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GRAFFITI UNDER THE GRAPHOSCOPIC OPTICS

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Abstract: This work aims to present the general characteristics of graffiti, in addition to presenting a tool to help identify their authors. It will be verified which graphoscopy parameters are applied in the writings from graffiti. The limitations encountered when performing this type of examination will also be addressed.

Keywords: Graffiti. Support. Graphics. Graphoscopy. Authorship.

INTRODUCTION

It is very common nowadays for people to come across walls, walls and even sculptures with marks from graffiti. These marks can be seen in homes, businesses and even buildings. They are formed by drawings, symbols, initials of names and even whole sentences.

In addition to visual pollution and damage to other people's property, they often bring messages with offensive content and profanity. Some even aim to identify properties as potential targets for crimes – kidnappings, robberies, thefts, among others.

Finding the perpetrators of these acts of vandalism has not been an easy task for the government. When the authorities manage to carry out the arrests, it is because the perpetrator confessed or was caught at the time of carrying out the act.

One way, among the few that exist, to reach the authors of the graffiti would be using the knowledge of Graphoscopic Expertise.

The main methodology used to carry out this type of expert examination is the confrontation of graffiti (questioned piece) with the graphic patterns provided by the author (pattern piece), based on specific parameters of writing, as will be seen later.

Graphoscopic Examination is commonly performed on graphic releases on supports such as sheets of paper, receipts, letters, promissory notes, etc. In the case of graffiti, the postings are carried out in dimensions

that can reach a few meters and on supports such as walls, walls and sculptures.

JUSTIFICATION

The present work meets the need to identify, or even exclude, the authors of graffiti, using Graphoscopy. In addition, it addresses a topic that is little explored when talking about Graphoscopy.

The analysis of writings from graffiti based on graphoscopy parameters is inserted in few works in this field. Many reasons can be pointed out to justify this fact, among which the difficulty in performing such an examination. This difficulty is based on the limitations in obtaining the graphic patterns of the suspect and the little interest of the authorities in investigating the crimes related to these acts of vandalism.

But perhaps the core of the discussion regarding the subject is the determination of the parameters studied by Graphoscopy that are applicable in the situation in question.

In graffiti, the size of the strokes can vary from a few tens of centimeters to a few meters. As for the support, they range from plastered walls to entire panes. In addition to these, there are other variations presented in this type of writing, which will be exposed later on.

CONCEPTS AND DEFINITIONS

EXPERTISE

Exam or set of exams that use the scientific method to perform and reach the result.

According to Alberi Espíndula (2009, p. 73), expertise is "(...) a generic expression that includes several types of specialized tests, aiming to clarify a certain fact from a scientific perspective (...)"

GRAFOSCOPY

Grafoscopy is a discipline whose purpose is to verify the authenticity or determine the

authorship of graphics.

GRAPHICS

These are the writings that come from the movements performed by the human being, but that have sufficient characteristics for the identification of their authorship. As for the form, they can be signatures, initials, writing in cursive, writing in block letters, pictographs and cryptography. According to José Del Picchia Filho (2005, p. 62), graphics are “writings that result directly from graphic gestures, corresponding, therefore, to the movements performed by man, in the fixation of his thought”.

GRAMS

It is the strokes and curves that form the letters. They can be considered as the units of graphics.

FUNDAMENTAL PRINCIPLE AND LAWS OF GRAPHICS¹

The fundamental principle of graphics says that “Graphism is individual and unmistakable”. That is, no two graphics are alike, and it is always possible to distinguish them from each other.

As for the General Postulate of Graphics and the Laws of Writing, they are transcribed below:

General postulate – “The laws of writing are independent of the alphabets used”.

1st Law – “The graphic gesture is under the immediate influence of the brain. Its form is not modified by the writing organ, if it functions normally and is sufficiently adapted to its function”.

2nd Law – “When you write the ME is in action, but the almost unconscious feeling that the ME is acting goes through continuous alternations of intensity and weakening. It is

¹ The Laws of Graphics and the General Postulate of Graphics were formulated by the French expert Solange Pellat in her book *Le Lois de L'écriture*.

at its maximum intensity where there is an effort to make, that is, at the beginning, and at its minimum where the writing movement is seconded by the acquired impulse, that is, at the extremities”.

3rd Law – “One cannot voluntarily modify, at a given moment, the natural writing itself, if not by introducing in the trace the mark of the effort that was made to obtain the modification”.

4th Law – “The writer who acts under circumstances in which the act of writing is particularly difficult, instinctively traces letter shapes that are more customary or simpler, with an easier scheme to be constructed”.

GRAFFITI

According to the Minidiscionário Aurélio, 4th edition, the word Pichar means *writing on walls and walls; graffiti*.

This way, graffiti is, above all, writing on walls, walls, etc.

As for graffiti, which is similar to pichação (mainly because of the use of *spray* paint and having walls, etc. as supports), it is an art authorized by the owners of the support (areas used) and does not have aggressive tones in the content. In addition, graffiti uses more elaborate techniques than graffiti, such as a variety of colors, special inks, among others.

As for the legal aspect, the act of graffiti is typified in article 65 of Law 9605 of February 12, 1998, which describes it as follows:

“Art. 65. *Graffiti, graffiti or otherwise defile a building or urban monument:*

Penalty - detention, from three months to one year, and a fine.

Single paragraph. If the act is carried out on a monument or thing listed for its artistic, archaeological or historical value, the penalty is six months to one year of detention, and a fine.”

The following figures illustrate examples and locations of graffiti:



Fig. 1 – Graffiti on house wall



Fig. 2 - Graffiti on metal door of commercial establishment

When it comes to graffiti, the *spray* can containing paint – the black one is the most common – is undoubtedly the instrument most used in graffiti. When translated into Portuguese, the word *spray* has, among others, the following meanings: gaseous jet of liquid or aerosol and container that emits this jet. In this work, the second definition will be used. Below is an image illustrating a *spray* can.



Fig. 3 - Example of a *spray* can

GENERAL CHARACTERISTICS OF GRAFFITI

When posting through graffiti, authors behave differently than they would on a sheet of paper with a ballpoint pen, for example. This difference is due to several factors; otherwise let's see:

I. The type of writing instrument

We can conceptualize writing instruments as any object that can be used to launch graphics. There are several writing instruments: ballpoint pen, pencil, brushes, and several others. In all of them there is the touch of the instrument on the support in the execution of the releases.

² <http://ciencia.hsw.uol.com.br/latas-de-aerosol3.htm>

This type of instrument works as follows²:

An aerosol can contains a fluid that boils well below room temperature (called the propellant) and one that boils at a much higher temperature (called the product). The product is a substance which in the case of graffiti is paint, and the propellant provides a way for the product to exit the can. Both fluids are stored in a sealed metal canister.

In most popular systems the propellant is a liquefied gas. This means that the propellant will take the form of a liquid when heavily compressed, even if it is kept well above its boiling point.

Since the product is liquid at room temperature, it is simply poured into the can

before it is sealed. The propellant, on the other hand, needs to be pumped in under high pressure after the can is sealed. When the propellant is held under high enough pressure, it does not have any ability to expand into a gas. It remains in a liquid state as long as the pressure is maintained. A diagram illustrating how the described system works is shown below:

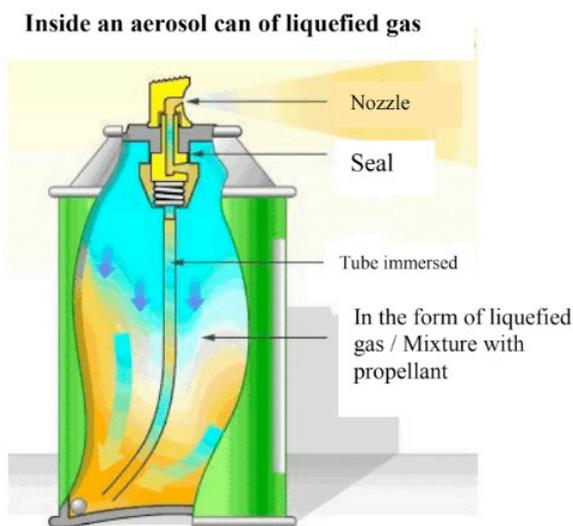


Fig. 4 - Diagram of the operating mechanism

When the valve is opened, the pressure in the liquid propellant is instantly reduced. At low pressure, it can start to boil. Particles are released, forming a layer of gas that collects at the top of the can. This layer of pressurized gas pushes the liquid product and also some of the liquid propellant up the tube towards the nozzle. Some cans, such as paint spray cans, have a motion ball inside. Shaking the can causes the ball to move, thereby helping to mix the propellant and the product, which comes out in a fine mist.

When liquid flows through the nozzle, the propellant quickly expands into a gas. In some aerosol cans, this action helps the product sprayer, forming a very thin layer of spray. In other designs, evaporating propellant forms bubbles in the product, creating a foam. The

consistency of the expelled product depends on several factors, which include:

- The chemical composition of the propellant;
- The proportion between the propellant and the product;
- The pressure of the propellant;
- The size and shape of the valve system.

II. How to hold the writing instrument

The act of holding the writing instrument - spray can - used to make graffiti is characterized by wrapping the fingers over the can, with the index finger, most of the time, used to activate the valve that triggers the liquid jet. Below is an image illustrating what was described:



Fig. 5 - Mão segurando uma lata de spray

III. The positioning of the body

When the graffiti artist performs the launch, his body assumes positions according to the location of the support on which he will affix his graphics. Most of the time the support is in the vertical position. This way, he can stand, lean or crouch facing the support, the first being the most common and most comfortable position. They are mainly used on walls.

In addition to this position, pichadores can perform the launches supporting themselves by one of their limbs, when they cannot support their feet in front of the support. They can also lie above support. In this case, the

postings are performed in reverse. According to the 4th Law of Writing, the more unfavorable the conditions for the realization of graffiti, the less complex will be the formation of the executed strokes.

Below you can see images of situations where the pichador is in an adverse situation for the act:



Fig. 6 - Person carrying out graffiti in reverse³



Fig. 7 - Person graffitiing in adverse conditions

IV. The movement of the writer member

When writing on a sheet of paper and using a ballpoint pen, for example, the movement of

[3 http://noticias.terra.com.br/interna/0,,OI3293109-EI11904,00.html](http://noticias.terra.com.br/interna/0,,OI3293109-EI11904,00.html)

the wrist and fingers that support the writing instrument occurs more intensely than the movement of the arm and forearm. In the case of releases with larger dimensions and on supports positioned vertically, as is the case with graffiti, the most intense movement is of the arm and forearm.

V. The Support

There are several supports used to make graffiti. And its most common position is vertical, as in walls and walls. As for the surface of the supports, they can have different configurations, such as smooth or rough. E.g.: plastered walls, smooth walls, steel doors, etc.

VI. Agenda line

Some releases are carried out with reference to the agenda. This line serves to guide the horizontal development of writing. In the case of graffiti, there is no use of agenda lines. In other words, these are unguided supports.

VII. Dimensions of releases

The size of grams, when it comes to graffiti, reaches dimensions ranging from tens of centimeters to a few meters. This variation is greatly influenced by the dimensions of the support, where the author tends to adapt the size of the grams.

Commonly, the maximum dimension achieved by releases approximates the distance between the lowest level of support and the maximum point the author's writing limb reaches.

VIII. Characteristics of the traits

Thickness– is the width of the stroke, and it depends on some factors, otherwise let's see:

- The distance between the spray nozzle and the support – The further away, the thicker the stroke becomes. The closer you get, the narrower the stroke becomes. See figure below:

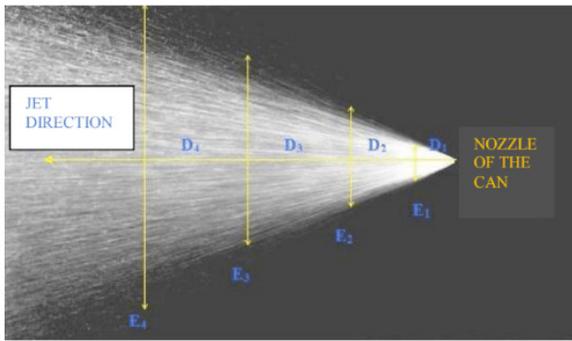


Fig. 8 - Schematic drawing: distance between nozzle and support vs stroke thickness

- The nozzles used in the *spray* – There are several types of nozzles used to spray the paint stored in the spray can. Each nozzle ejects the liquid in a different way, making the strokes have different thicknesses.



Fig. 9 - Examples of spray can nozzles and their respective strokes⁴

Color intensity: it is the tonality assumed – not that the color changes, but the intensity – by the strokes. This will vary due to two main factors:

- The distance between the spray nozzle and the support – The further away, the less close the particles that make up the paint will be. This way, the stroke will

⁴ <http://familialacerda.blogspot.com/2008/08/bico-de-spray-spray-cap-bico-para.html>

appear less intense;

- The amount of ink stored in the reservoir – If this magnitude is below sufficient, the amount squirted into the support will be small, causing a lower intensity of the stroke.

Another important feature present in some launches is the flow of part of the ink squirted on the support. It is observed that this flow is more evident in supports positioned vertically or inclined, due to the action of gravity. This way, the launch will present burrs.

The main reasons related to this peculiarity – which is actually an excessive accumulation of paint – are, among others, the quality of the paint used, the distance from the can spout to the support and the speed at which the launch is carried out.

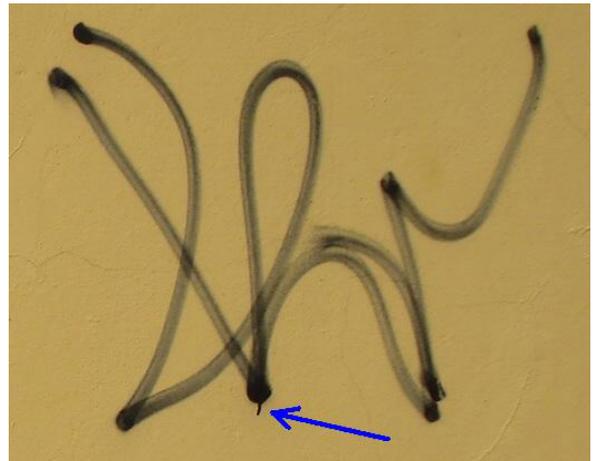


Fig. 10 - Graffiti with “burrs” from paint dripping

In most graffiti, the can does not touch the support, however, some authors can drag (rub) the can over the support. This attitude leaves marks, such as peeling paint or grooves on the support. This is an important characteristic in the individualization of authors.

IX. Emotional and social factors

When carrying out the graffiti, the authors do it, most of the time, under tension and

quickly, since it is an infraction and they do not want to be caught in action.

Regarding the profile of the pichadores, according to data from the Delegacia do Meio Ambiente de Goiânia – GO (DEMA), 85% of the pichadores are minors and have varied socio-economic conditions, that is, they are inserted in all social strata.

X. Graffiti content

Although there are entries made up of phrases with readable messages, most graffiti occur with the affixing of symbols or initials.

The symbols present in the graffiti, as well as the rubrics, are mostly used to demarcate territories – neighborhoods, streets, regions. Both can be used by groups or individually. There is no defined division of what may be a rubric or symbol, since the entry can vary from legible letter initials to letters or numbers so stylized or modified by the author that they are now considered symbols. And it is precisely this stylization of letters or symbols that sometimes serves as a competition between groups.

METHODOLOGY

PREPARATION

Before carrying out the graphic comparison, it is necessary to define what is desired with the expertise: decide on the authenticity or indicate the authorship.

When it comes to graffiti, the authenticity of the graphics is not of much interest to the authorities, since the aim of the authors of this type of posting is neither the falsification of someone else's graphics nor self-forgery.

Thus, expertise in graffiti will be guided by the search for authorship of entries.

THE METHOD EMPLOYED

There are several exams in writings, which are differentiated by the parameters adopted in the confrontations between the motive pieces and standard pieces. In the present work, the

approach will be the graphoscopic method.

In this method, the characteristics of the graphics are not considered separately, but together, each one being valued according to the expert analysis.

It will be carried out by comparing the characteristics of the questioned release with the standard release. This will even depend on whether the strokes placed on the support are letters belonging to an alphabet or pre-existing symbols. This is what the General Postulate of Writing says.

HARVEST OF STANDARDS

The standard release is performed by the suspected individual (authenticity) and aims to obtain as much information as possible about the characteristics of its graphics. It must be obtained by carrying out entries on supports and writing instruments that have characteristics similar to the questioned writing (adequacy). Another requirement that must be respected is the time when the pattern is harvested, as the time interval between it and the moment of graffiti occurrence must not be long (contemporary).

In the case of entries involving initials or symbols, the author, when carrying out the standard entries, cannot have access to the questioned entry (initial or symbol).

But perhaps the main way to obtain graphic patterns is by using other launches that are known to have been made by the suspect (authenticity) and that meet the other requirements mentioned in the previous paragraph. Due to its ease – when compared to the method in the previous paragraph – the use of existing graphic patterns makes the expert's work less arduous in identifying the authorship of graffiti.

CHARACTERISTICS EXAMINED

The graphics have certain characteristics that, together, individualize them. They are

called technical elements of graphics, and are used to compare releases. These elements are divided into generic technical elements and genetic technical elements and are briefly presented below:

GENERIC TECHNICAL ELEMENTS

a. Spacing

There are four types of spacing:

- a.1) Interlinears – is the distance between the written lines (when there is no staff);
- a.2) Intervocabulary – is the distance between words;
- a.3) Interliterals – is the distance between the letters;
- a.4) Intergrammatical – is the distance between grams.

b. Axial inclination

It is the inclination of the line that follows the direction of the letter or the gram of the graphic, in relation to a vertical line. Calculated by averaging the slopes of each letter.

c. Caliber

It is the dimension of the graphics, it can also be considered as the height of the letters.

d. Behavior in relation to the baseline and agenda

It is the way in which releases are developed in relation to the agenda. They can develop above the line, below the line or exactly on the line.

e. Graphic proportionality ratio

It is the ratio between the dimensions of the letters that make up a release.

f. Angular and curvilinear values

Most authors develop their graphics using angles (“closed” curves) and curves (“soft” curves), with a predominance of one or the other. This characteristic – predominance of

one of them – is frequently part of the author’s graphic habit.

GENETIC TECHNICAL ELEMENTS

Subdivide:

A. As for dynamics:

Elements related to the force exerted vertically by the writing member. They are expressed by the following magnitudes: it is presented under two magnitudes:

- **Pressure:**

Physically, pressure is the ratio between the force applied over the respective area of application. In affixing graphics, the force is that applied vertically by the author and the area is that of the tip of the writing instrument that touches the support. Often, depending on the intensity of pressure exerted by the author, grooves are formed on the support.

- **Progression:**

It is the variation that occurs with the pressure applied by the author throughout the launch. The pressure can remain constant, increase or decrease.

B. Regarding the trajectory:

It is related to the route taken by the writing instrument. They are expressed by the following quantities:

- **Shot attack**

It is the way in which graphism begins, a consequence of the first movement of the writing instrument over the support. They are divided into:

- a. Normal attacks;
- b. Grooved attacks;
- c. Rehearsed attacks;
- d. Rest point attacks;
- e. Attacks in twisting or brackets;
- f. Ringed or hooked attacks;
- g. Evanescent attacks;

- **Shot**

It has the same characteristics as the attack, except that it occurs at the end of the graphics.

- **Minimal graphics**

Minimal graphics are the punctuation marks, such as comma, full stop, among others.

- **Graphic moments**

Graphic momentum can be defined as the structure of the graphics that is placed on the support without removing the writing instrument.

DISCUSSION

Based on the characteristics presented, both of the graffiti and the technical elements of the graphics, the analysis of the possibilities of using these elements in the graphoscopic examination of graffiti follows:

Of the generic elements, the spacing presents possibility of use, mainly the interliteral and intergrammatical ones, and with less possibilities for the intervocalaries. This is because graffiti that exceed a written line or even a word are not common.

Inclination and caliber are characteristics that exist in graffiti, and whose analysis and estimation can be carried out in them.

The behavior in relation to the baseline cannot be examined, since staves are not common in supports. The graphic proportionality ratio is a quantity that can be compared as long as there are enough letters or characters to make the measurements. Thus, a symbol or a few letters in a word do not offer conditions to establish a graphical proportionality relationship.

Of the genetic elements, pressure and progression are characteristics that cannot be used in graffiti confrontations. The main reason that justifies this impossibility is the fact that the writing instrument does not

touch the support, besides, of course, not having the same operating mechanism as other writing instruments, such as ballpoint pens, for example.

The attack and the shot are also elements with great possibility in the collation of graffiti. With the exception of grooved attacks and shots, all types of attacks and shots can be manifested in pichos. See example below:



Fig. 11 - Attack at rest point - see indication

An observation must be made regarding the graffiti artist who drags the structure of the can at the same time as he performs the graffiti: despite the formation of grooves, these are not restricted only to the attack or shot, but tend to persist throughout the development of the graffiti.

In addition, there is the graphic moment, in which its application to the comparison of graffiti takes into account the structure that is launched on the support without ceasing the squirt of the *spray*. It is precisely this structure that compares to the graphic moment in conventional graphics. Figure 09 shown above illustrates a release consisting of a graphic moment, since there was no interruption of the *spray* jet.

As for minimal graphics – punctuation in general – their presence in graffiti is not very common. Thus, the application of this element

becomes somewhat limited.

CONCLUSION

The present work showed that most of the elements used by conventional graphoscopic expertise are applied in graffiti examinations, especially their authorship. And the efficiency of the exam becomes more achievable if existing standards are used and that have been proven to be applied by the suspected individual. When this is not possible, the exam has limitations regarding the collection of graphic patterns, especially when the graffiti in question is represented by symbols or headings. In addition to these difficulties, and due to lack of interest – perhaps due to the minimal penalty provided for by law – the demand for this type of expert examination is still not considerable.

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