



Ink Stains on Paper: Literature as a Historical Source

Manchas de Tinta no Papel: a Literatura como Fonte Histórica

Rafael Montoito¹

Diogo Franco Rios²

Abstract

This paper discusses the use of Literature as a research source in the History of Mathematics Education. At first, it promotes the use of this kind of source by discussing its potentialities and limitations, based on the theoretical framework that incorporates literature into historiography; following, it comments on fictional narrative and proposes sixteen different analysis categories which the researcher can rely on to question literary sources upon doing the historiographical research. Ultimately, by making use of two of these categories, an interpretation exercise from Edwin A. Abbott's book "Flatland", whose story involves characters such as geometrical beings, is presented. As a historical source, this work allows to know even better several conflicts in Victorian society, among which the way Abbott redesigns geometrical beings to represent the woman in British society at the time.

Keywords: History of Mathematical Education; Historical sources; Literature; Flatland.

Resumo

Este artigo discute o uso da literatura como fonte para as pesquisas em História da Educação Matemática. Em um primeiro momento, trazendo brevemente referenciais teóricos que incorporam a literatura à historiografia, o texto advoga acerca do uso deste tipo de fonte, discutindo suas potencialidades e limitações; em seguida, faz considerações sobre a narrativa ficcional e apresenta dezesseis categorias de análise que podem ser utilizadas pelo pesquisador para interrogar a fonte literária no fazer da pesquisa historiográfica. Por fim, lançando mão de duas dessas categorias, apresentamos um exercício interpretativo a partir do livro "Planolândia", de Edwin A. Abbott, cuja história tem, como personagens, entes geométricos. Tomada como fonte histórica, tal obra permite compreender ainda melhor várias tensões da sociedade vitoriana e, dentre essas, nosso estudo foca no modo como Abbott ressignifica os entes geométricos para representar a mulher da sociedade inglesa.

Palavras-chave: História da Educação Matemática; Fontes históricas; Literatura; Planolândia.

Sometimes books say something different from what they intended to say, (...) in every book there is a part that belongs to the author and a part that is an anonymous and a collective work. (Calvino, 2006, p. 346)

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¹ Doutor em Educação para a Ciência (UNESP, Bauru), professor no Mestrado Profissional em Educação e Tecnologia (IFSUL, Pelotas) e do Programa de Pós-Graduação em Educação Matemática (UFPEL, Pelotas). Brasil. E-mail: xmontoito@gmail.com

² Doutor em Ensino, Filosofia e História das Ciências (Universidade Federal da Bahia/Universidade Estadual de Feira de Santana); professor do Programa de Pós-Graduação em Educação Matemática (UFPEL, Pelotas). Brasil. E-mail: riosdf@hotmail.com

Like Stains on Paper

The History of Mathematical Education has contemplated, in recent years, a wide variety of sources and objects of interest, in part as a result of the approach of several researchers with perspectives of Cultural History who consider that the vestiges of the past allow access to certain representations of man in time.

Among the productions in the area, there are those that have already considered the use of literature as a source for scientific production (Montoito & Garnica, 2015; Oliveira, 2015), of which we highlight the work of Brito and Ribeiro (2013) which makes an interesting discussion about the approach of literature to historiographical production, which cannot and does not intend to confuse the epistemological status of these discourses:

[...] Even though close proximity occurs between historiographical narrative and fiction, for us they are not equal in terms of epistemological limits, because both have different ways of elaboration and validation, even though these are historically viable modes. However, one may serve as an inspiration or source for the other, as for example in period novels, in which history serves as a backdrop for literature. (Brilo & Ribeiro, 2013, p. 102).

It is important here to indicate that we are taking literature as a reference text of a given culture, that is, elaborated in a determined space-time, in which its author lives, and impregnated with elements of his time. This means that, in short, there is no work that is empty, that has no relation to the world and that says nothing about it, since the relationship between society and literary text is an expression of the author as historical subject and of his version about time lived (Neves, 2004). Além disso, como sugere a epígrafe deste texto, a literatura pode ser pensada como uma obra influenciada por vários autores, já que as vivências do coletivo respingam, em maior ou menor intensidade, nas páginas escritas.

Such thought encourages us to question the literature in search of elements that, although not so explicit in the text, allow the researcher to approach the time and the subject studied, as another way of access that, representative of a given culture, composes, by intertwine with other sources, an overview to be interpreted. This is the idea that Eco brings us by saying that “the fictional world rests parasitically on the real world, which is set against its backdrop” (Eco, 2017, p. 99), quote that problematizes the existence of a relation of partial equivalence - but also of complementarity - between both.

From the many possible elements that the researcher can derive from a research with literary sources, in this paper we will discuss about those that bring information about the teaching of Mathematics.

Guiding a discussion about the use of literature as a historical source is considered reasonable in considering approximation movements and distances between these two modes of production, resulting from the significant and dynamic renewal experienced by historiography throughout the twentieth century, from the School Annales, whose influence on Brazilian historiography is recognized (Barros, 2012, p. 40).

Among the changes produced in the course of this renewal, we highlight the

problematization of the hierarchy of source typologies for historiographic production:

[...] it would be necessary to state with ever-growing conviction that historians should no longer be concerned **only** with archival sources and chronicles that concern traditional political history. Any trace or evidence - from the objects of material culture to literary works, from statistical data series to iconographic images, from songs to wills, from anonymous diaries to newspapers - could now be legitimately used by historians. (Barros, 2012, 140-141. Author's emphasis).

Considering such dynamization regarding the expansion of the use of various types of sources, in recent decades, the potential of literature has been considered especially by the possibility of offering the historian, for his exercise of understanding of the past, social values representations and experiences lived by man in various social contexts over time (Ferreira, 2017).

Without wishing to enter into the debate of the tense relations placed between realistic and antirealistic historiographical perspectives, the fact is that, from the linguistic turn, the idea of historical source has been abandoned “[...] anchored in the analogy of water that springs from stone or earth, odorless, tasteless, colorless, transparent, crystal clear and pure to quench the historian's thirst for historical information” (Dias, 2012, p. 303), which relativized the status of “truth” attributed to certain traditionally used traces and validated new and different modalities of traces, considering the historicity and narrative modes they carry; this, in a way, redefined the understanding of the historian's performance in addressing the various vestiges of the past, within which “[...] the questions the historian asks arising from the problems he formulates matter, and the interpretations and explanations he builds on the basis of available evidence and the answers he elaborates for these questions” (Dias, 2012, p. 303-304).

In this paper we join the understanding that considers literature, or fictional discourse, not as the reverse of the real, but as a way of access to it. It is noteworthy that in literary writing the limits of creation and fantasy are wider than those allowed to a historian. (Pesavento, 1995). And in this sense, the historian could make use of these narratives as a source as long as he understood that what there is to read about it is the representation it holds. That is, the reading of literature by history is not done literally, and “[...] what is rescued in it is the re-presentation of the world that includes the narrative form” (Pesavento, 1995, p. 117).

The fact that a book exists is itself a testimony of time and its author, and, like any other work of art, the interpretation that enables those who make contact with it “[...] develops through these countless layers of reading, and each reader strips these layers to discover the work on their own terms.” (Manguel, 2009, p. 62). It is about this search that this article deals with: how to identify, in these layers, traces demarcated temporally and socially in the literature that allow the researcher to construct plausible interpretations of the past, based on their mediation. This means understanding that literature in certain cases has the potential to trigger, in cross-reference with other sources, the construction of new interpretations of the past; and that it is possible to identify in the literature traces and social

habits that had been previously noted in other sources, which are underlined by the literary text in the composition of scenarios, dialogues, attitudes of the characters, etc.

By this we do not mean that there is always a relation in a sense that departs from the analysis of the literary source for the production of social or historiographical explanations. We understand that this is a kind of movement that makes the researcher oscillate from the literary work to society and back to it as many times as he wants, as he seeks to better delineate the complementarities and dissonances between the written text and the social context in which it was produced. If, for this process, there is an advantage that a literary work gives to the researcher, this advantage is its finitude, because the book can be taken as a microcosm of society, as Eco tells us. (2017).

In an essay published a long time ago, I wrote that we know Julien Sorel (main character in Stendhal's *The Red and the Black*) better than our father. Many aspects of our father will always escape us (thoughts he kept to himself, seemingly unexplained actions, marked affections, secrets, memories, and facts of his childhood), while we know all about Julien. When I wrote that essay, my father was still alive. Then I realized that I would like to know much more about him, and I can only draw weak conclusions from vague memories. Stendhal, however, tells me **everything I need to know about Julien Sorel and his generation. What doesn't tell me** (for example, if Julien liked his first toy, or - like Proust - kept fidgeting and rolling in bed while waiting for his mother to kiss her good night) **doesn't matter** (Eco, 2017, p. 91-92, author's emphasis).

In addition to the provocation brought by Eco about the values that matter to a society – or about the fact that some of them need to be said, as many others do not need it, either because of their “unimportance” or obviousness – the quote refers to the possibility we will discuss here: since “a text only exists if there is a reader to give it meaning” (Chartier, 1999, p. 11), the literary text has much to say about the society that legitimizes it and about those that circulate it.

To problematize these discussions, especially regarding the possibilities and limitations of this type of source, we will interweave theoretical references of History, Literature and the field of literary analysis, drawing on the metaphor of ink stains on paper, an analogy to when writers wrote with pen and ink and often spilled it over the originals. Some stains dried or were hidden by the blotter before the final version of a work. Here we are interested in identifying these spots that, in the final version, were eliminated from the text, but which speak a lot about their process; spots that are not visible to the naked eye in the analyzed book, however, bring evidence of the historical moment of its production and the society that makes it possible: the author's intention, the society of the time the book was written, the relations that the text establishes with the world around it etc.

So we can discuss these issues, the text is divided into two moments: the presentation of sixteen categories - the stains on paper - that propose interrogative glances to the literature, which the researcher can use to approach a literary work while historical source; and an analytical exercise from the book “Flatland”.

As we said, this text intends to offer researchers in History of Mathematical Education

reflections on the use of literature as a historical source, recognizing its explanatory potential by indicating, for example, representations of a social microcosm, as in the case we will discuss here. It is clear to us that it is not a question of presenting a closed model for the use of this source, since the construction of the historiographic exercise depends, to a greater or lesser degree, on the hermeneutic exercise performed by the historian in relation to the vestiges with which he works.

Some Interpretative Stains

Paraphrasing Heraclitus' famous phrase, Manguel (2009, p. 97) which says that “we have never entered the same book twice.” Using a literary work as a source of historiographical research requires, from the outset, this posture of the researcher: willingness to revisit it, over and over, like a pendulum that goes round and round, so that his gaze will be accurate and be inferred from the text.

There are several questions that can be directed to the chosen literary work: the use of the language of a certain time and its vocabulary, the role that the work occupies in the author's set of productions, its position in relation to the customs of his time, the production and circulation of the book, criticism that the work received, interfaces that the narrative establishes with other themes and works, illustrations and cover models etc. Some of these themes, analyzed on the timeline, may form part of specific historiographies (such as a history of illustrations) and are more common in literary studies where, by definition, literature is the richest source.

Thinking of questions that fall outside the scope of literary studies, other approaches have to be shaped. Not that it is completely inappropriate to use methods and theories of linguistics, semiotics or hermeneutics, but

it must be argued that, for the most part, such resources are artificial in historical research. Although it should not be ignored, the fact is that they add little to the investigation, except when indispensable to answer specific questions [...]. The method will always be built by the researcher in contact with its object. (Ferreira, 2017, p. 81).

Because, in addition to the objective aspects already described, it proposes to also connect the subjectivity of the writer with that of the reader – in this case in the role of researcher – the interpretation of literary texts demands something beyond the methods: a particular kind of sensitivity that only those who like to read this kind of writings can develop (Ferreira, 2017). This type of reader, called by Manguel (2009) the “ideal reader”, is the one that subverts the text and, by dissecting it, seeks to go beyond the writer's words; the effort employed in understanding it is all the more intense and multiple the greater the value the reader attaches to it for his research (Ávila, 1996).

“Understanding a literary work is not a kind of scientific knowledge that shifts from existence to the world of concepts; it is a historic gathering that appeals to the personal experience of those in the world” (Palmer, 1969, p. 21), mediated by the intersection of

several sources. Starting from our previous experiences as readers and researchers - that is, as agents in the world - we build the scheme that will be commented below, which is a proposal of categories that interrogate a literary work, when taken as a historical source.

It is important to emphasize that this systematization is not presented as a closed method of analysis, even less as an absolute truth. The categories were born when we thought about how we could “surround” a literary work, extracting from it the largest amount of significant elements that would help us identify the possible diluted spots in the final version of the work. There are two main categories: one referring to the author and the other to the work; In each of them, eight subcategories can help the researcher establish interlocutions with the narrative.



Figure 1 – Subcategories for the analysis of the category “Author”
Source: Elaborated by the authors.

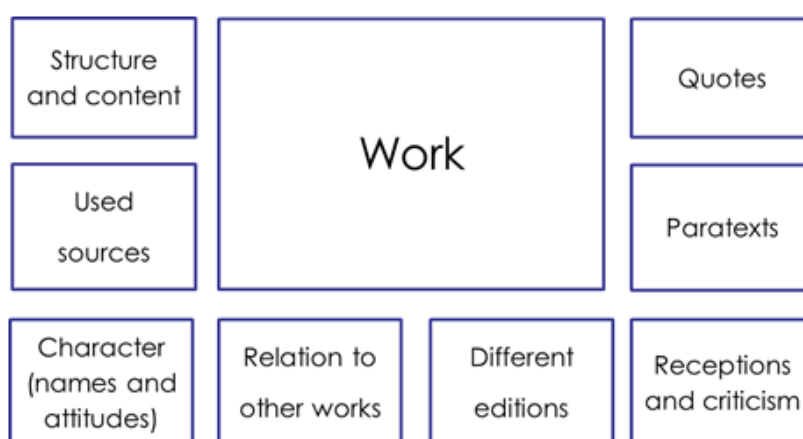


Figure 2 – Subcategories for the analysis of the category “Work”
Source: Elaborated by the authors.

Subcategories are not always necessarily disjoint. Each one is there for the researcher to look at, as we think they are important spots that give clues about the source, which does not mean that they do not overlap. For example: analyzing subcategories of the same category, we can find, annotated in the author's "diary", "personal convictions" representative of the "social circle" in which he belongs; and "different editions" may contain different "paratext". It is also possible to discover interrelationships between subcategories of the two main categories, such as the case of "scholars of his works" commenting on the "quotes" and "sources" used in narrative elaboration.

Seen in this way, the combinations can be numerous, which would greatly extend this discussion. However, overlapping or not, it seems imperative to us to understand that categories, even with subcategories, pervade each other symbiotically. At the same time that the author produces the work, molding it to his will, it absorbs nuances of its creator who, not always, realizes that he put them there and, therefore, think of the dissociated literary work of its author. It would be a gross mistake in the analysis of this kind of historical source.

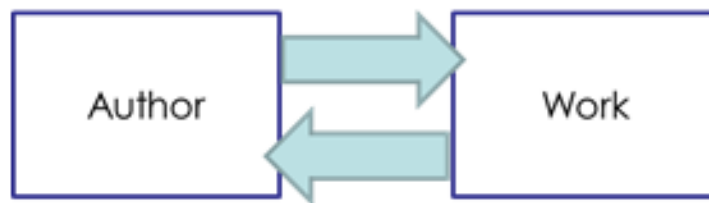


Figure 3 – Mutual impregnation between "Author" and "Work"
Source: Elaborated by the authors.

In the following, we will show how we produce, from the work "Flatland – A Romance of Many Dimensions", new interpretations about the teaching of geometry in Victorian England³, even using only two of the subcategories presented. The (im)possibility of manipulating all subcategories will depend, as in the present case, on the work at hand and what other sources are available for dialogue with it, which is not a problem in itself, but a more or less limited historiographical advance with the use of this source.

Straight, Modest, and Homework⁴: Geometry as a Metaphor for the Representation of Women in Victorian Society

In this part we will discuss the last of the points previously announced: the way mathematical language serves, in the work analyzed, as a figurative element that reproduces – therefore highlights – aspects of society at the time it was written and thus allows its analysis identifies interpretative spots of this temporality. The analyzes made here are about the book

³ The expression "Victorian England" refers to the Queen Victoria's historical period of reign (1837-1901).

⁴ This subtitle is a wordplay with the headline of a Brazilian magazine that introduced the Brazilian former president Michel Temer's wife as "beauty, demure and homely", a role model for other women to follow.

“Flatland” and arouse discussions about a period of the History of Mathematical Education, as they bring elements related to school mathematics of Victorian England, when the work was written.

Authored by Edwin A. Abbott, then professor at Cambridge University, the work was published in 1884 and uses mathematical language as a figurative element that reproduces aspects of society at the time it was written. The story takes place in Flatland, a flat universe where all existing beings are two-dimensional figures - except women, who are straight. Without commenting on the details of the story so as not to spoil the reading of those who do not know it, it is sufficient to say that the narrator is a Square that, in his adventures, leaves Flatland and knows other worlds, such as Lineland and Spaceland.

We have few biographical references about Abbott, which limits the analysis of the “author” category. Even so, the few elements present in those available online (O'Connor & Robertson, 2005) reveal points that clarify some spots of “Flatland”.

Abbott was an exemplary student whose academic career was honored in 1861 with first place in the "Smith Prize" at Cambridge University⁵, and whose knowledge opened doors for him in the educational world. Between 1863 and 1865, he taught at major institutions: at King Edward's School in Birmingham, and later at Clifton College. This was an independent Bristol school recently founded - in 1862 - which quickly became notable for being one of the few public schools of the time⁶ to focus on science rather than classical studies, as well as its liberal stance towards some social elitism (Jews could enroll in it, for example).

The difference between the contents studied at Clifton College and other public schools can be noted from the report prepared by the Duke of Newcastle's supervised commission⁷, in 1858 – four years before the founding of Clifton College – which found that out of 1824 schools only 69.3% taught arithmetic, 0.6% taught mechanics, 0.8% taught algebra, and 0.8% taught Euclidean geometry, using Euclid's *The Elements* as a textbook (Howson, 2010).

Given this scenario and the modifications suggested by Abbott and adopted by Clifton College, it is plausible to describe it as follows:

His greatness as an educator derived partly from his organization of new methods of instruction, partly from his initiation of many innovations in the school curriculum, and partly from what can only be called his genius for teaching. Having a reverence for physical science not often found among the classical scholars of his day, he made

⁵ Award in memory of the mathematician Robert Smith, awarded to students with outstanding performance in physics and/or mathematics. To underscore the Smith Award's scope, it is worth mentioning that George Gabriel Stokes, James Clerk Maxwell and Joseph John Thomson were also honored with him.

⁶ Although public schools were created with provisions for the education of poor students, they soon became almost entirely occupied by students from the wealthier classes (Howson, 2010).

⁷ The purpose of the report was to find out what steps could be taken to extend elementary schooling to all classes cheaply.

an elementary knowledge of chemistry compulsory throughout the upper school⁸ (O'Connor & Robertson, 2005).

These indications enable us to think a little about Abbott's personal convictions as an educator, transposed to "Flatland". Among the contents he studied at the schools he went to (City of London School and St. John's College, Cambridge) was certainly Euclidean geometry, as it was a relevant topic in the formation of the English elite.

The fact that O'Connor and Robertson did not mention Abbott's proposed changes to the teaching of geometry can be explained by the fact that Euclid is considered one of the pillars of classical teaching and the best synthesis of Greek mathematics since antiquity (Bicudo, 2009; Gasca, 2007; Levi, 2008). It is noteworthy that while at the time the discussion of the maintenance of Euclid's "The Elements" as a textbook for the teaching of geometry in Victorian England was under discussion, this quarrel would drag on for years and, even after the creation of AIGT⁹, the Greek manual it was not abandoned (Montoito, 2013).

Although Price (1994) points out that most students were just the first and second books of "The Elements", the contents of which were required to enroll at Oxford, he also comments that unquestioningly he was credited with solving the problems. There are so many mental and spiritual benefits available. Therefore, the fact that Euclidean geometry is not strange, at least to students of the wealthy classes, may have guided Abbott's choice to write a book that manipulates geometric statements and entities in a literary language.

The book, relatively well-known to mathematics researchers and teachers, has become animation and is available online¹⁰. It is possible to find some works that use it for teaching geometry, discussing polygon elements (Bharath, 2004; Brito, 2015; Julio, 2007; Valdés & Escudero, 2002), but we see these appropriations as "didactic" and not as questions of historiographic imprint made to the source.

The main questions, thinking of this work as a historical document of the late nineteenth century, would be "What does "Flatland", a Victorian novel, talk about your society and about the role of women in those days?" And "In what way? contents and mathematical language are manipulated by the author in the construction of a representation of Victorian society? Answers to these questions will be delineated from the analysis of the subcategories "temporality" (from the main category "author") and "characters (names and attitudes)" (from the main category "work"), studied both separately and interrelated. Subsequent writing brings, in its form, the pendulum movement work-society-work, that is, oscillates between the two sides to construct the answers to the proposed questions. This is because we understand that one is not the point of departure and the other the point of arrival; There is, instead, a repeated exercise of collating that places, side by side, in the hermeneutic process of understanding past time, the literary source and the society with which it was

⁸ The English upper school deals with secondary education for teenagers from fourteen years old.

⁹ In 1871 the Association for the Improvement of Geometrical Teaching was created with the aim of elaborating and publishing a new textbook for the teaching of geometry (Price, 1994).

¹⁰ <https://www.youtube.com/watch?v=gcGa79PclpU>

produced.

The discussions about a certain representation of the Victorian woman from this work do not ignore other analyzes that, although not deepened here, are brought to the discussion of the period in question¹¹. We will take, as a starting point for this study, the way Abbott presents to the reader the “Flatland’s” society¹²:

Our Women are Straight Lines.

Our Soldiers and Lowest Classes of Workmen are Triangles with two equal sides, each about eleven inches long, and a base or third side so short (often not exceeding half an inch) that they form at their vertices a very sharp and formidable angle. Indeed when their bases are of the most degraded type (not more than the eighth part of an inch in size), they can hardly be distinguished from Straight Lines or Women; so extremely pointed are their vertices. With us, as with you, these Triangles are distinguished from others by being called Isosceles; and by this name I shall refer to them in the following pages.

Our Middle Class consists of Equilateral or Equal-Sided Triangles.

Our Professional Men and Gentlemen are Squares (to which class I myself belong) and Five-Sided Figures or Pentagons.

Next above these come the Nobility, of whom there are several degrees, beginning at Six-Sided Figures, or Hexagons, and from thence rising in the number of their sides till they receive the honorable title of Polygonal, or many-sided. Finally when the number of the sides becomes so numerous, and the sides themselves so small, that the figure cannot be distinguished from a circle, he is included in the Circular or Priestly order; and this is the highest class of all. (Abbott, 1884, p. 8).

What is easily perceived from Flatland’s society is that it distinguishes women from men in terms of the size of the figures that represent them. Moreover, among men there is an insurmountable social hierarchy, since those who “are born” to a certain polygon are lifelong, and in “more degraded” cases they can hardly be distinguished from women. The fact that polygons with the most sides are higher up the social pyramid can be explained in two different ways that interrelate English society with mathematical language:

(1) Geometrically: In Book I of “The Elements”, the first problem given¹³ – and therefore considered the easiest – is “to construct an equilateral triangle over the given limited line” (Euclides, 2009, p. 99). Moreover, of the 47 problems in Book I, the construction of some kind of triangle is necessary to reach the solution in 36 of them. It is clear, therefore, that mastering the construction of triangles is indispensable to advance in the

¹¹ These and other analyzes, commented briefly here, are the result of the research project “Inter-relações entre Matemática e Literatura: um estudo Crítico, Social e Conteudista da Obra “Planolândia”, developed at the Federal Institute of Education, Science and Technology of Rio Grande do Sul (Pelotas Campus) in the 2017-2018 biennium, with CAPES scholarship for scientific initiation.

¹² Flatland’s society carries a certain parallelism with the society described by Plato (2000). In “The Republic” the philosopher divides the inhabitants of the Greek polis into three groups according to the works they would be able to perform, which would be linked to their inner virtues.

¹³ “Os Elementos” é dividido em XIII livros (como se cada um fosse um capítulo). Desconsiderando os enunciados que são definições, postulados e noções comuns, os demais são problemas (ou teoremas) a serem resolvidos.

studies of book I. In addition, the triangle is the most rudimentary geometric figure, in relation to the number of sides, and such rudimentaryness is also a feature of Flatland's society, since the triangles are responsible for the subordinate works (soldiers and lower classes), that is, they are indispensable for the good functioning of the society.

The peak of social stratification in Flatland is occupied by the circles (priests), since these can be interpreted as a polygon of infinite sides. This interpretation does not escape the spiritual and religious associations associated with the circular form since antiquity (Goldstein, 1996) and the important role that Anglican priests occupied in England - Abbott even became an ordained Anglican deacon (O'Connor & Robertson, 2005). An emblematic example of this relationship is that, as allowed in the Anglican church, the Flatland's priests can marry. In Flatland, "a Circle has been known deliberately to take a wife" (Abbott, 1884, p. 48).

(2) Socially: English public education took a long time to be widely implemented in Victorian society because, fearing the social developments after the French Revolution, the English considered it completely unnecessary for the lower classes to acquire formal knowledge that could "give them ideas above their condition" (Howson, 2010). In the meantime, wealthy and noble-headed families sent their children to study at the best English universities, especially Oxford and Cambridge, referred to by Chastenet (no date) as "two universities to which a gentleman could enroll." There is, therefore, a noticeable equivalence between the "honorary title" conferred on a polygon and the academic titles conferred on gentlemen: in both cases the titles reinforce a social superiority defined by an already privileged condition of birth.

Commenting on these points, we can turn to the element we want to better discuss from this historical source: the role of women in Victorian society. Considering the subcategory "temporality" in dialogue with a certain historiography that addresses the habits of Victorian England (Chastenet, no date; Flores & Vasconcelos, 2000; Gay, 1993; Morais, 2004), we note marks of apprehension of the English elite about thoughts, reformists disseminated by the French Revolution, which feared that this paradigm shift would destroy society as it knew it. The uncertainties of the English about the future were also aggravated in the spiritual field, since

The Christian view of the universe was being questioned by the scientific view of a vast mechanism of cause and effect, acting through physical laws that even governed man himself. While rationalists conceived of this latter view with growing utopian optimism, most Victorians were horribly shocked (Morais, 2004, p. 43).

In addition to Comte's materialism, which affirmed the precedence of matter over spirit or mind, Darwin's evolutionary theory also checked religious dogmas: Morais (2004) points out that, at a time when the Bible was read in family evenings and passages like those of Genesis were interpreted literally, the publication of "The Origin of Species" "provoked more intimate conflicts and tensions, the handwriting of Holy Scripture said one thing, and scientific authority said another." (Morais, 2004, p. 44).

In response to these destabilizing forces, the English imagination has reinforced national identity values: reverence and sentimentality toward the family have intensified, making home a core of security for such “advanced” ideas. “Victorians have everywhere built a wall between the public and private spheres” (Gay, 1993, p. 293), which led to an idealized behavioral view that “led to the separation of everyday life into two distinct spheres of acting: one, ruled by men and working outside the home, another, completely different, in which the woman acted with her duties as wife and housewife” (Morais, 2004, p. 28). Even the Industrial Revolution, with new professions, complicated women's lives.

Paradoxically, all this has pushed bourgeois women away from visible economic activities. The Victorian years saw a considerable abandonment of the outposts that women had begun to conquer in Enlightenment times. The spectacular spread of prosperity and idle time among the middle classes that accompanied these explosive upheavals has allowed more and more husbands to keep their wives at home. (Gay, 1993, p. 293).

Women “far from visible economic activities” do not belong to any working class, which would possibly justify being represented in “Flatland” as straight: any polygon has any labor activity in Flatland’s society, except women – the straight – who do not have recognized public occupation. Women are socially educated to be housewives.

There is an express relationship of intellectual inferiority with respect to women in Flatland, a society in which they are considered “wholly devoid of brain-power, and have neither reflection, judgment nor forethought, and hardly any memory.” (Abbott, 1884, p. 14). The author goes on to detail the female condition and to replicate its forcible interdiction to the educational spaces:

About three hundred years ago, it was decreed by the Chief Circle that, since women are deficient in Reason but abundant in Emotion, they ought no longer to be treated as rational, nor receive any mental education. [The consequence was that they were no longer taught to read, nor even to master Arithmetic enough to enable them to count the angles of their husband or children ; and hence they sensibly declined during each generation in intellectual power. And this system of female non-education or quietism still prevails (Abbott, 1884, p. 49).

Flatland’s educational system goes hand in hand with that of Victorian England, which resisted a more effective role for women in the discussions of the time, the result of the argument that intellectual affairs and political problems were too complicated for the female mind to understand. Although female names signing literary works and philosophical essays had already appeared during the nineteenth century (Morais, 2004), the idea that women had only the task of caring for affective and family affairs was almost hegemonic. The thesis accepted by men is that “the sexes differ as radically in **mentality** as in **body**” (Gay 1993, p. 294, authors’ emphasis).

On mentalities, the division between public and private spaces

necessarily implied the inferiorization of women, since their character was practically denied access to public life, study, participation in community affairs in general. Morality was associated with women and intellect with men. (Morais, 2004, p. 28).

From Gay's earlier statement, we find it interesting to discuss a little about the believed difference in mentality between the sexes, a condition identical to what Morais states when he uses the noun "intellect." Women therefore had a kind of instruction that was intended to make them good wives or housekeepers, so that what they learned emphasized their "fragile character," such as embroidery and homemaking activities. In terms of instruction, it was thought that women were not able, or need not, to learn the same things as men, which placed them in an inferior intellectual position. The change in this scenario is so gradual that it is only at the turn of the century, in 1910, that will be counted about "1,000 women occupying Oxford and Cambridge university degrees, however they will not be allowed any title" 2004, p. 66).

To reflect on the differences between male and female bodies, also pointed out by Gay, we will go deeper into the subcategory "character (names and attitudes)", in order to try to derive from her traits that mirror the English woman in Flatland. In order to help this interpretation, we bring some references to the suffrage movement.

In 1865, John Stuart Mill campaigned for parliament with a platform that defended female voting, but English women were not allowed to vote until 1918 (Abreu, 2002). In the meantime, the group of women who fought for the right to vote - who became known as suffragettes - grew in organization and actions: printing leaflets, campaigns, hunger strikes and even depredations were tactics adopted by women dissatisfied with their social role, which were often called crazy and rowdy. Some suffragettes were arrested and in one extreme case "In 1913, at the famous Derby horse race, the feminist Emily Davison threw herself in front of the King of England's horse and died." (Monteiro & Grubba, 2017, p. 268).

Widespread at the time by the media, such as The Daily Mail (Monteiro & Grubba, 2017), the view of maddening and noisy women that disturbed the order of English society is the same offered to the reader about Flatland's women, parallel established by the description of Abbott.

Firstly, because they are straight, their bodies are "liable to be shattered" (Abbott, 1884, p. 14). Even though they have more fragile bodies than men, they are considered extremely dangerous because they have "the power of making herself practically invisible at will" (Abbott, 1884, p. 11), when looked at plumb, so they can "pierce" a polygon and put it to death – there are cases reported in Flatland. Afraid that Flatland's women might rise up against men and subvert society,

In some of the States there is an additional Law forbidding Females, under penalty of death, from walking or standing in any public place without moving their backs constantly from right to left so as to indicate their presence to those 'behind them ; others oblige a Woman, when travelling, to be followed by one of her sons, or servants, or by her husband ; others confine Women altogether to their houses except during the religious festivals. (Abbott, 1884, p. 13).

As straight, that is, lengths without width, women cannot change orientation - a metaphor for thoughts and actions - since they have no angles (Abbott, 2002) and, because they do not have them, they are even inferior to isosceles triangles. If we remember that

isosceles are at the bottom of the social pyramid because they are less intelligent and more apt to do manual labor, we realize how much in the book women are attributed a position of complete intellectual inferiority, as well as submission to the home and to the husband. In Flatland, as a “wife has absolutely nothing to say, and absolutely no constraint of wit” (Abbott, 1884, p. 16), she is expected not to pursue the affairs of husbands, as English women were expected to maintain modesty and submission to male decisions.

When it is indispensable for a woman to move around Flatland, she must do so by swinging and singing a song aloud. This is to warn men that they are passing, in time for them to get out of their way: men do not want to be bored, that is, they do not want the woman to penetrate their world and deconfigure it. The stammering that sings while moving makes her be seen as insane that offends the social order, echoes of the suffragist manifestations in the Flatland territory.

Gay (1993) Victorian historiography of England and Abbott's (2002) literature, when overlapped, reveal common areas of discussion of the roles of men and women in English society: they were seen as quite distinct social beings, both in mindset and in the constitution and manner of their bodies.

Other views about Planolândia

What we can see from the spots that the subcategories discussed have brought to light is that Abbott created, in “Flatland”, a microcosm that, in a way, can be read as a representation of Victorian society in terms of different social classes and role of the woman.

Taking “Flatland” as a historical source that makes it possible to identify traces of Victorian England, we perceive parallelism between the two societies that the subcategories of analysis helped to highlight. What the stains allow to glimpse about Abbott's book goes beyond a possible didactic appropriation of this material, as we have already mentioned: it shows that the Flatland's society is not just any society, but a fictional society of geometric characters that mirrors tensions of Victorian society that there they can be read. Added to other sources, this literary work allows the researcher to further expand the construction of a representative and interpretive framework of Victorian England.

Abbott's narrative choice in writing his book using concepts and geometric beings seems to be based on the fact that Euclidean geometry was a subject studied and known by the educated reader of the time. Thus, the author takes advantage of this to approach the tensions of English society in a metaphorical but easily understandable way, since dimensions, number of sides, angles, etc. would not be at all foreign to the reading public. Abbott appropriates mathematical language to represent Victorian society, which allows us to understand this book as a (literary) microcosm of such an age.

Although “Flatland” describes a hierarchical, patriarchal society, some excerpts suggest that Abbott was using irony to challenge the English educational system. By recognizing that “a common Tradesman cannot afford to let his son spend a third of his life in

abstract studies” (Abbott, 1884, p. 36), he would be advocating an education that embraces the popular classes.

Taking as reasonable the interpretation that Abbot is the narrator of “Flatland”¹⁴ and that at the time England was discussing the expansion of public education in a way that balanced the expenditure undertaken with the expected result of the students¹⁵, we understand that the author reverberates in Planolndian education another component of English educational discussions:

although I am not ignorant that, in many popularly elected School Boards, there is a reaction in favour of " the cheap system," as it is called I am myself disposed to think that this is one of the many cases in which expense is the truest economy (Abbott, 1884, p. 21).

The questions listed here, which do not exhaust possible interpretations of Abbott's work, are indicators of how literature can be visited as a source for the production of historiographical interpretations. This exercise, in its pendulum movement, made it possible to identify representations of Victorian society in Flatland, as well as to better understand it from elements that the work brings and which are not commonly found in other sources, such as humor, irony, metaphors, etc. Finally, considering that, in the educational setting, “The Elements” was fundamental to the formation of students, we infer that the use of mathematical language is a stylistic option of the author to put in dialogue some issues of his time with a certain portion of the public: schooled English.

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¹⁴Alessandro Grego, author of the preface to the Portuguese-language edition, comments that the first publication of “Flatland” was signed by the pseudonym A. Square. “A”, which would mean the abbreviation of the author's name, is an indefinite article in the English language, so the author (A. Square) would be the same narrator of the book, which is the character Square. Since it is possible to establish this connection between author and character, Greek points to the possibility that the questions defended by the Square in history are the same as Abbott would defend.

¹⁵ “If it is not cheap, it has to be efficient; if it is not efficient, it has to be cheap” (Howson, 2010, p. 23) is the phrase that well summed up Parliament's view on expanding English schooling.

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