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ARTICLE

OBSERVING THE INVISIBLE: THE TRANSFERENTIAL RELATIONSHIP FROM THE DISCOURSES BETWEEN CHILDREN AND TEACHERS MONITORS IN AN ASTRONOMICAL OBSERVATORY

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ABSTRACT:

The main purpose of this research is to interpret the discourses of the transferencial relations between children and monitors teachers in an astronomical observatory. In this regard, the concepts of transference and discourse is introduced highlighting the psychoanalytic aspect as reference to understand the teacher-student relation, during a class visit in an astronomical observatory. The present work is theoretically and methodologically based on Education, Psychoanalisys and Astronomy Education references. This report refers to a field investigational qualitative research with the following instruments for the constitution of data: observation, audiovisual recording and fild diary documentations. The results obtained by the analysis of the four lacanian discourses of the unconscious point to traces of three approaches to the discursive transferential relationship between monitors and children at the observatory: authoritarianism, excitability and otherness.

Keywords:
Astronomy education;
Psychoanalysis;
Non-formal education.

OBSERVANDO O INVISÍVEL: A RELAÇÃO TRANSFERENCIAL A PARTIR DOS DISCURSOS ENTRE CRIANÇAS E PROFESSORAS MONITORAS EM UM OBSERVATÓRIO ASTRONÔMICO

RESUMO:

Esta pesquisa tem como objetivo interpretar os discursos das relações transferenciais entre crianças e professores monitores em um observatório astronômico. Nesse sentido, apresenta-se o conceito de transferência e de discurso destacando a vertente psicanalítica como referencial para compreender a relação professor-estudante durante uma visita a um observatório astronômico. Fundamenta-se teórica e metodologicamente em referenciais da Educação, Psicanálise e da Educação em Astronomia. Trata-se de uma pesquisa qualitativa com investigação em campo, com os seguintes instrumentos de constituição dos dados: observação, gravação audiovisual e registros em diário de campo. Os resultados obtidos pela análise dos quatro discursos lacanianos do inconsciente apontam para vestígios de três enfoques da relação transferencial discursiva entre monitores e crianças no observatório: autoritarismo, excitabilidade e alteridade.

Palavra-chave:
Educação em Astronomia;
Psicanálise;
Educação não-formal.

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OBSERVANDO LO INVISIBLE: LA RELACIÓN TRANSFERENCIAL A PARTIR DE LOS DISCURSOS ENTRE NIÑOS Y MAESTRAS MONITORAS EN UN OBSERVATORIO ASTRONÓMICO

RESUMEN:

Esta investigación tiene la finalidad de interpreter los discursos de las relaciones transferenciales entre niños y maestros monitores en un observatorio astronómico. En este sentido, se presenta el concepto de transferencia y discurso destacando la propuesta psicoanalítica como lo referencial para comprender la relación maestro-alumno durante una visita a un observatorio astronómico. La investigación se asienta teórica y metodológicamente en referenciales de la Educación, Psicoanálisis y Educación en Astronomía. Se trata de una investigación cualitativa con investigación de campo, con los siguientes instrumentos de recogida de datos: observación, grabación audiovisual y apuntes en un diario de campo. Los resultados obtenidos por medio del análisis de los cuatro discursos lacanianos del inconsciente apuntan a vestigios de tres enfoques de la relación transferencial discursiva entre monitores y niños en el observatorio: autoritarismo, excitabilidad y alteridad.

Palabras clave:
Educación en Astronomía;
Psicoanálisis;
Educación no formal.

INTRODUCTION

This paper aims to present the findings from a master's thesis[1] on science education, focusing on discourses and transference relations in spaces of non-formal education in astronomy. What we propose to observe and analyze is the discursive relationship between children in Early Childhood Education and teaching assistants[2] during a visit to an astronomical observatory (LIMA, 2020).[3] Based on discursive traces, we seek to reveal the transferential relationship between the subjects mentioned, supported by a theoretical and methodological framework of psychoanalysis with Lacanian orientation, more precisely in what it understands as discourse and transference (PORGE, 1996). We take the discourse, who speaks and to whom the speech is addressed as the research object. Thus, our object is rather a movement than an object. For the interpretation of the speeches, we used Lacan's four discourses on the unconscious redesigned by Villani and Barolli (2006).

Inevitably, this discursive movement leads us to the following question: what do the assistants demand[4] from children so that they can participate in the scientific culture? From this questioning, we analyzed to what extent the knowledge on astronomy has been exchanged through the discourses at this astronomical observatory. We understand that the work of astronomy dissemination among children and the relationship with knowledge in non-formal education are the basis and a way to understand the processes of initiation to scientific literacy. By showing the interaction between the subjects at the astronomical observatory, we propose to rethink teaching practices that remain prescriptive and instrumental for an emancipatory education.

Astronomy Education as a research field still provides little to no works related to childhood and psychoanalysis, or to any theory that comes close to use discourse to denote a social bond.[5] Therefore, we believe that the results of this study can contribute to the field, proposing reflections about frontiers of astronomy education, non-formal spaces of knowledge (the astronomical observatory), psychoanalysis, childhood and scientific literacy.

MOVEMENTS OF ASTRONOMY IN THE PROCESS OF APPROPRIATION OF THE WORLD

Astronomy education is practically not present in the initial training of teachers, but is called upon at all times to answer curricular questions (IACHEL, 2013; LANGHI, 2009; LANGHI, NARDI, 2012). This is indeed an inconsistency, given its historical, cultural, political, awareness-raising, scientific and humanizing relevance. As the authors point out, astronomy should be more infused into teacher education programs. For this reason, this research enabled us to reflect on the need to promote educational actions so that children from an early age can be guided into astronomical scientific culture, as a process of human awareness.

So why does astronomy move us so much in the process of appropriation of the world? Certainly, one of the reasons concerns its maieutic view on sciences. Before any comprehension, humans would look at the sky and wonder. It is precisely this curiosity that should be nurtured in children at astronomical observatories. Astronomy is movement, be it from the stars that surprise us, or from the curious looks that seek to remedy concerns that were never even imaginable. The chaos and order of the cosmos not only place us in the abyss of who we are, but also reveals humanity's greatness and insignificance, our aspirations, our desires,[6] our fears, our lacks. As psychoanalysis incites us, astronomy shows our real insignificance in the face of the cosmos and our real unrest in the world. Nevertheless, it also shows us that with a little bit of electromagnetic radiation, research and a lot of creativity we can push the boundaries beyond what our eyes see.

However, it seems to us that this ontological longing for astronomy is being lost. If we do not teach, both in the systematized spaces of knowledge such as schools, and in non-formal education environments such as observatories, planetariums, among others, we will not carry on the simple, but enriching, habit of looking at the sky. In this sense, teachers are the ones who can help the most in this process of humanization and access to culture – in this case, the teacher assistants from astronomical observatories, the transactors of knowledge. They are essential in the process of literacy in the culture of astronomy, of giving meaning to the signs of astronomy.

To teach astronomy is to support students to take ownership of the world and being able to transform it. And that is why it is no longer enough to regale people with lectures full of complex information and to show a tiny ball of light on the telescope and say: "look, this is Jupiter!" The process of giving meaning to knowledge is essential, be it at school, science centers, observatories, or among amateur astronomy groups. To teach astronomy is to teach about ourselves, the others and the world. The depths of the Universe are as inhospitable as ours, and to teach means putting in signs what we know about the cosmos, is as intense as trying to signify our own apprehensions, as well as our own existence. There is the fulfilling part of teaching astronomy, this impossible profession,[7] that involves teaching individuals who think and learn, each in their own way, about a complex and profound universe.

It is in this context of movements of astronomy in the process of appropriation of the world that we focus on the concept of transference, aiming to understand the relationship between children, teacher assistants and the astronomical observatory and its singularities, from the investments of these protagonists of this research.

TRANSFERENTIAL RELATIONSHIP: elements of Lacanian psychoanalysis in thinking about the relationship with others and knowledge

When placing the subject in the domains of language and unconsciousness, psychoanalysis constitutes a knowledge of interpretation. It shows us the boundaries of human possibilities, by placing the subject in the territory of the impossible. Impossible, because it proposes a missing, ambiguous and contradictory subject (BIRMAN, 1987). We bring this theoretical background of psychoanalysis to the research in order

to look for possible meanings in the discourses of the analyzed subjects, because it is their words that carries their demands, desires and incompletenesses and, consequently, the possibility of learning.

The transference, commonly known as the "act or effect of transferring or being transferred" or the action of passing something from one place to another, as understood in this paper, refers to our encounter with the children's and assistants' words at the astronomical observatory. In the psychoanalytic field, Baremblitt (2013) clarifies that Lacan drew on Freudian theory to gradually re-elaborate the concept of transference, which has also undergone several changes. The transference process allows for free association, for saying whatever comes to mind:

> For Lacan, every discouse is produced unconsciously, forwarded to the other, who Lacan calls the Great Other and who, strictly speaking, will give the true meaning of the discourse, in such a way that the conscious subject will be surprised because they always say more or less what they thought and confront it with a saying, whose meaning was unknown, revealing that the unconscious – structured like a language – contains a knowledge about which the subject knows nothing. When this discourse and its truth are placed, they seem to come from the other, to whom it was unconsciously forwarded (BARMEBLITT, 2013, p. 79-80).

This notion of the unconscious as a discourse, structured as a language, is necessary to understand the transference in Lacan's work. The Other is not a subject (to which the subject would address), but a place. Thus, even though the transfer is unconscious, it has a conscious repetition and needs to be deciphered and interpreted with the baggage of psychoanalytic theory, through the words (BAREMBLITT, 2013).

Lacan starts to place the transference in the outcome of the analyst's desire, revealing the demand for love [8] in this object of desire (PORGE, 1996). In the case of the observatory, it is as if the child accepted to learn from the assistant, precisely because there lies a relation of love. Thus, the role of the teacher in this context would be to do exactly what is not expected of them, which is to leave her place of knowing everything and enabling the child to be able to demand something, to be able to express through language what they want, even if is an unconscious process.

Hence, in the psychoanalytic context, the therapist assumes a not-knowing instance, of ignorance, in a way to circumvent the mask that the subject creates in the sense of not being ideal. Only in this way the professional can perform a meaning analysis, enabling the analysand to become the subject of their own desire, and to be able to demand and associate freely. This fundamental position of the desiring subject, fundamentally that of lack, can erupt through love (PORGE, 1996). Thus, without expecting the teacher to know everything or to have to answer everything, but rather that they may desire the child's desire to learn, helping, as evidenced by Villani (1999), in the student's knowledge filter.

By understanding the unconscious as a language, the discourse analysis of the transferential relationship between assistant/child needs to be done in an approximate way, "[...] not within the Cartesian modality of "clear ideas", but using rhetorical figures in which meanings slide [...]" (BAREMBLITT, 2013, p. 73). For this reason, our analysis makes use of a relation with Lacan's four discourses: Master, University, Hysteric and Analyst, enabling us to understand the concept of discourse to investigate transferential relations at the astronomical observatory, where they happen between analyst/teacher/assistant and analysand/student/child, who listen to each other and estabilish ties. Thus, as the transference develops, it becomes the depository of something belonging to the children, having a special importance for them.

When teaching astronomy, to enable the children to understand what is expected of them is a way to make them participate in the scientific culture. The transferential relationship assumed at the observatory means that the teacher assistant is seen by the children as someone who knows. Thus, both teachers and students, assistants and children, are heard, and the historical human legacies materialize as the act of teaching.

Transferential relationship is precisely that moment in which we speak to the other spontaneously. This moment carries an acknowledgment of love for the one who speaks to us, depending on the relationship

of knowledge and authority. In other words, it happens when the teacher assistants allow children to demand knowledge, or when children recognize that they want to learn. The transference is about recognizing the empty places that teachers and analysts occupy, showing children and analyzands that they do not need to know about everything that they demand. On the contrary, they will be aided when confronted with their lacks; they will be listened to in regads to what they want to learn.

From these reflections, we can see how psychoanalysis moves more onto the field of ethics and interpretation, onto the challenge of thinking about the human condition and otherness (FÜRST, 2003). The possibility of learning happens when both subjects are involved in this transferential relationship. Thus, the teacher cannot wish for the student, just as the student cannot wish for the teacher, as well as the assistant cannot wish to learn for the child who visits the observatory. Only when the teacher captivates the student can knowledge become meaningful.

DISCOURSE IN LACAN: social relations as a wordless structure

We used discourse analysis based on what we understand by language, discourse and transference in Lacanian theory. Language is an independent system that binds people together. In addition to being an instrument of human control, it is the structuring of social ties. On the other hand, discourse is a wordless mode of social engagement (VILLANI AND BAROLLI, 2006). In Lacanian theory, discourses are ways of using language as a social link, building on the *signified* part of the sign that produces the discourse. As discorses are unconscious and wordless, the signifiers in them represent sound, since language is composed of sounds. When these signifiers are articulated, they produce what Lacan calls meaning (VILLANI, BAROLLI, 2006; COELHO, 2006).

Accordingly, the discourse materializes in social relations that create social bonds through the structuring of language. We started from this assumption using the metaphor of Lacan's theory of four unconscious discourses proposed by Villani and Barolli (2006), which helped us to interpret the discourse and attain, even partially, the understanding of the transference relationship between teacher assistants and children. This is an analytical device with some discursive categories, which allows us to interpret speeches in different discourses.

On social bonds, structured by language and constitutive of a new social relation (the discourse), Lacan elaborated four discourses, according to Villani and Barolli (2006). At first, they refer to the unconscious, which only happens through articulation between signifiers. These elements, explain the authors, are demarcated as places from Lacan's understanding and are illustrated below:

Figure 1. Lacanian structure of discourse
Source: authors

The agent is the one who addresses the other, producing a discourse through intervention, be it a question, suggestion, order or even silence. It is the agent who sets the tone for the discourse and creates social bonds, enabling otherness. This discursive production through intervention implicitly creates a demand that does not happen fully, but that consolidates through the discourse and in how the agent relates to the other. In this sense, the other is to whom the agent addresses the discourse and who needs the agent to develop. Production is the discourse's effect, it is what is left over, it is a place occupied by what is produced by the other when complying to the agent's discourse, taking forms, which involves losses, gains, depending on the subject's satisfaction. Finally, the truth is what sustains the discourse, which supports the agent, however, it is always half done, since the truth cannot be fully told (COELHO, 2006; VILLANI, BAROLLI, 2006).

To occupy these places, Lacan defines representatives or – in linguistic terms – signifiers (VILLANI, BAROLLI, 2006), configuring the four discourses of the unconscious: the Master's, the University's, the Hysteric's and the Analyst's. In the first, that of the master is the position of wholeness, when in the relationship the discourse operates a displacement of the satisfaction of the other and can generate a new knowledge. In this discourse, the agent would be the teacher assistant, and the other, the child, and this relationship happens in the other three discourses as well. When accepting the bond proposed by the agent (the assistant), the child understands that this knowledge is satisfactory. It is a very seductive discourse that guarantees a certain effectiveness of the product, proposing some form of wholeness to the child, to the student who owns this knowledge. It is as if the other took advantage of this act of submission.

In the second, the discourse becomes a dogma. The Institution's discourse ignores the previous knowledge of the other when showing what the student lacks, and it can produce courage, leading to more efforts. This constant lack causes stress the other, in a way that students are always wanting to know more. It is in facing their alienation that the other can "wake up" from their illusions of knowledge, confronting their own ignorance in relation to the knowledge that they want (VILLANI, BAROLLI, 2006). This is the discourse of the division, there are no loopholes, the other is never in a position to assume the position of dogma that the agent offers to them. See the structure below:

$$\frac{\text{Teacher/assistant}}{\text{dogmatic science (astronomy)}} \qquad \frac{\text{child}}{\text{alienated subject}}$$

The third discourse, that of the hysterical, represents the discourse of dissatisfaction, which is typical of the sciences. In this, the agent is responsible for questioning the other, who considered themselves full of their knowledge, challenging them to go beyond that knowledge they already possess, being able to produce new knowledge or re-signify the existing ones. The bond that the "[...] teacher seeks to establish with the student is constituted through the possibility of the subject taking pleasure in perceiving the incompleteness of their knowledge and, at the same time, going beyond the knowledge with which they are satisfied" (VILLANI , BAROLLI, 2006, p. 168). Finally, the last speech, that of the analyst, assumes that the other finds autonomy in the search for knowledge. Here the level of demand is different, since the agent demands from the other the same thing that they demand from themselves.

As in the structure exemplified above, the teacher assistants are always agents, who demand something from the other – the children. In this attempt to understand and establish a bond between assistants and children, the result of this investigation can produce different situations, either knowledge, a sense of importance or dominance or a complaint from one of the parties. Finally, in order to assess at least in part what was produced from these bonds, or from this transferential relation, we used Lacan's four discourses, which take turns in those four places mentioned above.

The position of the teacher assistants in reelation with scientific or didactic-pedagogical knowledge depends on the relationship established with the children. They can use any of the discourses, but discourses are only legitimate when the other is also creating bonds using the same discourse as the agent. This is how the bond between the subjects occur on a subject level, not on the unconscious. Therefore, it is necessary for educators to slide between these discourses "[...] in order to make the most of the relationships established by the subjects in favor of meaningful learning, which is certainly beyond their control, and, therefore, it is not something that can be included in a prescription" (LOPES, 2012, p. 120). This statement is necessary to understand that, during the analysis, this change from one discourse to another was very common, as it is part of the relationship between the subjects.

METHODOLOGICAL OUTLINES

We decided to use a qualitative approach in this study for its applicability in the analysis of social relations, due to the pluralization of life worlds, and given that it is essential to analyze subjective meanings of everyday life. We employed the idea of movement to counter illusory aspects of objectivist theories as we analyzed the individuals who spoke at the astronomical observatories. Thus, this approach allows us to understand both places and individuals, in the light of the theory that undergirds this study.

The very idea of science changes when we do qualitative research. As Ludke and André (1986) note, it is a social phenomenon in which the data speaks for iself, since knowledge and individuals are marked by signs of time and history, and the ideas become not so clear, casting dubiousness on both objective and subjective issues. Thus, objects "[...] are not reduced to simple variables, but are represented in their entirety, within their everyday contexts. Therefore, the fields of study are not artificial situations created in the laboratory, but practices and interactions of subjects in everyday life" (FICK, 2009, p. 24).

Due to the scope of astronomy education, the locus of study was the Didactic Observatory of Astronomy, "Lionel José Andriatto" at Unesp in Bauru, São Paulo, Brazil. This is a place that falls into the category of non-formal education (LANGHI, NARDI , 2012; MARANDINO, et al. 2004). As pointed out, our discourse analysis focused on the transferential relationship between the subjects. The speaking subjects of this research are children in early childhood education that visited the observatory, as well as the teacher assistants who guided the visit. Data collection was made through observation, using audiovisual recording and records in a field diary, later transcribed, so this study is based on qualitative fieldwork (FLICK, 2009; LUDKE; ANDRÉ, 1986).

In total, there were two days of observation, May 10 and 13, 2019, but for this article we analyzed the first of them. The research subjects were 22 children (thirteen boys and nine girls) in kindergarten, between four and five years old from a public school in Bauru (SP). There were seven teaching assistants working in the service of this school, however, two specifically in the mediation that this study focuses on: Selene and Mercurius.[9] Selene is a science disseminator, artist and holds a licentiate in biology. Passionate about the Moon and the mythology around it, she is one of the teaching assistants who has been working at the observatory for the longest time. As for Mercúrio, she is a journalist, and has worked at the observatory for three years. She has a strong interest in the fields of education and science dissemination, always "pushing" knowledge such as the story behind the planet that served as messenger of the gods. The observatory currently employs volunteers from the most varied fields: physics, pedagogy, biology, journalism, mathematics, psychology, chemistry, among others, which reiterates the interdisciplinarity of astronomy (ODA, 2019).

Upon arriving at the observatory, the children went through three moments of mediation along with the teaching assistants. First, in the projection room, called Antares, Selene sat on the floor with the children in a semicircle and had a conversation while projecting the Stellarium software. In the second and third moments, after the break, they went to the ground floor and the dome, respectively, with Mercury, as summarized in Table 1.

Moment I	Conversation using the Stellarium. [10] (35 minutes)
Moment II	Conversation at the dome of the observatory, using books, globes, telescopes, among other devices. (24 minutes)
Moment III	Solar observation using specific sunglasses on the ground floor next to the dome. (15 minutes)

Figure 2. The three moments of the visit
Source: LIMA, (2020).

We chose some parts of the audio and video recordings of the three moments and related them to each of the four speeches: the master, the institution, the hysteric and the analyst, which, as we will see below,

were not found. Next, we continue with the analyzes based on Lacan's theory of four discourses previously presented and with the possible visibility of transferential relationships between the assistants and children at the astronomical observatory.

AGAINST THE GRAIN OF THEORY: transference and the four discourses

Bearing in mind that we propose an analysis based on Lacan's theory of four discourses, we begin our analytical investigations. The discourses defined by Lacan provide clues as to what the assistants reveal beyond their conscious discourse and how children relate to them in the relationship of learning. The excerpts of the discourses were selected according to their association with one or more of Lacan's four discourses explained above.

During the mediation at the observatory, both assistants started with questions to break the ice with the children, and, in a way, to draw inferences about what they already knew about astronomy: *"Selene: could you tell me what you already know about the sky? To anyone who wants to say something, please raise your hand and tell me what you're studying, but you gotta tell me! [children raise their hands excitedly]. Calm down! One at a time!".*

Selene's initial question to the children causes them to raise their hands quickly and get very curious. Here, mutual investment between them begins to develop, enabling and encouraging children to speak. For Kehl (2002), this possibility of "letting them talk" is the cornerstone of psychoanalysis, which makes it possible to find uncertainties and give the benefit of the doubt, facilitating the learning relationship, because, when adhering to the request of the teacher assistant to answering questions, they both take on the hysteric's discourse. Children see the assistant as someone who knows, to whom they agree do submit for questioning, making it possible to learn something new. This is what Lacan calls the function of love, produced in the transferential relationship between the subjects (PORGE, 1996). This invitation to speak is a transformative discourse, as it allows speaking in a place of silence. By allowing children to speak, getting aware of their curiosities about the cosmos, the teaching assistant makes them part of that place and, as such, allowed to talk and question about it.

In the excerpt below, Selene, together with the children and using Stellarium as a mediation, realizes that they could not recognize stars as round. Hence the Sun was also not considered a star, which is common, as they tend to depict stars as polygons. This kind of misconception show the importance of astronomical literacy, in which the child should not memorize concepts mechanically, but relate them to their surroundings through imagination and creativity, drawings and games, as well as photos, observations and contact with nature.

> *Selene: Our Sun is actually white and a little yellow. But it shines white light. We can see it, but we draw it yellow, don't we?*
>
> *Children: Yes.*
>
> *Child a: I know how to draw a square house ... (but you got to make the sun on top, right? – asks the monitor) but I also know how to draw a sun.*
>
> *Selene: (Oh, so you know!) But people, what is the sun?*
>
> *Child b: Something that brings light.*
>
> *Selene: Exactly, that emits light, but do you think the sun is a star? Children: No! (in chorus).*
>
> *Selene: But why don't you think it's a star?*
>
> *Children: Because it's round... (but aren't stars round, asks the monitor) no, it's a little ball.*
>
> *Selene: What's a little ball? (the sun, the children answer) Aren't stars little balls? (no)... is it really that? (yes).*
>
> *Child c: And it has one more point (proceeds to draw the sun with spikes).*
>
> *Selene: Do stars have points? Or are them like balls? [...].*

Children were quite immersed in the conversation until the assistant seemed to speak as an agent of knowledge, estabilishing a master's discourse, leaving the children a little confused, because, when explaining the reason for the colors, some children seemed to lose interest and focus on the "draw" part of the previous excerpt. In this sense, Selene tried to resume this relation with the drawings: *"[...] you told me that stars weren't round and how you draw them (the kids draw a five-point star in the air), with the spikies, right? But there are no spikes! Child f: But I draw like this (draws with points) [...]".* This shows the difficulty of breaking with pre-established knowledge.

Villani (1999) shed light on the difficulty of keeping up children's attention to complex or systematized concepts of everyday life, because, after all, stars have points because they see them like this every day, in drawings, books and at school... So, how to break with such an important and habitual symbol for the children? In order to learn something that we do not know, we need to recognize that we do not know. Thus, when showing that there could be a star other than the one with the points, the teacher assistant begins a process of movement in the child's knowledge filter, proposing a new approach to what was usual to them.

In this search for bringing the notion of the Sun as a round star into being, there is a movement between discourses, namely, the hysteric's, the institution's and the master's. The teacher assistant realized that she had not been able to reach the children, so she decided to use a different approach (which at that moment tended towards the discourse of the hysteric, as she attempted to confront children with new knowledge). She used the sky as a basis for questioning, projecting Stellarium onto the screen:

> *Selene: Look, let's do something really cool here, let's erase the sky and the night. What is in the sky at night? (the moon, clouds, stars – children answered) the moon, stars... right? So let's do something, let's erase the sun.*
>
> *Child a: There are birds too.*
>
> *Selene: There are birds! (At that moment the screen changed as the assistant removed the atmosphere in Stelarium... The kids were visibly impressed, astonished and touched). Here is the sun, but it's as if it didn't shine. Look at this star, here's a great big star in the sky.*
>
> *Child d: Shooting star!*
>
> *Selene: Is this a shooting star? I don't think so!*
>
> *Child e: It died there and became a star.*
>
> *Selene: Yeah, it became a little star. (Children started talking at once).*

At the end of the conversation, movements between discourses are remarkable, and end up flowing and assuming, in this case, a form of the Institution's discourse, reflecting a systematized knowledge, of the "clear ideas", when the assistant states, categorically: "so although our eyes see stars twinkling, they are round." At that moment, she tried to make it clear that stars are indeed round by explaining with the example of the distance between them:

> *Selene: kids, this star is called Capella, isn't it round, isn't it a ball? (yeah...) and now? you told me that stars weren't round and how you draw the stars (the kids draw five-point stars in the air) with the spikies, right? But there are no spikes in them.*
>
> *Child f: But I do draw them like this, (draws with points).*
>
> *Selene: so, but we see the points because of our eye, but the stars are round. And look how cool, our sun is also a star, but why do we see it huge and stars tiny?*
>
> *Child g: because they're in space and our sun is in the sky.*

The master's discourse, like the institution's, is authoritarian and represents a position of knowing everything, however, it tries to capture the other so that it acts according to the interests of the master. In the previous dialogue, it is evident how this is not always possible, as it is difficult to lure the other into the discou-

rse. However, we noticed how children participate in what the teacher assistants were saying when answering their questions about the size of the Sun: *"[...] why do we see it [the sun] huge and the stars tiny? Child g: because they're in space and our sun is in the sky".* This child's level of abstraction is remarkable. In an attempt to show Selene that the Sun and the stars are in different places, the child shows that she learned from what she observed, using an Aristotelian view of the universe. However, what is evidenced in this statement is to what extent all Selene's previous attempts to make children participate in that discussion really managed to bring them together. These are examples of the hysteric's discourse, or to enable children to confront their knowledge and to exercise their understanding of the world, exploring other visions and possibilities of knowledge.

The following is an example of the institution's discourse: *"Selene: What else do you know about planets? (Neptune, the children answer) ... Neptune, ok, let's see one closer, do you know the order of the planets? (yes) Look, the closest to the sun is Mercury, what next? (Venus)".*[11] Selene makes a problem about the order of the planets in the Solar System, however, even though children randomly mention several names of planets, she demands them delimited order, reproducing an institutionalized discourse, a dogma, that is, the answer would only be valid if it were in the "correct" order of the planets in relation to the sun, revealing bookish and prescriptive postulations, typical of textbooks.

This alienation that emerges from questioning about a correct "order" not only drives children away from what they had already linked to the topic, but also negatively affects the possibility of learning something new. Children's desire to speak and learn is extinguished, as rules for answering are strict. Under this institution's discourse, children will never be able to find the desired answer. Even though Venus seemed to come up in the order of the Solar System, our video recordings confirmed that children spoke at random. The names of the planets were not yet understood as a sequence, but as a simple name. Why is the order of the planets so important? Do children really know what a planet is? The institution's discourse became clear with its Cartesian "clear ideas", in which concepts are just thrown at the children and, for this reason, do not provide conditions for deepening or assimilation.

Next, at the observatory, the children stepped up to the summit where assistant Mercúrio waited for them: *"... we're going to talk a little bit with you about our universe, ok? (Holding a globe in her hand). Do you know what this is? (The planet earth, the children answer) the planet earth, we live her, right? Where do we live? (Brazil) Brazil? Do you know where Brazil is?"* She then proceeded to carry on with the mediation by making questions about the children's surroundings, going from the most abstract place, the planet Earth, to getting closer to finding Brazil.

> *Mercury: And now let's imagine, can we travel there to the sun? (yes) Can we? (yes) Isn' it too hot? (The sun is not hot, a child replies) ... Isn't the sun hot? (No, yes). So, if we get much closer, won't it be hotter? (yes) Then isn't it dangerous to go there? (Children are confused about what to answer). It's very hot here, right? So we can't travel there.*
>
> *Child a: you get all sweat.*
>
> *Mercury: Yep, you sweat and burn, it is dangerous. But let's imagine a space trip..*

During this conversation, she keeps on talking about the sun and we realized how much the children were not yet comfortable with the new knowledge about the stars, because they had already talked before and still had great difficulty in relating the subjects. It seemed that both assistants end up not addressing some specific aspects of stars to facilitate the children's understanding. Perhaps a clearer approach would have been to give characteristics of the star, as it happened at first, in a way to enrich this encounter with a different knowledge, allowing children to confront their own with a new one. The mediation of this second part was shorter and even with a lot of subjects addressed,

This second part of the mediation was shorter, but addressed a lot of subjects, and the children already showed signs of exhaustion, as they were often sitting around. Many materials such as books, globes, telescopes were used in mediation, however, we noticed that Mercury was more into long talks than into interacting with the children.

When Mercury invites the children to look inside the telescope, they are excited and curious. They do not understand very well what is happening witih that tube with a mirror at the bottom. Mediation with the telescope can be seen as the hysteric's discourse, as the assistant managed to somehow create a way to make children feel challenged in relation to new knowledge. However, without much conversation, the children simply understand that they are seeing their own heads magnified by the telescope's mirror.

> *Mercury: I'm going to point this one somewhere, showing the telescope ... (The children begin to examine the inside of the telescope). Can you see? What are you seeing? A ball, can't you see their face? What else are you seeing there beyond... What can you see? A ball ... (me) You know. And the rounded shape of the first eyepiece ... (after the kids looked inside the telescope) Hey kids, here where you looked is where we pointed the telescope to... so we can see some of the things that are in space, like stars, the moon.... It is from where we receive light.*
>
> *Class teacher: so what did she called it? Teles.... (children answer: telescope). What can you see through it? ("a ball", they replied)... a single ball? Look, she said that it is called telescope and we can see what is in the sky with it, right?*
>
> *Mercury a: (showing the telescope) There is where we point to at night. What do you think that you can see at night?*
>
> *Children: (respond quickly) the moon.*

The class teacher tries to capture children's interest by explaining that what they have just seen is a telescope and that they could observe the sky with it. The mediation by the assistant tends more to the institution's discourse, as children seem to be alienated from this new knowledge, unable to creat a bond. As they respond randomly, they appeal to the common sense in relating the Moon to the night. At the end, they confirm, with the help of the teacher, that it was a telescope, and the conversation ends as in the following excerpt:

> *Mercury: This is where we put our eye when we want to observe. So we will receive the light from up here. You remember that one of you said that you saw their faces, right, there beyond. (yeah). Let's think about what we look at to see our face. (in the mirror). Right, in a mirror, but the one that is there is not straight like the one we have at home, it is deep, curved, beautiful, so we can observe. Then it will reflect the image to a smaller mirror that is right here, and that's why we can look here and see. The mirror is big and I asked you if you could see a big or a small face... it's big, isn't it? (yeah). The objects in space are very, very far away, so you need to have a mirror that enlarges the image, so we can see in more detail. Okay, did you understand?*
>
> *Teacher: So what do you call it? (a telescope, children answered).*

The last moment of the visit refers to solar observation by the children, using appropriate glasses. However, the sun was already going down and due to the location of the observatory, the last children had difficulty to make the observation.

Our analysis reveals how often children are asked questions, but their answers, sometimes automatic, represent empty words, and are used only to meet adults' expectations. Even when the assistants use the Master's and especially the Institution's discourse when talking about astronomy, which most of the time sound cruel and authoritative, they are trying to teach something. However, they do not open possibilities for the other to also meet this new knowledge, often resulting in boring talks. As an example, Selene wanted children to recognize the sun and stars with the same characteristics, although they appear to be different. She started with a question about the children's knowledge on this topic and involved the children in the discussions, unlike the conversation about the planets, which is dominated by convenient answers. Then when Mercurio returns to the trip to the Sun, she finds no support in the children's knowledge, making it a random conversation.

The transference relationship had been established during the first exchanges between Selene and the children, because by inviting the children to speak, a bond was created. Because they are in this relationship,

it was very common for children to agree with those who worked in the mediation, even though they did not know what was being said, or were unable to connect to the assistants' discourses. The children were already used to giving immediate answers to certain questions, clearly aligned with the institution' discourse.

We should note that we do not intend to criticize the assistant's mediation by highlighting real scientific explanations, as we all as teachers do it quite frequently. Teachers demand knowledge daily in the classroom, as well as assign a grade at the end of each school term, but have the children really learned anything at all with this? When we insist on a prescriptive discourse, the meaning of what is said does create bonds, as it does not reach the other and cannot be effectively heard: "In this case the teacher speaks as one who knows everything about scientific knowledge, leaving the idea that this knowledge works for them, working effectively in any situation and providing them with satisfaction, since it resolves any conflict [...]"(VILLANI; BAROLLI, 2006, p. 162).

Therefore, psychoanalytic theory serves as a critique of Cartesianism, innovating by understanding the subject in history, investing in them with discourse, alterity and transference. On transference, Villani (1999) explains the difficulty of conducting it. When children refuse new knowledge, they accept that they will not be fully satisfied, so mediation is necessary for grasping this new knowledge. In science education, children already know things due to their interaction with the world, but "[...] they realize that on certain occasions they are insufficient, and that is why they would like to acquire new knowledge, more suitable for solving certain problems [...]" (VILLANI, 1999, p. 130). In this way, the author shows how teaching assistants play a central role in filtering knowledge, as:

> [...] they select the appropriate knowledge and information for the subject, they constitute what must be changed for mastering something new. The subject needs help. However, help is not always immediate, as the same filter that rejects new knowledge will try to reject help as well. It seems like an impossible mission, because no one can learn in the other's place. Only someone who has been through something similar will be able to provide help to overcome the issue (idem).

In this sense, we emphasize the importance of mediating astronomy is a way to raise scientifically literate children without demanding so much of them with systematically or mechanically memorized knowledge, but bearing in mind that they should not be left alone to understand their surroundings. A key aim of this study is to seek a fair way, among discourses and mediations, in which transferential relations occur more fluidly so that scientific literacy can march forward (LIMA, 2020). For this reason, "[...] *Insignare*[12] means 'to put in signs', which requires a conscious and deliberate intention in order signify a certain meaning [...]" (VOLTOLINI, 2011, p. 35-36).

In this search for meaning, this educational adventure is doomed to cause disappointment due to lack of knowledge, hence the desire to learn something new. In the end, what was expected was to know something without full control over it, as knowledge is ultimately uncontrollable. So how does this reinterpretation of knowledge happen? It happens thanks to "transference", an unconscious process that makes "[...] a given person work, for us, more in accordance with an assumption that we have of them than with their real acts or inclinations [...]" (VOLTOLINI, 2011, p. 33).

The words served as the foundation for our understanding of the transference relationships that take place at the astronomical observatory. The hysteric's discourse was predominant, as long as both the assistants and children were interested in participating in scientific culture. Their discoursive relation revealed that this mutual occupation resulted in an anxious discourse. Dissatisfaction prevailed, even though children's demands not always matched that of the assistants, because they wanted to talk about drawings, animals, rockets, and the teachers demanded scientific knowledge, which is most aligned to the master's discourse. They created a bond, and when there is a bond, there is a transferential relation.

Using Lacan's four discourses in our final analyses made it possible to find traces of transferential engagement between the subjects. These findings allow us to define at least three approaches that outline the

demands of children and assistants. First, we have the Authority Approach, paving the way for a more Cartesian, dogmatic relationship, and promoting literacy through the "clear ideas" of science, constantly demanding answers from children. Second, there is the Excitability Approach, which relies on the hysteric's discourse, with a more meaningful transference, grouping children together under the rhetoric of astronomy, exciting and urging them to seek knowledge, proposing questions and encouraging their participation. The third is the Alterity Approach, which describes a relationship more concerned with the construction of knowledge in the other, as when the assistants invested more in encouraging children to speak, enabling a scientific literacy that considers alterity.

AUTHORITY APPROACH	EXCITABILITY APPROACH	ALTERITY APPROACH
• Cartesian, dogmatic relationship; • literacy through the "clear ideas" of science; • demanding imediate answers from children.	• more meaningful transference; • the assistants encouraged children to seek knowledge using unusual methodologies; • the assistants confronted children's knowledge (using filters of knowledge); • encouraging children's participation.	• a relationship more concerned with the construction of knowledge in the other; • istants invested more in encouraging children to speak; • scientific literacy that considers alterity; • using ludic techniques as a means to reach children, paving the way for knowledge.

Figure 3. The three approaches to the transferential discursive relationship between assistants and children at the observatory

Source: LIMA, (2020).

The teaching assistants worked both for recognizing their own limits and making movements in a constant search for knowledge. In transferential pedagogical relations, teachers must be interested in the changing process of students' work, so that these can not only face their difficulties as disappointments, but also experience new problems. The basis of teaching is precisely in this confrontation with knowledge, with its flaws, allowing the student to make more "discoveries" in this process of rethinking their own knowledge.

As we realized during the analysis, to educate is to rely on words as a means to mediate and invest on knowledge. By investing in the children's possibility of speaking, and by listening to the other's discourse, the teaching assistants made Astronomy make some sense at the observatory. Analogous to the psychoanalyst/analysand relationship, the teacher/student, or the assistant/child, the psychoanalytic action at the observatory – grounded on words, otherness and transferential relations – is essential for transcending the idea of a prescriptive environment and for using exchanges and social bonds as possibilities to learn.

FINAL REMARKS

Psychoanalysis proved to be an important analytical reference for thinking about the relations between the subjects at the astronomical observatory. At the same time, it supported scientific literacy, which is a crucial demand in places of education and for dissemination of astronomy. In the field of transferential discourses, as we faced them, we realized that it was crucial to look at otherness, as it is so fundamental to human relations, instead of falling into scripts on how to deal with certain subjects, because, after all, there is no ready prescription for teaching children astronomy.

AAs we used Lacan's theory of four discourses to create an analysis that considered the movements in the learning process, our approach is based on a parallel between: i) denial of psychic disorders, establishment of imaginary transference, switch to symbolic transference, separation ii) refusal of new knowledge, passive demands, active learning and independent searching. In this parallelism, managing transferences through discourses is what allows for moving from one to another. Thus, the Master's Discourse played a vital role against denials and refusals, and for moving towards passive demands. On the other hand, the University's Discourse was important to validate the relation with knowledge. In the same way, the Hysteric's Discourse was essential for promoting active learning, and, finally, the Analyst's Discourse introduced and encouraged independent searching for knowledge, which, as we noted, has not been the case.

We proposed different ways of using Lacan's discourses to interpret relations between teaching assistants and children in early childhood education. The effect of transference on children depended fundamentally on the articulation between the discourses so as not to lose the bond with them. There is no dominant discourse that can guarantee this bond; what matters is the presence of interventions that prevent meaningless discourses, for which the assistants were responsible. When the Hysteric's discourse is not supported by a corresponding Institution's or Master's discourse, which provide information to be assimilated, the interaction becomes pointless. In this sense, the institution's discourse should be interrupted to allow children to achieve effective participation, so that results remain consistent.

The results also revealed the need to invest in teacher training in its entirety, in a way that teaching assistants can use discourses for better recognizing the other's demands. It does not need to be perfect, because education is an impossible profession, which includes teaching and dissemination of astronomy. Not only the children, but also the teaching assistants need to deal with failings and recognize that accessing the other's world is not yet well understood. Although the training program tries to address this field, it involves subjective issues, especially in the context of education. language and otherness. Training teaching assistants is still recent and requires more research. Therefore, this paper not only explores ways to teach children something new, but also takes us back to the original question: are we really listening to the demands of those who visit astronomical observatories?

After all, children who try to look beyond what the eyes can see, with respect and imagination, just like astronomy, understand our existence and its failings, through which we can reclaim our humanity. Perhaps the most remarkable characteristic of this knowledge is that it enables us to admire the world, to get fascinated with the grandeur and delicacy with which light get to us. If everything were so easily visible, curiosity would not be so vibrant.

Pointing to the sky and showing children that all that belongs to everyday life, not only affecting seasons and tides, causing day and night, but also having a profound ontological impact on us. This proves that we can initiate children in scientific culture from an early age. And that happens when we encourage speaking and reasoning in these places for education and dissemination of astronomy. The movement of words through senses is the same movement for teaching children astronomy, and this is constantly changing.

REFERENCES

Baremblitt, G. F. *Cinco Lições sobre a transferência.* 4. ed. Belo Horizonte: Editora FGB/IFG, 2013.

Birman, J. *Psicanálise, Ciência e Cultura.* Rio de Janeiro: Jorge Zahar, 1987.

Coelho, C. M. S. Psicanálise e laço social-uma leitura do Seminário 17. *Mental*, v. 4, n. 6, p. 107-121, 2006. Disponível em: <http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S167944272006000100009>. Acesso em: 31 jan. 2020.

Flick, U. *Introdução à pesquisa qualitativa.* Tradução: Joice Elias Costa. 3. ed. Porto Alegre: Artmed, 2009.

Fürst, R. 2003. *A ética na educação:* uma perspectiva psicanalítica. (Dissertação de Mestrado em Educação). Faculdade de Educação, UFRGS, Porto Alegre. Disponível em: <https://lume.ufrgs.br/handle/10183/2560>. Acesso em: 30 jan. 2020.

Iachel, G. 2013. *Os caminhos da formação de professores e da pesquisa em ensino de Astronomia.* (Tese de Doutorado em Educação para a Ciência). Faculdade de Ciências, UNESP, Bauru. Disponível em: <https://repositorio.unesp.br/handle/11449/102005>. Acesso em: 30 jan. 2020.

Langhi, R., & Nardi, R. *Educação em astronomia:* repensando a formação de professores. (Educação para a Ciência:11), São Paulo: Escrituras Editora, 2012.

Langhi, R. 2009. *Astronomia nos anos iniciais do ensino fundamental:* repensando a formação de professores. (Tese de Doutorado em Educação para a Ciência). Faculdade de Ciências, UNESP, Bauru. Disponível em: <https://repositorio.unesp.br/handle/11449/101991>. Acesso em: 31 jan. 2020.

Lima, G. K. 2020. *Discursos na Relação Transferencial monitor/criança em um observatório astronômico.* Dissertação de Mestrado em Educação para a Ciência). Universidade Estadual Paulista (UNESP), Faculdade de Ciências, Bauru, São Paulo.

Lopes, A. M. 2012. *Professores de física:* práticas e subjetividades no processo de ensinar. (Dissertação de Mestrado em Educação). Faculdade de Educação, UNICAMP, Campinas. Disponível em: <http://repositorio.unicamp.br/jspui/handle/REPOSIP/250891>. Acesso em: 20 ago. 2018.

Ludke, M., & André, M. E. D. A. *Pesquisa em educação:* abordagens qualitativas. São Paulo: EPU, 1986.

Marandino, M. et al. A educação não formal e a divulgação científica: o que pensa quem faz? *In: ENCONTRO NACIONAL DE PESQUISA EM ENSINO DE CIÊNCIAS*, 4., 2004, Bauru. Atas... São Paulo: ABRAPEC, 2004. Disponível em: <http://www.fep.if.usp.br/~profis/arquivos/ivenpec/Arquivos/Orais/ORAL009.pdf>. Acesso em: 31 jan. 2020.

Millot, C. *Freud Antipedagogo*. Rio de Janeiro: Jorge Zahar, 1987.

Oda, Observatório Didático de Astronomia. *Manual da equipe.* Bauru, 2019.

Porge, É. Transferência. *In: Dicionário enciclopédico de psicanálise:* o legado de Freud e Lacan. Ed. Pierre Kaufrnann, Trad. Vera Ribeiro. Maria Luiza X. de A. Borges, Cons. Marco Antonio Coutinho Jorge. Rio de Janeiro: Jorge Zahar, 1996.

Villani, A. Psicanálise e educação: tarefas" intrigantes"? *Estilos da Clínica*, v. 4, n. 6, p. 126-137, 1999. Disponível em: <http://pepsic.bvsalud.org/scielo.php?script=sci_arttext&pid=S1415-71281999000100013>. Acesso em: 31 jan. 2020.

Villani, A., & Barolli, E. Os discursos do professor e o ensino de Ciências. *Pro-Posições*, v. 17, n. 1, p. 155-175, 2006. Disponível em: <https://www.fe.unicamp.br/pf-fe/publicacao/2351/49_dossie_villania_etal.pdf>. Acesso em: 31 jan. 2020.

Voltolini, R. *Educação e psicanálise.* Rio de Janeiro: Zahar, 2011.

NOTES

1 Part of the research was presented at the III SiPEC (acronym in Portuguese for Symposium for Research on Science Education) (LIMA, LANGHI, 2021, in press).

2 We chose to use this term in our article to get a wider picture of the relations of teaching and all the complexity that involves non-formal education. That is why we expanded the idea of "teaching assistants" for students, teachers and researchers who get involved in the educational process in spaces of teaching and dissemination of science, making them part of the team.

3 Research funded by CAPES.

4 We use Lacan's understanding of demand, lack and desire. Demand is the result of language acquisition on physical needs, which are articulated through signifiers (sounds) to be expressed. In other words, children need to know how to express themselves, in this case to the assistants, who need to understand what they are demanding from the children.

5 We found five studies on this subject published from 2011 to 2018 for the National Symposia on Astronomy Education, the most important national event on this subject in Brazil. For more information, see Lima (2000).

6 Desire is understood here as the force that takes shape in the subject through language and signs (BAREMBLITT, 2013).

7 Freud asserts that government, education and analysis constitute three "impossible" professions, as they rely on words to reach the other and entail a tug of war between "conscious self" and "unconscious drives" (MILLOT, 1987).

8 In Lacanian theory, this love in transference confirms a bond between the desire of the analyst with the desire to analyze. This would be the love as we imagine for Lacan, the current love that enables transference. (PORGE, 1996).

9 It is worth mentioning that the identity of all research participants will remain anonymous, as we used fictitious names for refering to them (Lima, 2020). The research project was verified by Brazilian National Research Ethics Committee, and is known by protocol number: 3,198,813.

10 Open-source free-software planetarium. Available at: http://stellarium.org/.

11 As previously mentioned (Lima, 2020), children were already enrolled in a project with students from the Institutional Program of Teaching Initiation Scholarships (PIBID), which involved the universe, but no specific knowledge on the planets had been addressed.

12 TN: Latin word that is the root of Ensinar ("to teach", in Portuguese).

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