learning program, 65% are over 25 years of age, about 50% are working, and over 25% already have a university degree or are simultaneously preparing for a second one. This means that they are usually older and more experienced that those enrolled in full-time studies.

From the randomly selected student's signatures, 50% are from students enrolled in full-time studies and 50% in distance learning, 74% are of female subjects and 36% are of male subjects.

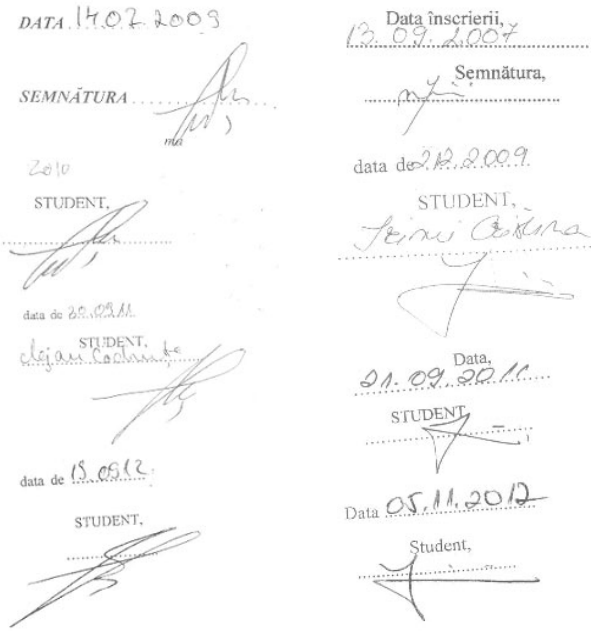


Fig. 1 – A slight simplification of the signature, due to the increasing execution speed.

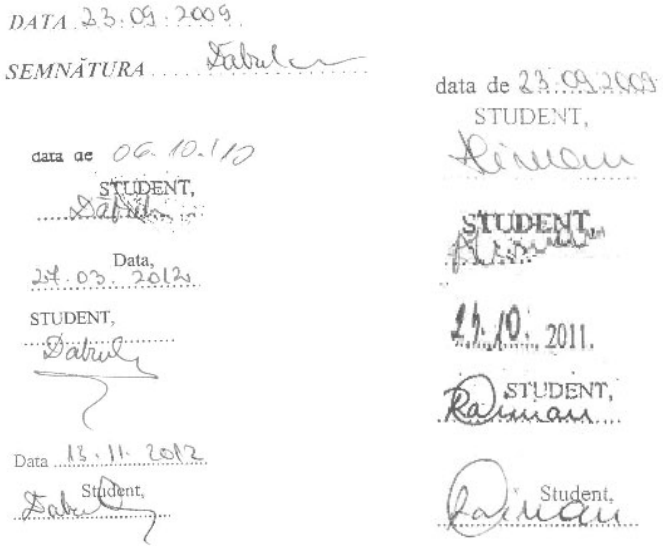


Fig. 2 – Changes through aesthetic elements added to the signature.

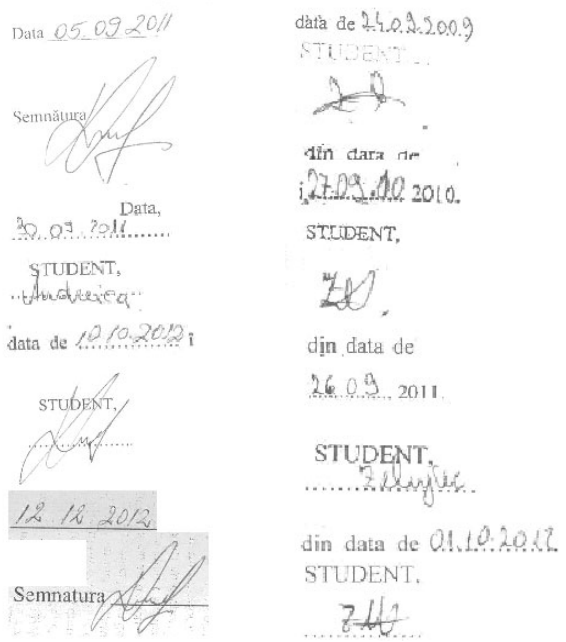


Fig. 3 – The use of the calligraphic shape in some unusual state of mind.

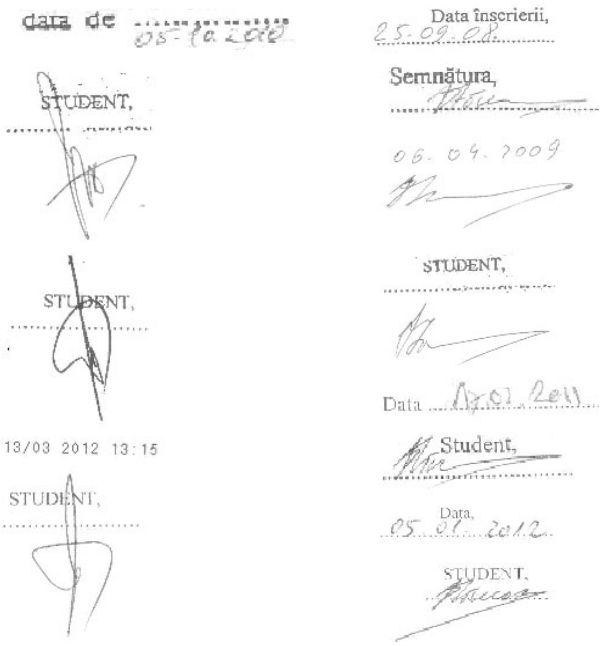


Fig. 4 – Changes through the simplification or the complication of the graphics.

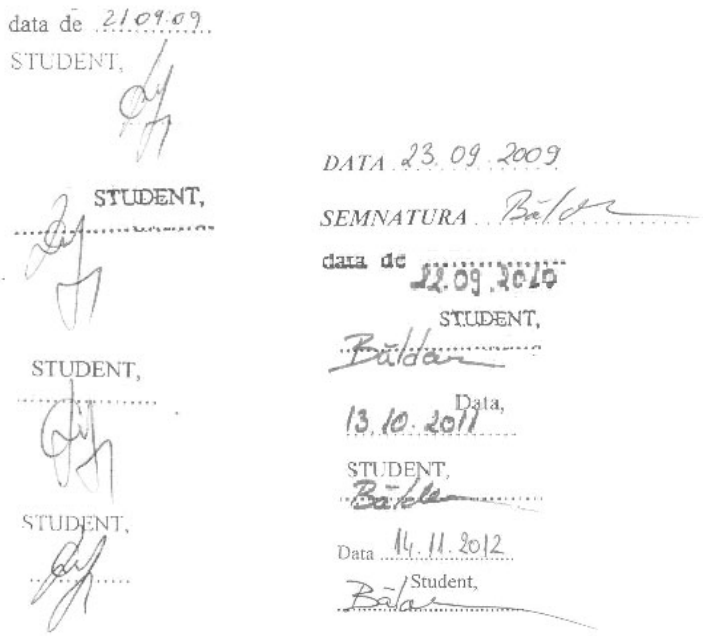


Fig. 5 – Normal variability in time.

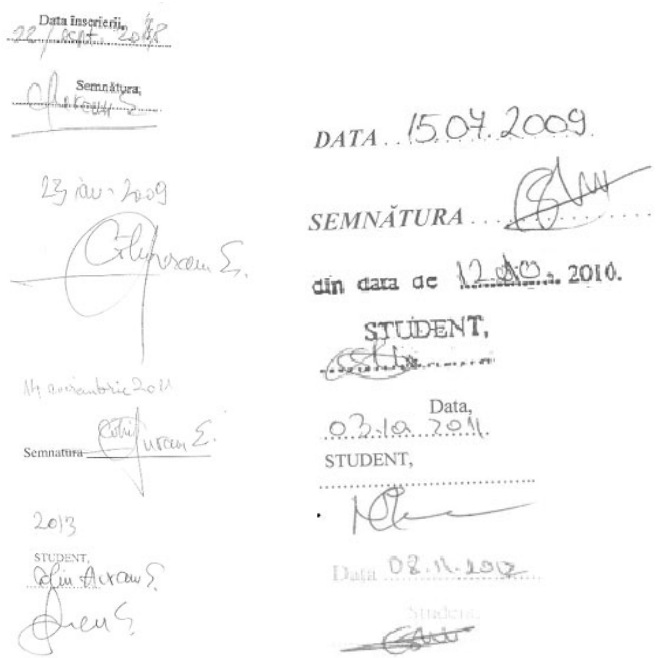


Fig. 6 – Different aspects depending on the subject situation (physical and mental conditions).

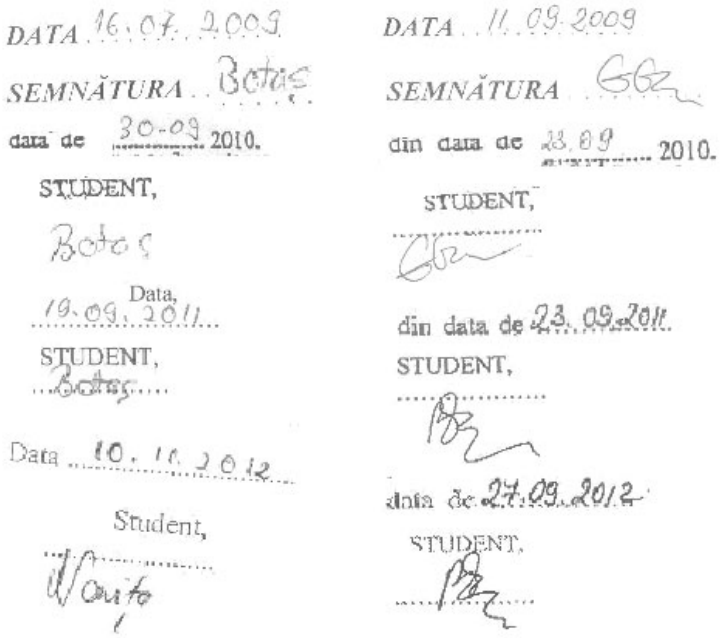


Fig. 7 – Forming a signature after changing the name through marriage.

Fig. 8 – Keeping both versions of the signature after marriage.

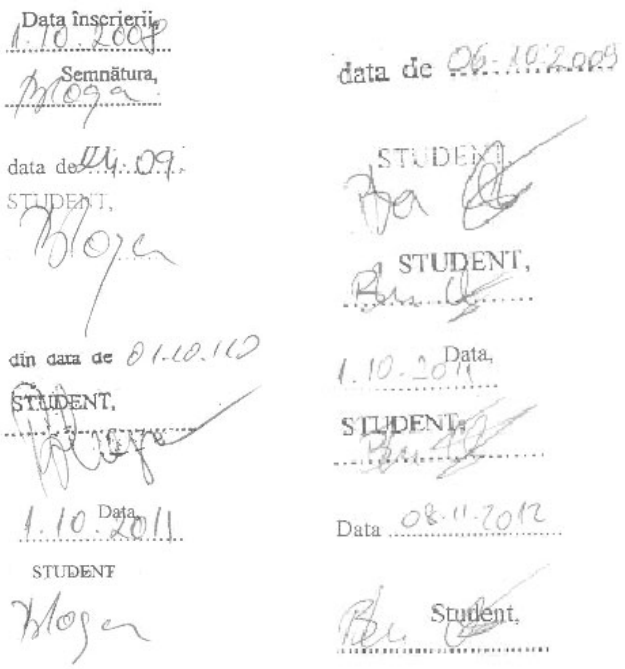


Fig. 9 – Constant signatures.

Fig. 10 – Legible signature including the entire name.

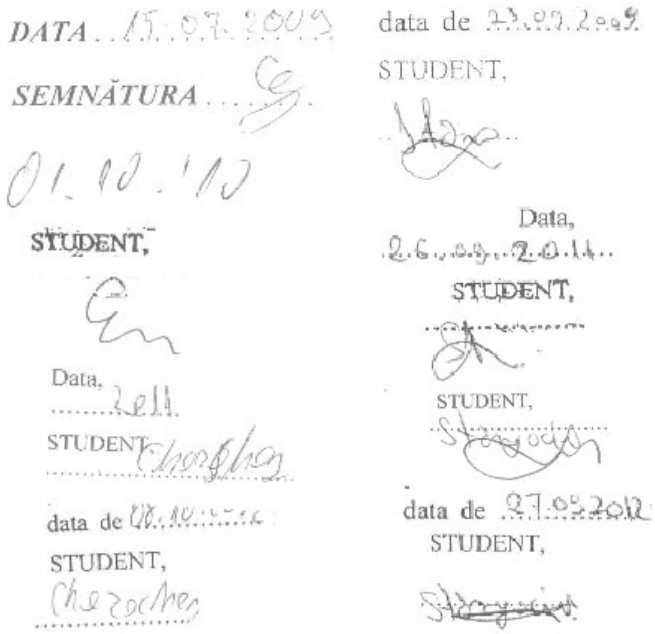


Fig. 11 – Increasing the signature's complexity.

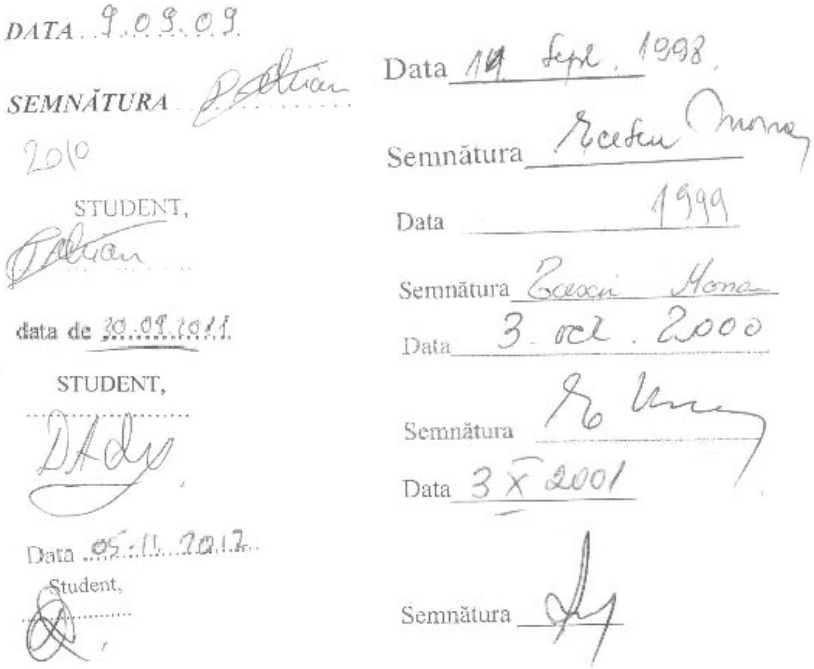


Fig. 12 – A strong simplification of the signature.

Fig. 13 – Different degrees of the signature's evolution.

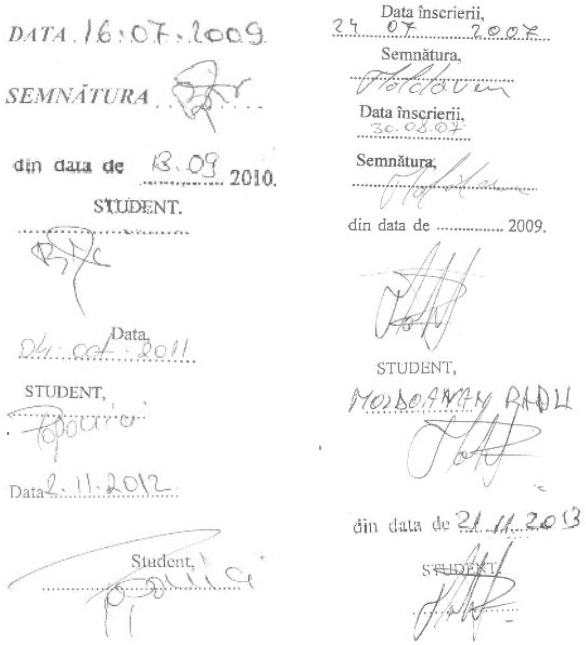


Fig. 14 – The transition from initials (the short form) to the full form and vice versa.

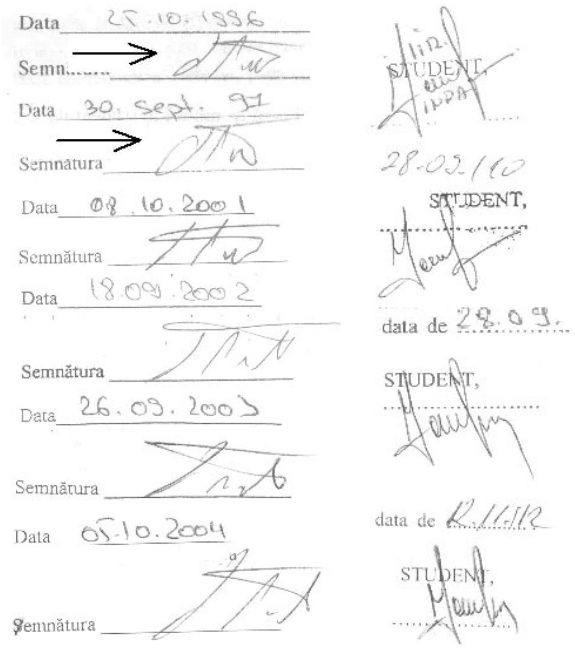


Fig. 15 – Changes due to the professional needs.

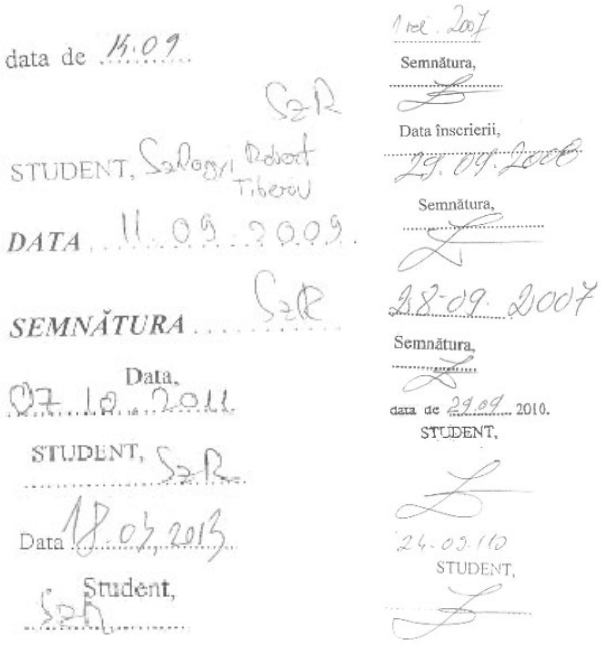


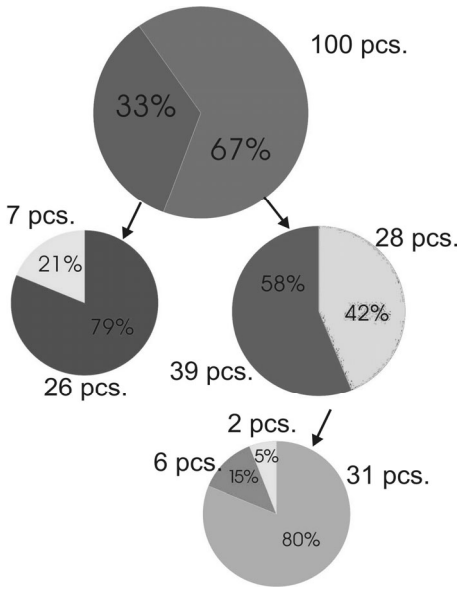
Fig. 16 – Simple signature with the initials.

Analyzing these randomly selected signatures of the students, we can see that their signatures change during the academic cycle of studies, especially for the students enrolled in full-time studies, which are younger and just with school experience.

From the randomly 100 selected signatures, 33% were constant and 67% showed changes, during the academic cycle of studies.

The constant signatures reflect the phenomenon of natural variability. Most of them, 79%, belong to students enrolled in the distance learning program.

The modifications of the changed signatures are reflected in the simplifications of 42% of the cases and in the transformations of the graphics in 58% of the cases. From the graphic modified signatures, there were changes of the name through marriage in 15% of the cases and not defined yet signatures in 5% of the cases. We also observed an isolate case of transformation from initials to the full form of the name.



CONCLUSIONS

In the past few years, there has been a spectacular depreciation of the quality of handwriting. I was able to notice this myself by examining the handwritten exam papers handed in by the students of our university. It is not hard to understand why: handwriting is losing ground, gradually replaced by typing, on computers or other electronic devices. We have stopped writing by hand even the traditional birthday or holiday wishes, which are now sent through SMS, email, if not even bought as pre-printed cards where no human input is required (as an aside, this also entails an

unnecessary invasion of English neologisms, sometimes inappropriately used!). In the history of human evolution, we can recognize a natural succession from the emergence of the articulated language, as a signaling tool, followed by the invention of writing. In its turn, writing underwent a diversified development in the shape taken by the graphic signs and the phonetic or iconic representation of speech. It stretches from the Sumerian cuneiform writing, Egyptian hieroglyphs or Mayan glyphs, to the gracefully arched floral Arab calligraphy, to the carefully studied Gothic European initials or to the East-Asian ideograms. As a dynamic stereotype, all these types of writing suppose the manual mastery of a writing instrument and require a material medium on which to inscribe the writing. This situation allows us to evaluate a document not only from the point of view of the script characteristics, but also according to the physical and chemical properties of its constitutive materials.

The invention of printing diminished the importance of the handwriting in the dissemination of scientific or cultural information, but did not affect its importance as a means of private communication for several centuries. Starting from the last decades of the twentieth century, however, with the information technologies boom, the access of the general population to computers and world-wide networks has followed an exponential growth. For practical and evolutionary reasons, when communication does not take place through one's own sensory organs, through the direct perception of an image and sound, the mediation requires that the message be transmitted by operating a device – a keyboard – which assembles standardized graphic signs. If we wanted to keep the traditional gestures and skills of handwriting, even in this modern age, we could still scan or photograph a text (scanners and cameras being now constantly used in daily life) and then send its digital version. But who is willing to complicate their daily routine in that way?

As a somewhat natural consequence of this devolution of handwriting, some are predicting the radical reduction, if not even extinction of this ancient skill. In a news item on Radio France International in February 2013, it was announced that some states in the USA are considering making handwriting an optional subject in primary schools, replacing it with the teaching of typing on a basic word processing software. One of the reasons given for considering handwriting obsolete was that it can be a cause of accidental death: the sad and hilarious explanation was that hundreds of people were supposedly killed by the failure to decode handwritten medical prescripttions. This should make us think about the precariousness of education amongst certain segments of the population, and not only of those most disadvantaged!

From the point of view of these pessimistic predictions, we could try to anticipate the future evolution of forensics in the examining of suspicious documents. Of course, handwriting will not suddenly disappear in the near future from the surface of the planet, but, as it happened with the typewriter, so ubiquitous fifty years ago, and now virtually out of use, we might witness serious changes in the number of people who choose computer over manual editing of a

text. If we were to be optimistic, even if writing disappeared as a habit, ologaph signatures would still exist by necessity (for authenticating documents and so on); but, if the loss of any handwriting skill becomes complete, if there is no more dynamic stereotype, ologaph signatures will also disappear, and would be replaced by electronic signatures or other technological solutions.

By examining the signatures of one hundred students, we reached the conclusion that, for now, it is still possible to distinguish individual characteristics at each personal signature, taking into account their relative stability, manifested within the natural range of variability, induced by objective or subjective factors.

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