The Role of Mathematics within Ethnomathematical Descriptions

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Abstract

This paper aims to discuss the description of a practice within ethnomathematics from a contemporaneous point of view, without separating describer from a practice described. For that, instead of looking for mathematics in a practice, we defend the idea of describing a practice mathematically. Besides that, we point out what would be the ethnomathematics reasercher role within this vision, and a methodological path based on Alangui's *Mutual Interrogation* methodology.

Keywords: Ethnomathematics. Description. Ethnography. Mutal Interrogation.

Resumo

Este artigo visa discutir a descrição de uma prática em etnomatemática de uma perspectiva contemporânea, sem separar descritor da prática que é descrita. Para isso, ao invés de buscar pela matemática em uma prática, defendemos a ideia de descrever uma prática matematicamente. Além disso, apontamos qual seria o papel do pesquisador em Etnomatemática nessa visão, assim como um caminho metodológico baseado na metodologia de *Interrogação Mútua* de Alangui.

Palavras-chave: Etnomatemática. Descrição. Etnografia. Interrogação Mútua.

Introduction

It has been twenty six years since Ubiratan D'Ambrosio identified ethnomatematics as a research field within mathematics education at the 5th International Congress on

Mathematics Education (D'Ambrosio, 1984). In the meantime ethnomathematics has been through diverse criticism and debates (Carson & Rowland, 2002; Vithal & Skovsmose, 1997; Adam et al, 2003), having its framework modified, built up and reinforced.

Even though many issues have already been sorted out, there are some questions that remain unclear. The aim of this article is to discuss one of them: the role of mathematics within ethnomathematics, more specifically, within the practices that researchers in ethnomathematics aim to describe. There is not an agreement on it, what has already been noticed by Skovsmose & Vithal (1997) when they talk about the problem of circularity in definitions of Ethnomathematics:

> Either 'ethnomathematics' can be defined by using explanations which do not include mathematics (a way of doing this is indicated by D'Ambrosio's explanation of ethno-mathema-tics), or the definition must include the word 'mathematics'. While the first strategy runs the risk of being too broad, the second runs the risk of introducing a certain perspective on mathematics in the definition of 'ethnomathematics'. (2002, p. 141-142)

D'Ambrosio, for instance, explains ethnomathematics by dividing the word into 3 parts in order to emphasize the relation between mathematics and society: *mathema*, *tics* and *ethno*. For him, *tics* is related to the root of arts and technique, *mathema* is about teaching and understanding, and *ethno* means cultural environment (D'Ambrosio, 2007).

Paulus Gerdes, however, does not define ethnomathematics separated from mathematics, retaining universal characteristics of mathematics. Besides that, Gerdes brings the concept of 'frozen Mathematics' as the hidden mathematics present in a practice (Gerdes, 2000).

Either of the two definitions, although, separate subject from object in a Cartesian way. Both of them talk about a kind of knowledge that can be noticed through practice, without highlighting the role of the researcher who notices it.

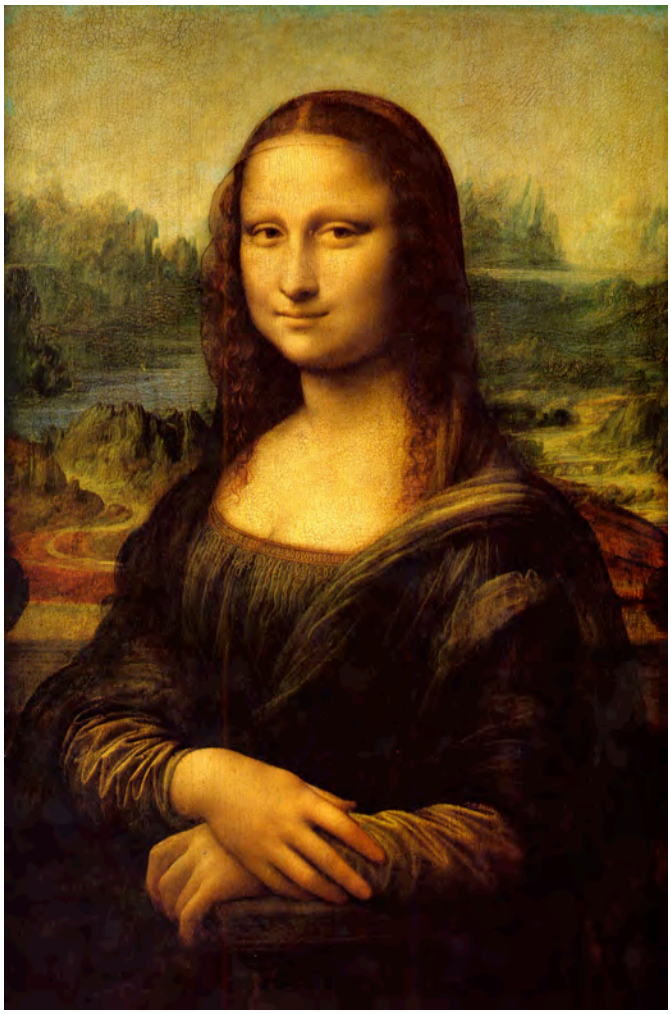
Nevertheless, we will defend in this paper that, instead of mathematics present in a practice, it would be more consonant with post-modern literature if we said that we might describe a practice mathematically.

Visions of Arts: disclosing the meaning of describing

In order to explore some possibilities of visions about the relation between a describer and a practice, we will use a discussion proposed by Ostrower (1983) about different perspectives of the relation between a painter and his painting.

Ostrower (1983) highlights 3 basic attitudes upon the way that someone can face and elaborate their experiences of living: the *idealism*, the *naturalism* and the *expressionism*. She claims that those attitudes interpenetrate the style of a painter and can be historically recognized in some blocks, such as in Renaissance Art, Impressionism and Expressionism.

An idealistic attitude will come from a supposition that everything would have an essence. So the individual aspects of a phenomenon should be left out in favor of a generalization, which aims to get its essence. Within Arts, the painter with this attitude would seek for a canon, idealizing the natural forms in favor of a general pattern. Visually, this search for a valid canon and essence gets approached to geometrical forms. An example of that is the Renaissance Art. It was not aimed to paint reality or what it was perceived, but what the painter believed to be the essence of what was being seen. Mona Lisa, with its geometrical shapes and precise proportions is an example of painting in this style:

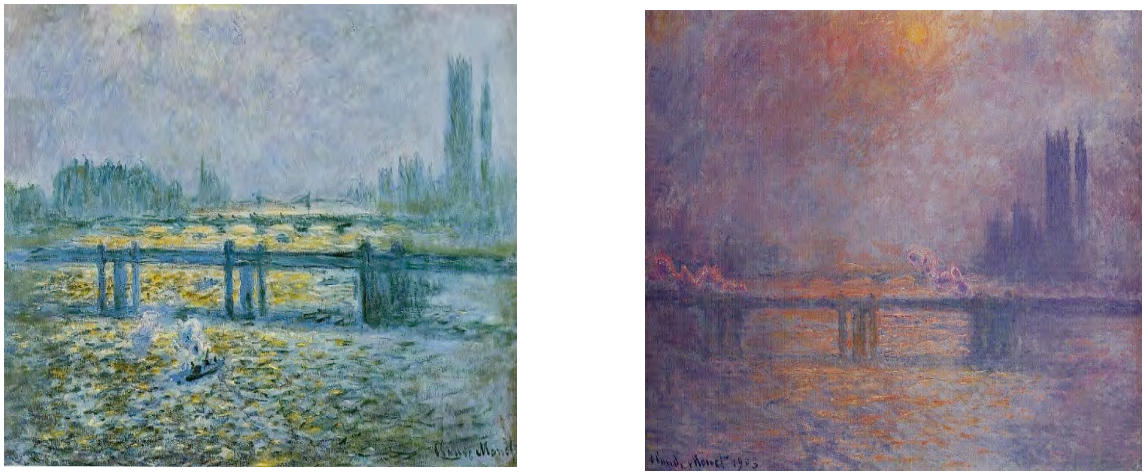


Mona Lisa (1503), by Leonardo da Vinci

Ethnographically, a describer driven by this attitude would describe a practice strongly guided by his beliefs about what that culture which the practice is part of. The describer's subjectivity is not taken under consideration. A tough criticism on this kind of description is that the essence of the practitioner's culture is built within the describer's cultural background. Besides that, the practitioner's culture is seen in a static way. Many researches within ethnomathematics fall in this trap, what can be realized when a description does not include the cultural changes that a culture has suffered with European contact. In Brazil, for instance, there are plenty of researches that just have descriptions of what the describer believes to be specific of a cultural group. Western clothes, for instance, are left out

of descriptions of Brazilian indigenous groups as nakedness are expected and idealized to be essential to that cultural group, even if they are part of the current group habits.

The naturalists, however, believed they could have access to the nature in an objective way. Within painting, artists aimed to pick up some features of what was instantly perceived in their work. An example of naturalist painting style is the Impressionism. The very aim of some impressionists was to keep in their paintings the luminosity instantly perceived. That is the reason for their quick and apparently careless flicks. They needed to do them as fast as they could, once the luminosity would inevitably change. The aimed feature was the light, not the shape. Then, sequences of landscapes painted in different moments used to be very common, as the light in each painting was not the same. An example of that is the sequence of paintings "Charing Cross Bridge, the Thames", by Claude Monet, in 1899:



Charing Cross Bridge, the Thames (1899), by Claude Monet

A description made by assuming an attitude like this would consider a possibility for the describer to be impartial. The describer becomes an observer, who does not affect the cultural group that he is studying if he is careful. The search is for a strong methodology that would enable anyone to be a describer. In that way, a good description depends on the care that the describer has with his methodology and with his attention.

Within the third great stylistic chain, the expressionism, the painter's subjective aspects are valued, in a coming and going movement between the subjectivity and the

intersubjectivity rooted in a cultural soil. The painter gives up of a pretense search for objectivity. Arts start to value the perception of who perceived. The painting is an encounter among painter, the seen, and the world where they are. The painting *The Scream*, by Munch, is an example of expressionist attitude in Arts:

The Scream (1883), by Edvard Munch

When a describer assumes this posture, he is aware that his description is not neutral, that what he sees is a practice that might have a meaning within the culture that it belongs to, but, for the describer, it is an expression. The description that he does is driven by his own experiences in a cultural soil. The practice itself is a totality with a non limited number of perspectives. A description, however, is limited and created somehow within the articulation among describer who perceives a practice, the practice as expression and the describer's cultural soil. The decision about the perspective that will take part of the description is not always clear to the describer.

The appreciation of an expressionist painting would not also be objective. It will keep the same movement subjectivity/intersubjectivity constituted within the perception of who perceives. In the same way, a description does not enclose itself. Its "appreciation" will be contextualized in a context that depends on the reader's experiences.

Describing a practice mathematically

From now onwards, we will discuss what could be a description when we assume a posture that on one hand does not leave the describer out of the process and, on the other hand, is not meaningless. For that, besides the subject and the practice, it is important to detach some cultural features that guide the description. If we think of mathematics, let us say that it is possible to describe a practice mathematically.

In that idea, three words must be highlighted: *practice*, *description* and *mathematically*. A *practice* can be understood as an action that a human being does in a cultural environment. A *description* could be taken as a way that somebody expresses a practice that has perceived by using a language. The "ly" of *mathematically* means that we are dealing with an adverb, in other words, the way that something is done is driven by mathematics and its logical structure.

In order to expand this idea, we will say that a description can be driven by a *thematization* within some kind of knowledge. We have opted to use *thematization* instead of *theme*, as the suffix *ation* of the first word carries with itself the idea of an action and its dynamicity, while the second word is static. When something is thematized, there is an action involved, the one of putting something under the perspective of a theme. In that way, we reinforce the importance of the describer's action in the process.

Hence, "describing a practice mathematically" will mean in this work a description of an action that is perceived driven by a thematization, in this case, mathematics. However, a description of a practice could be done in many sorts of ways, depending on thematizations,

such as religiously, pragmatically, mythically, and so on. The choice of a theme, to be meaningful, is linked to the experiences of the one who describes a practice. If we think socially, by paying attention to the soil where the describer comes from, we can say that the themes have their origin in his culture. Summing up, a thematization has its origin in a cultural background.

So mathematics structured within the Western culture could be a theme. We have just to be warned that mathematics in the way we know is not necessarily a theme present in other cultures. However, it does not mean that we could not extent the meaning of mathematics in a way it might be present in different cultures.

Within this rationale, a description of a practice becomes a totality that articulates practice, describer and the describer's cultural background. A describer can thematize his view of a practice in a religious way. Another one could do that in a mythical way. A third one could do that by using a theme that is not present in a knowledge that might not be commonly thematized by Westerners, that would make it hard for us to understand the knowledge produced in that description. The same happens when we have a description of a practice driven by its own thematization. The practitioner may not recognize it as knowledge built on his own practice nor even give meaning to that knowledge.

By now, my argumentation has not taken under consideration the practitioner's cultural background. I could say that a description does not really have to be with somebody else's background, apart from the practice, an expression of their culture. However, in this way, I would be denying the possibility of communication with the *other* and then, enclosing a description in a subjective scope. Nevertheless, even in a culture we have differences among people, but even though due to some similarities, the communication may happen. Why could it not happen among different cultures?

A Possibility for a dialogue

Let us say that in order for the communication to happen, we need convergent meaning to be built on the same object. As we are talking about a practice and its meaning built through a description, we must take under consideration the describer, the practitioner, the practice, the describer's cultural soil and the practitioner's cultural soil.

We have been defending that, when a descriptions has been carried out, it must be driven by a thematization. But what would be the meaning of it? We can formulate a question even stronger than that one. Would it also be meaningful to the practitioner? If the theme, which guided the thematization is not meaningful for the practitioner's cultural soil, then the description will probably say little about the meaning the practitioner gives to his practice.

On the other hand, each culture may have its own important thematizations. A possible solution for this situation would be finding a commons thematization or, at least, expand a thematization in a way that it could reach a thematization actually present in the practitioner's culture. That would be a way to create an intersubjective region, where a dialogue about the knowledge produced through descriptions could be discussed.

In the case of Ethnomathematics, the starting thematization is clear: mathematics in the way we know it as present in our culture. If we want our mathematical descriptions to be meaningful to the one whose practice we are describing, we should expand our theme in a way that this expanded theme becomes meaningful within the other's culture.

Expanding a mathematical thematization and proposing a dialogue

Some researchers within ethnomathematics have already proposed ways of expanding mathematics in a way that it could go beyond the Western understanding of this theme. D'Ambrosio (2002) and Bishop (1988) do that by using mathematical actions, such as comparing, classifying, quantifying, measuring, explaining, generalizing, inferring and evaluating.

Barton works on the concept of mathematics, saying that, instead of looking for mathematical activities, we should pay attention to systems that deal "with quantitative, relational, or spatial aspects of human experience" (Barton, 2008, p. 10), calling them QRS systems, assuming that they are likely found in different cultural soils. Alangui (2009), in his thesis supervised by Barton, calls *QRS Conceptual System* the same system used by Barton. He does not leave clear the reason for this differentiation. However, the word *concept* brings the idea of something already reflected and structured in a way we can interpret that in a *QRS conceptual system* there is awareness on the QRS system used by a people or, in other words, that a *QRS conceptual system* talks about a *QRS system* that have already been thematized by a cultural group.

The *QRS Conceptual System* could be a start in the search for a thematization present in the Western culture and in the practitioner's culture and a door for a discussion on theme that might be present in both cultures.

Alangui (2009), as cited in Mendoza (2001), also offers a methodological solution for the role of the ethnomatematics research. He would work as a mediator between two cultural groups. His aim would be to enable the dialogue, looking for knowledge production in both groups. He calls this methodology *Mutual Interrogation*, in which the researcher should be responsible for "setting up two systems of knowledge in parallel to each other in order to illuminate their similarities and differences, and explore the potential of enhancing each other." (Alangui, 2006). He points out the actions to be taken by the research when at assuming this direction in his work:

- Sets up a dialogue between cultural practice and mathematics
- Draws up parallels between the two practices, using elements in one system to ask questions of the other.
- Involves a series of reflection and questioning of assumptions about the ethnomathematician's mathematics.

- Entails more exploring of alternative conceptions and their effects in each knowledge system. (Alangui, 2006)

Final Considerations

We believe that it is time to take the describer and his cultural soil under consideration when a practice is being described. A description is no longer neutral, nor can it get closer to a pretence truth. It talks about a text created on a practice, but that is enrooted in the describer's belief and the way he organizes his own knowledge. A description is done in a perspective and, in order to be meaningful, the thematizations which guided it must be clear for the describer in order to make the dialogue with the practitioner possible.

This view can bring a new paradigm to the ethnomathematics research, changing even its aims. Instead of looking for an empowerment of a cultural group by making its knowledge widely known, the objective for this kind of research would be to generate knowledge for all parts involved. Each cultural group knows its important issues to be dealt with and just through the dialogue these points can come out. We pointed out in this paper, that a possibility for that would be extending the describer's thematizations. We also indicated Alangui's *Mutual Interrogation* as a possible methodology to start thinking how this dialogue could be carried out.

We intend to carry on this research thinking on the power relations that might happen when the *Mutual Interrogation* is being used, or in any other ways of creating a dialogical situation.

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